

ZIPP MANUFACTURING

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# JAE GAS Outrigger V2

A Zippkits R/C Boat

## Building Instructions

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[www.zippkits.com](http://www.zippkits.com)

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The JAE outrigger was designed and developed as a result of a joint venture between IMPBA Hall of Fame member Rod Geraghty, along with David Hall, Ron Zaker Jr. & Martin Truex Jr.

The main difference between this hull and all the others is the use of sharp edges on the bottom of the sponsons and tub, as opposed to curved surfaces. This helps break any surface tension of the water and makes for a faster boat.

This design approach has been built, developed and tested a great deal.

This kit represents the latest gasoline version as of March 2012. The changes we made were many, yet the boat still looks almost exactly the same. Most of the changes were made so that the boat was easier to build, easier to setup, handled better, was faster and easier to repair. Many of the changes were a result of our experience, and some were the result of customer request.

All in all, this kit is the very best we can make it, thanks to you, our customer.

The kit is not hard to assemble, as all of the hard stuff has been done for you. That is no excuse to do a poor job with assembly. The better you build this boat, the better it will run. Often the difference between an excellent building job and a poor one is a simple sanding block.

A note about overhangs:

This boat is designed to shear water and prevent any capillary action of water. To do this the tub, ski and sponsons have rear overhangs. These shear the water off and must be left in place and not rounded in any way.

**Take the time to read this entire manual, so that you are familiar with all the building steps and their proper order. Take your time; make sure you understand everything before you do it and you will be rewarded with an impressive running hull...**

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.

***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.***

# Tools and supplies needed to build

- § Sanding blocks with 80 and 150 grit paper
- § 220, 400 and 600 grit paper
- § Drill with bits
- § Square
- § Flat file
- § FLAT Workbench
- § 1/2 ounce Medium CA glue and accelerator
- § Good quality 30 minute epoxy
- § Epoxy finishing resin
- § Spring clamps, paper clamps, c clamps, etc.
- § Weights or bricks
- § Razor blade or X-Acto knife
- § Masking tape
- § Waxed paper
- § Wood filler
- § Primer
- § Paint

# Additional items needed to complete

- § 23-36cc water cooled Gasoline engine with 5 inch mounts
- § .250 Collet for engine (Zipp 3446 for Zenoah, Sikk, RCMK)
- § .250 24 inch cable w/welded 1/4 stub shaft (Zipp 3444)
- § Header to fit engine (Zipp 2000 for side exhaust)
- § Exhaust flange (Zipp 2008)
- § Tuned pipe (Zipp 2011)
- § 2 channel surface radio with 2 servos (1 quarter scale servo)
- § Rudder pushrod (4-40 Size) (Zipp3463)
- § 4-40 ball link (Zipp 3457)
- § 4-40 solder clevis (Zipp 3455)
- § Throttle pushrod (2-56 size) (Zipp 3462)
- § 2-56 nylon clevis (Zipp 3459)
- § 3 pushrod seals (Zipp 3404)
- § 12-16 ounce Fuel Tank or IV bag (Zipp 3506 IV Bag)
- § .250 strut (Zipp 3496)
- § .250 drive dog (Zipp 3442)
- § Zipp 678 or ABC 2818/2 prop (starting point)
- § Prop nuts (Zipp 3450)
- § Cable grease
- § Rudder (Zipp 3414)
- § 36 inch length of 5/16 brass tubing (Zipp 3452)
- § 36 inch length of 5/32 brass tubing (Zipp 3510)

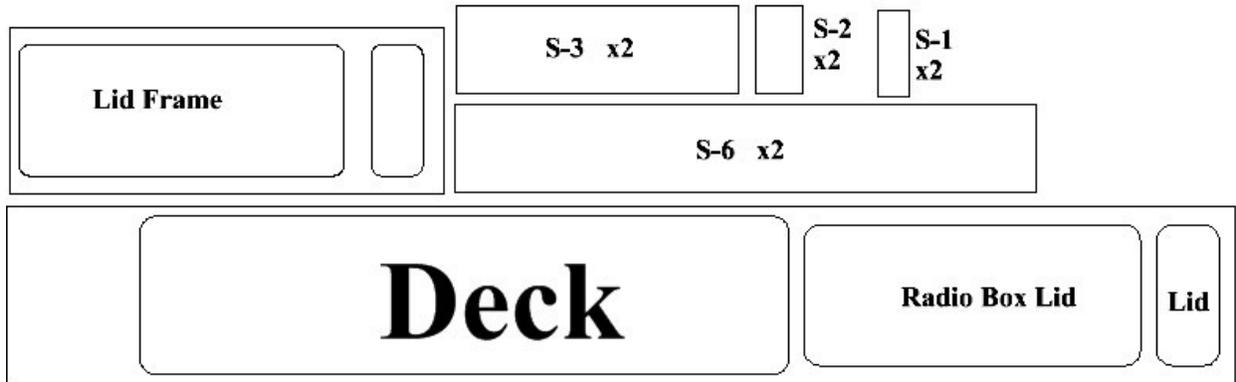
**All of the required hardware and accessories are available in a single Ultimate Hardware package as Zipp 3605-U.**

**This package contains everything except the bare engine and radio.**

Let's identify the parts so that we can easily find them when needed. Mark the parts that are inside other parts.

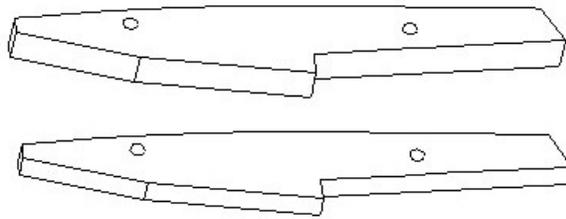
## 1/16 plywood parts:

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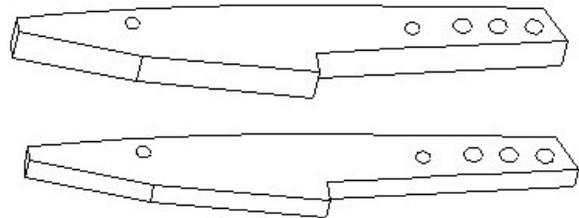


## Foam parts

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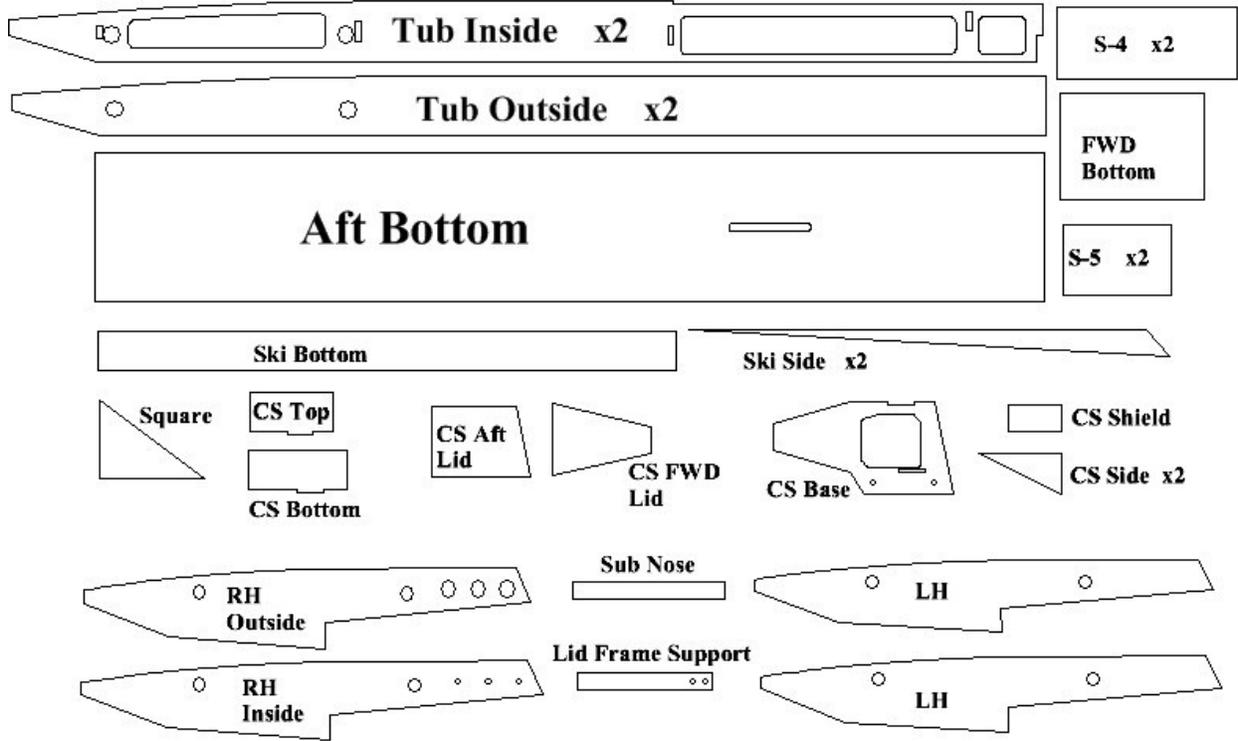


**Left Side**

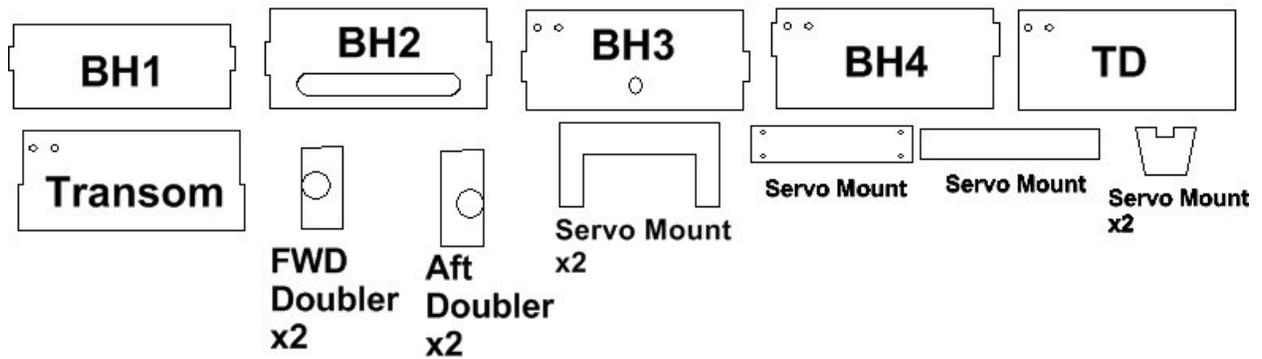


**Right Side**

# 1/8 plywood parts

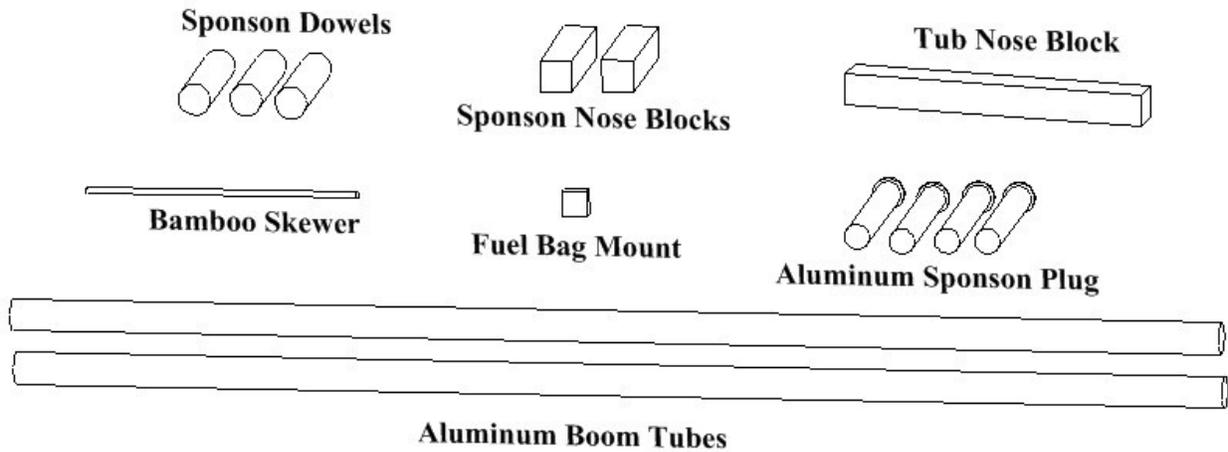


# 1/4 plywood parts



# Miscellaneous parts

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Do an inventory of all the parts, to be sure that everything is there. If anything is missing or damaged, contact us as soon as possible, so that we can get replacements to you quickly.

# Tub Jig

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We recommend that you make a jig for the tub.

This can be as simple as two straight pieces of  $\frac{1}{2}$  to  $\frac{3}{4}$  inch thick wood.

It can be as elaborate as 1/8 by 2 inch aluminum angle with adjustment slots for different tub widths.

Either way, you need something to clamp the tub sides to.  
Every critical component on this hull depends on a straight, square tub.  
Do whatever it takes to get it done correctly.



Tub sides marked before assembly.



Ledge for radio box lid frame.



Tub side shown with boom tube for alignment.

## Tub

Let's build the tub.

The tub sides are laminated from 2 pieces of 1/8 ply, so take your time and make sure you understand the tub assembly before you glue anything.

First, mark the insides of the inner tub right and left.

Make these marks in the front portion of the sides, where it won't be seen later.

The outer sides are the same, except that there are no lightening or bulkhead holes.

Notice the little "ledge" at the rear of the inner sides. This is for the radio box lid frame.

Use a file to touch up the inside corners on the tub sides, to square off the tiny radius left by the cutting bit.

Glue the inner sides to the outers, making sure that you have a **RIGHT** and a **LEFT** side (they are mirror images of each other).

Use the aluminum boom tubes to ensure perfect alignment of the inner and outer sides.

Try not to get any glue in the slots for the bulkheads.

Be sure that the rear of the sides are flush at the bottom, and have the 1/16 gap at the top.

Be sure to scrape any excess epoxy away from this corner, as the lid frame will be glued here later.

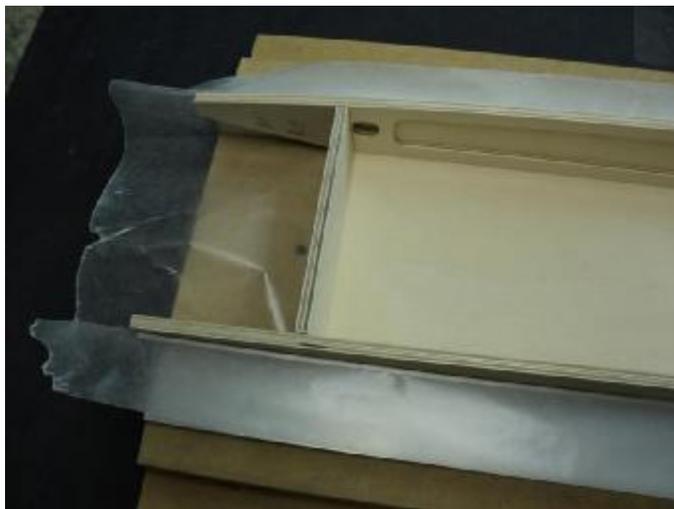
Check to make sure that the sides have not slipped out of alignment.

Allow to cure.

Check the fit of the bulkheads in the right tub side.



Tub sides glued to bulkheads.



Forward tub sides hanging past end of jig.



Tub with aft bottom in place.

Make sure that the rear 3 bulkheads have the 2 little holes on the right. These are for the brass cooling water tubes installed later.

Once you are happy with the fit of the bulkheads in the tub sides, glue them in with CA or epoxy. Use the square provided in the kit to ensure each bulkhead is perfectly square.

When cured, flip the tub over and lightly sand the bottom.

Now is the time to use your tub jig. If you don't have the ability to make an aluminum jig, use a pair of straight, thick wooden sticks. Leave these clamped to the sides while gluing the aft bottom in place.

Put a layer of waxed paper over the jig.

Put the tub aft bottom in the jig and set the tub onto it.

Fully clamp the tub sides to the jig. Check all around to make sure that the tub fits properly on the bottom sheet.

Remove the tub from the jig in preparation for gluing.

Using epoxy, glue the tub aft bottom in place. Make sure that the bottom extends to the front bulkhead. It should cover the full 1/4 inch bulkhead.

Leave the overhang at the rear of the tub. Do not sand this off.

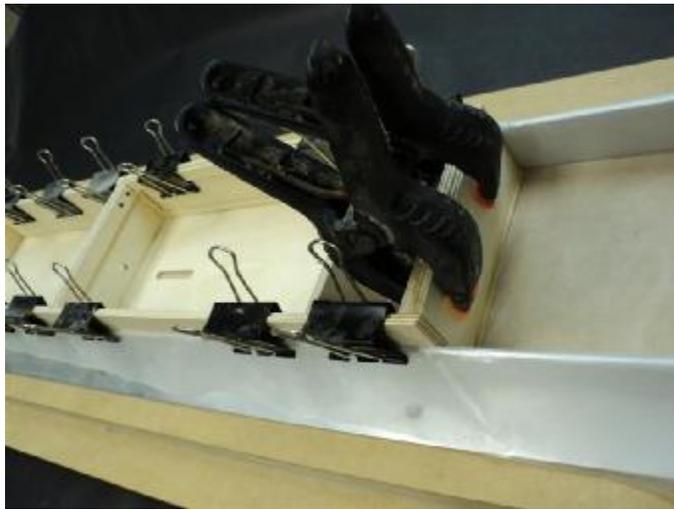
If you use anything other than aluminum angle, make sure that the bottom sheet doesn't move sideways while it cures.

This can occur if you use angle iron, or some other angle that doesn't have a sharp angle.

It may be a good idea to draw a line on the bottom, along the inside of the tub, to be sure the bottom sheet has not moved.



Sub nose glued in place.



Transom doubler clamped in place.



Aft bottom sheet sanded and ready for fwd bottom.

Glue the tub sub nose to the very front of the tub. This supports the nose for sheeting, and provides a solid base for the tub nose block.

There should be a slight overhang on all sides so that the sub nose can be sanded to shape later.

Glue in the transom doubler with epoxy. Make sure that it fits flat against the transom, and that it sits firmly on the tub bottom. Clamp until cured.

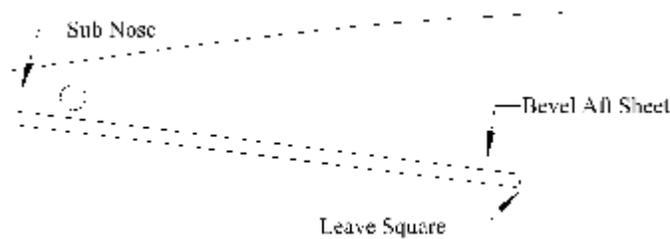
When cured, remove the tub from the jig and flip it over.

Put the upside down tub back in the jig.

Sand the front edge of the bottom sheet so that it matches the angle of the forward bottom.



Fwd bottom in place. Note rear overhang.



This is what makes a JAE a JAE... Sponsons are similar.



Bamboo skewers glued in place.

Glue the forward bottom sheet in place. The forward sheet should overhang on the rear. See drawing.

When cured, sand the bottom sheets flush with the tub sides and front. Do not sand off the rear overhang.

Drill two 1/8 inch holes through the tub sides, into the transom. Make these about 3/4 inch deep. Cut 4 pieces of bamboo skewer about an inch long. Put a drop of glue in the hole, and hammer the skewer in each hole until it bottoms out. Allow to cure. Cut the skewer with side cutters and sand flush.



Sanded flush.

The transom is now permanently attached, without the need for any additional reinforcement.



Radio box lid support glued in place behind bulkhead 3.

Glue in the lid frame support. This gets attached to the rear of bulkhead 3, and is flush with the lower portion of the sides.



Radio box lid support in place.

Be sure that the lid frame support is flush with the lower (inside) edge. The 1/16 radio box lid frame will go here later.



Engine in place on scraps of wood as spacers.



Tracing around mounts.



Using a washer to draw holes for drilling.

## Engine

Install your engine on its mounts, then set the engine and mount in place. Use some scraps of plywood under the engine to space off the floor. Use about 1/8 inch in the rear and 3/8 inch in the front (pull start end). Mount the engine so that the spark plug is about 19-1/2 to 20 inches forward of the transom.

Use a piece of 1/4 brass tube or drill bit to make sure that the engine is aligned with the holes in the rear bulkhead and floor.

Put the 1/4 inch tube or bit in the collet and snug it up by hand.

If you want to be precise about the shaft tube location, you can slip a piece of 9/32 brass tubing over your 1/4.

This will then be a nice slip fit to your 5/16 shaft tube.

It should line up perfectly. If not, put scrap wood spacers under the engine to get it to the correct height and angle.

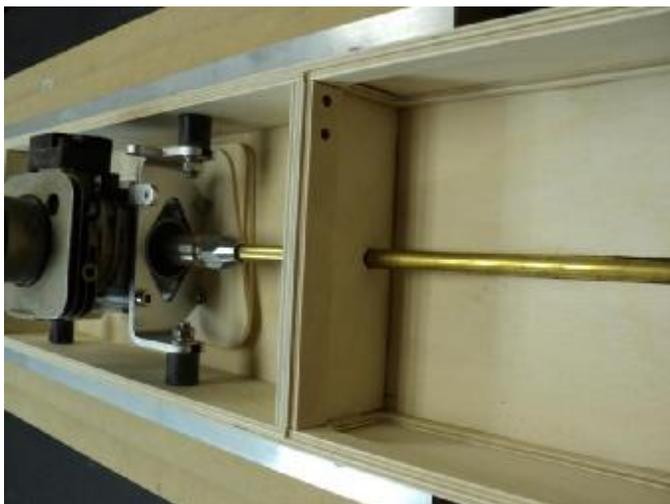
Once you are happy with the engine placement, draw around as much of the rubber isolators as you can. Remove the engine and use a flat washer about the size of the rubber isolators to draw a center hole.



Drilling holes for mounts.



Right angle drill is handy.



Shaft tube aligned properly.

Use a center punch or nail to mark the center for your hole.

Drill this hole  $\frac{1}{4}$  inch, and mount the engine.

With the engine in place, we can move on to the shaft tube.

Slide your  $\frac{5}{16}$  shaft tube in until it is about  $\frac{1}{4}$  inch from the collet.

Make a small mark where your  $\frac{5}{16}$  tube goes through the bulkhead.

Make another mark about 6 inches past the back of the boat.

Cut the brass tube here.

The  $\frac{5}{16}$  inch brass tubing needs to be annealed.

This will make it easy to bend by hand, without kinks.

Only anneal the brass tube from the mark you made rearward. We don't want to anneal the forward portion that sticks through the bulkhead.



Epoxy with filler in place.



Be sure to pack the epoxy around the tube.



Tape on tub bottom, around shaft tube.

To anneal the tube, simply heat it with any propane torch, until it changes color. You will see the brass color change to a sort of blue. It only takes a couple of seconds, so watch for it.

When you see the tubing change color, move the flame slowly down the tube until the whole thing is done.

Put a screwdriver in one end of the tubing to hold it while you heat it.

Try not to anneal the last inch or so.

You can either set the hot tube on a heat proof surface (concrete will do), or you can quench it with water until cold.

When cool, use a ScotchBrite pad or coarse sandpaper to scuff the brass tube.

Put the shaft tube through the hole in the tub bottom, and through bulkhead 3.

Put the end that you didn't anneal towards the engine.

The tube should start  $\frac{1}{4}$  inch behind the engine, and continue about 6 inches behind the transom.

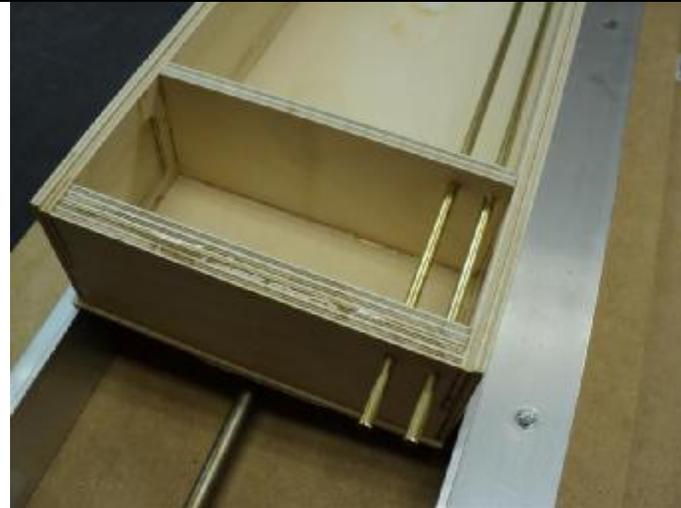
If the tube fits okay we can epoxy it in place. If not, sand the opening(s) until it does.

Glue the shaft tube in place with epoxy and filler (to thicken).

Be sure to sand the shaft tube where the epoxy will be.

To prevent epoxy from running out the bottom of the slot, use tape to make a "dam" on the bottom of the tub.

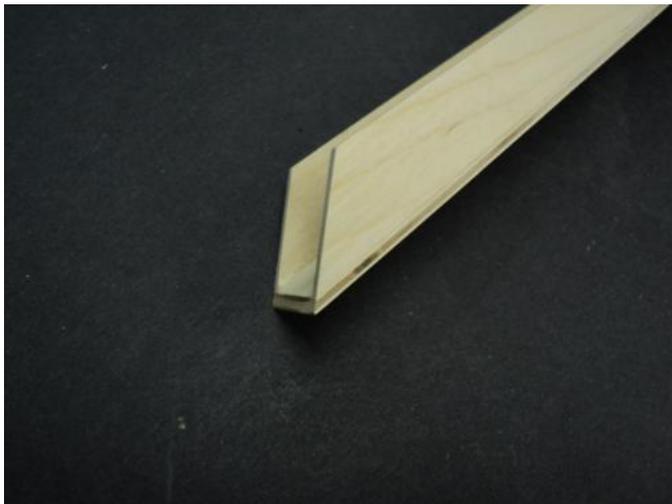
Allow to cure fully before touching anything.



5/32 brass water tubes installed.



Front end of tubes.



Rear edge of ski sanded to shape.

## Water lines

Cut your 5/32 brass tubing so that you have two pieces, each 16 inches long.

Deburr the ends (inside and out) and put them in place in the pre-drilled holes in the bulkheads.

Leave about  $\frac{3}{4}$  inch sticking out the transom.

Put a drop of epoxy around each tube where it goes through each bulkhead. Do both sides of the bulkheads for a leak free installation.

## Ski

Assemble the 3 parts of the ski using epoxy or CA.

Let the bottom overhang past the sides about 1/8 inch at the rear to allow for sanding.

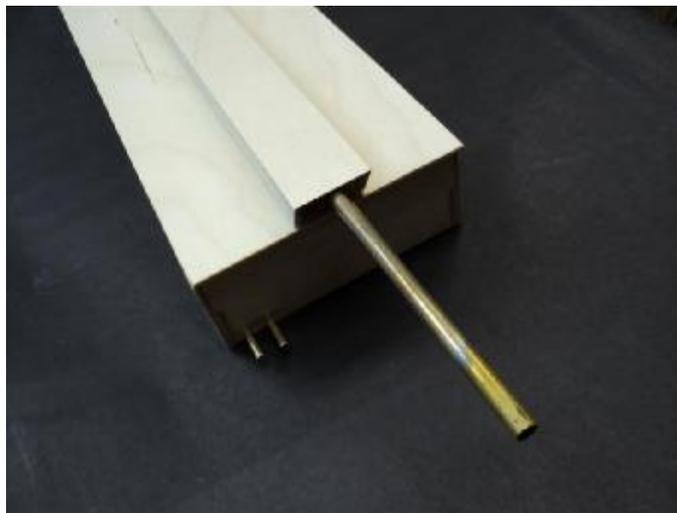
Glue the ski **bottom onto the sides**. Leave about 1/8 inch of bottom behind the ski sides.

Clamp or tape this assembly until cured. Be sure that the ski sides are 90 degrees to the bottom. We used medium CA and accelerator for this.

Sand a sharp bevel on the rear of the ski bottom sheet, so that it matches the ski sides. Sand the front of the ski bottom so that it tapers to nothing. Do not glue the ski to the tub yet.



Shaft tube bent for ski clearance.



Ski in place.



Strut mounting holes marked.

Bend the shaft tube so that the ski fits over it. The tube should touch the ski when the ski is in place on the tub,

Tape the ski in place over the shaft tube. We want the ski to sit flat on the tub, and the strut to sit on the bottom of the ski at the rear.

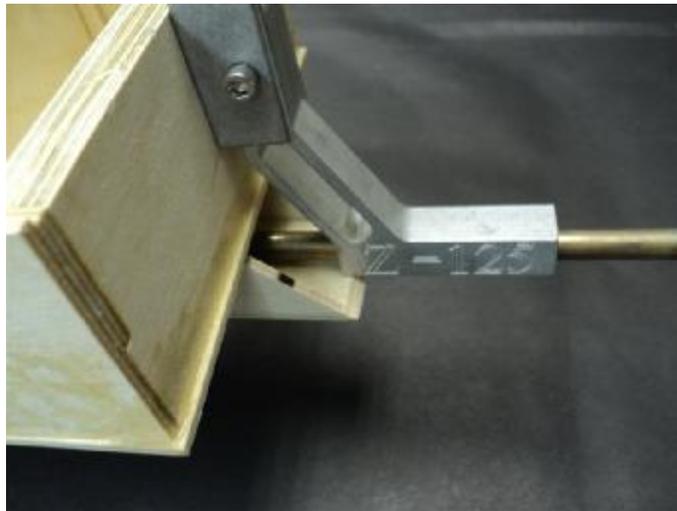
## Strut

Make a pencil line in the center of the transom and mount the strut bracket flush with the top of the transom.

Slide the strut onto the shaft tube and bolt in place.



Strut in position.



Strut sitting on rear of ski.



Rudder in position on bottom of transom.

Bolt the strut in the tub, touching the ski. The shaft tube should go all the way through the Zipp strut. Slightly bend the shaft tube so that the strut will slide on and bolt squarely to the transom.

Mark the tube where it exits the strut. Remove the strut and cut the shaft tube at your mark. Clean and deburr this cut inside and out.

Remove the ski.

## Rudder

Bolt the rudder in place. This should be as far to the **left** as possible and **sitting on the bottom sheet overhang** (as low as possible).

Make a mark on the transom where the rudder pushrod will exit.

Sight this from behind the boat.

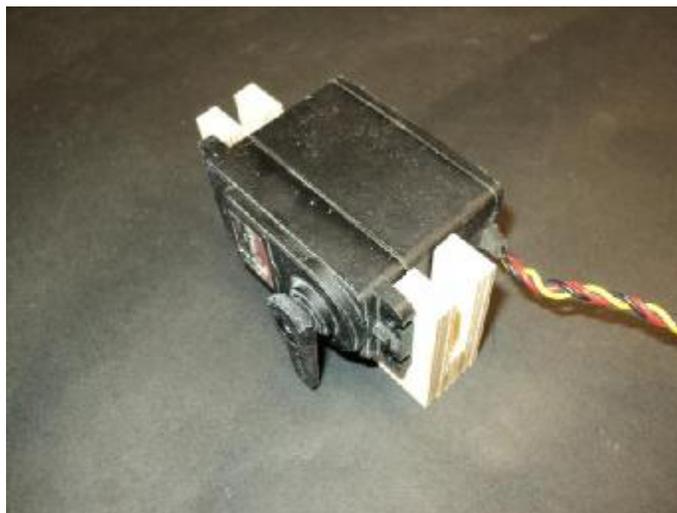
Drill a  $\frac{1}{4}$  inch hole, on your mark.



Boom tube doublers in place.



Rudder servo mount parts. All are 1/4 ply.



Servo mount assembled.

## Boom tube Doublers

The boom tube doublers are 1/4 inch ply and give added support to the aluminum boom tubes.

Use the boom tubes to locate these and epoxy in place. Use clamps and remove the aluminum boom tubes before the epoxy cures.

Wipe off any epoxy on the tubes.

## Rudder Servo

Assemble the rudder servo mount. This is made from the servo mount base parts and the strap. This mount will fit "quarter scale" sized servos.

The rudder servo mount base is assembled from 3 pieces.

Glue the 1/4 inch spacer to the bottom side of one of the mount halves. Be sure that the spacer is perfectly aligned.

Glue the other half to the spacer.  
We used medium CA for this.

Put this assembly on the bench to be sure that it sits flat.

Clamp until cured.

Check the height of your servo. The mount should be a tiny bit shorter than your servo. If necessary, sand the top of the mounts slightly until the servo is about 1/32 inch taller.

Set the 1/4 ply strap in place and drill pilot holes with a 1/16 bit.

Do not omit these or the ply will split.

Put the servo in place and clamp it down with the strap and 4 servo screws.

Notice that the screws only need to be snug to hold the servo securely in place.



Quarter scale servo in place on mount.



Rudder servo and pushrod in place.



4-40 solder clevis at servo end.

This mount puts the servo arm in the correct position for a straight pushrod run to the rudder. We will use the innermost servo arm hole.

Thread a 4-40 ball link onto a 4/40 pushrod.

Slip this into the hole in the transom and bulkhead and attach it to the rudder with a 4-40 screw and nut.

Sand the bottom of the servo mount so that it is flat.

Put the servo/mount assembly in position about 1 inch forward of the rear bulkhead. Mark the pushrod where the servo output shaft is.

Remove the pushrod. Cut the pushrod and solder a clevis in place so that its pin is where the mark was.

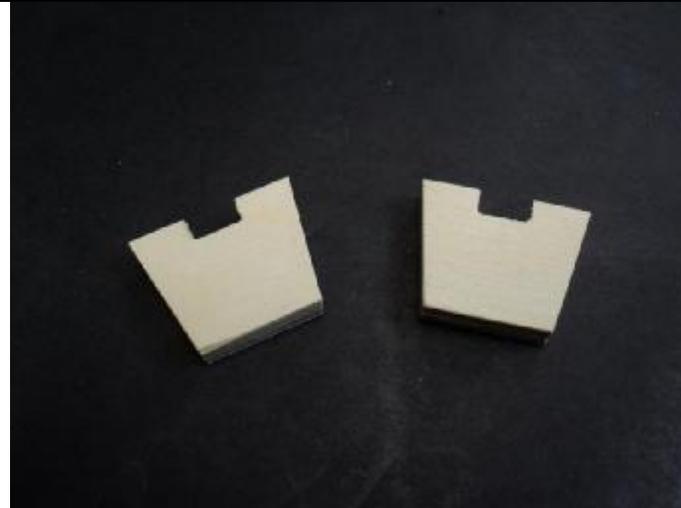
Put the pushrod back in place. Put a servo arm on the servo so that it is facing straight down.

Pop the clevis into the innermost hole in the servo arm and move the servo/mount assembly around until the pushrod is not touching the hole sides and the rudder is straight.

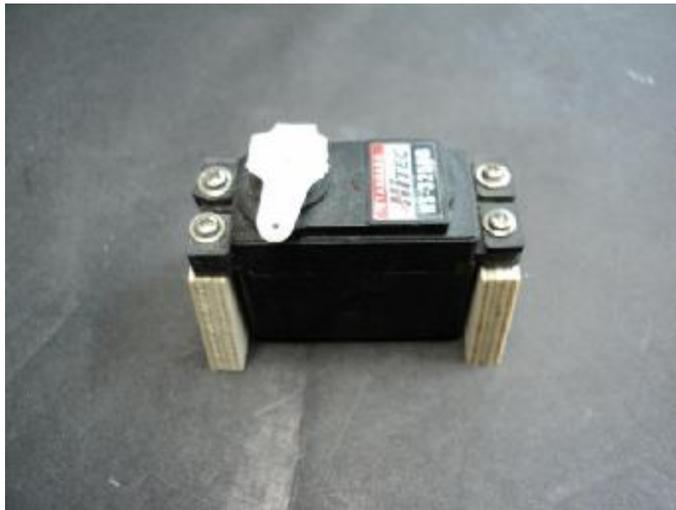
Use epoxy to glue the mount in place, again making sure that the rudder is straight.

Don't get any glue on the servo or wire.

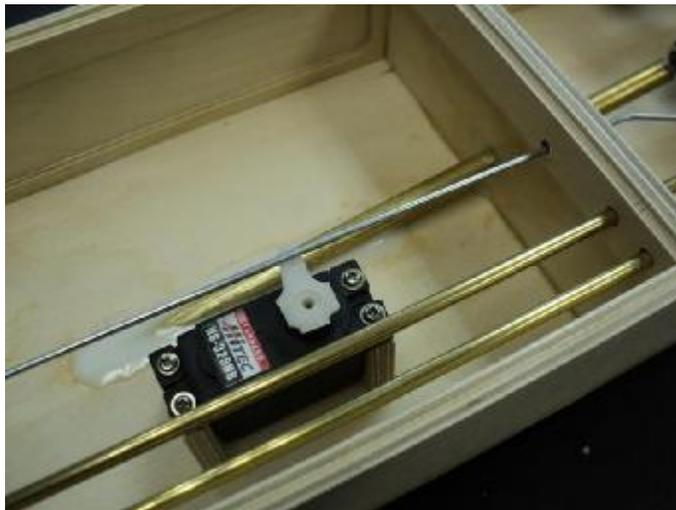
Allow to cure.



Throttle servo mounts.



Throttle servo installed in mounts.



Throttle servo mounted in tub.

## Throttle servo

The throttle servo is mounted to the two blocks standing upright.

Make sure you use the rubber grommets and brass bushings with your servo.

Drill 1/16 pilot holes and mount the servo with about 1/16 clearance between the servo and mount.

Be sure the servo wire is not touching the mount. Open this cutout if necessary.

Screw the servo to the mounts with servo screws.

Thread a nylon clevis onto the 2-56 pushrod and attach your clevis to the throttle.

Figure out where you need to drill the hole through the bulkhead and drill it with a 1/4 inch bit.

Set the servo in position

The servo should not touch the tub floor.



Another view.



Radio box lid frame in place.



Tub top taped in place. Note that it is centered on radio box lip.

Use either a “Z” bend or an EZ connector at the servo.

Glue the servo mounts to the tub floor.  
Don't get any glue on the servo.  
Allow to cure.

Remove everything from the tub.

## Top Deck

The first step is to get the tub blocked up so that it is flat on the bench. You can use pieces of  $\frac{3}{4}$  ply or some scrap wood at least  $\frac{3}{4}$  inch thick.

When we attach the deck, we will “lock in” the shape of the tub. If there is any twist, this will make it permanent.

Make sure that there is no twist.  
if you want to be perfect, you can put the boom tubes in place and measure from the bench to be sure that the tub is level.

Before we get to the top deck, we need to glue in the radio box lid frame.  
This frame provides the “lip” around the radio box for the lid to sit in.

Check all around the area where the frame will go, and look for any glue that will prevent it from sitting flush with the outer sides.

If you find anything, a single edge razor can be used to scrape it away.

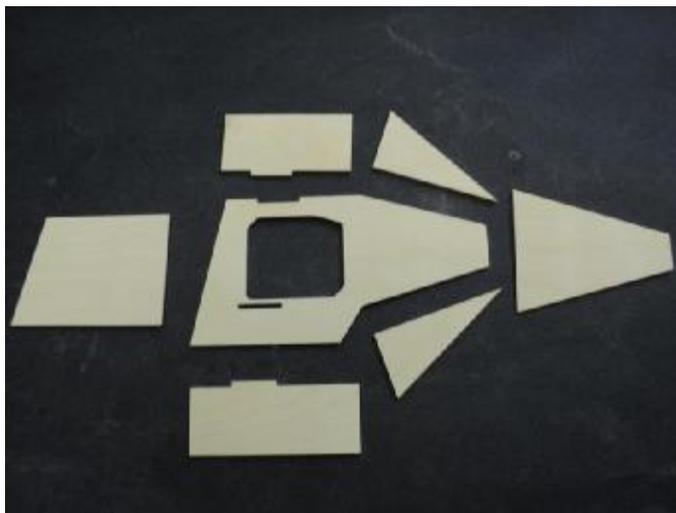
Once you are happy with the fit of the lid frame, glue it in place.



Pine tub nose block in place. Sand to match tub.



Tub top taped in place. Note that it is centered on radio box lip.



Parts for carb shield

Tape and weight this, and be sure that it is all the way against bulkhead 3.  
Allow to cure.

Once the lid frame is cured, sand the entire top of the tub in preparation for the top deck.

Test fit the top deck, and be sure that you center the "lip" in the radio box area, and that there is a little overhang all around.

When you are happy with the fit of the top deck, mark the bottom and mix up some 30 minute epoxy.

Using a brush or scraper, coat the underside of the deck with epoxy. Get the whole deck as it needs to be waterproof. Work quickly.

Coat the tops of the bulkheads and tub sides. Also coat the top of the lid frame. Again, work quickly.

Set the deck in place and start taping it to the tub and bulkheads.

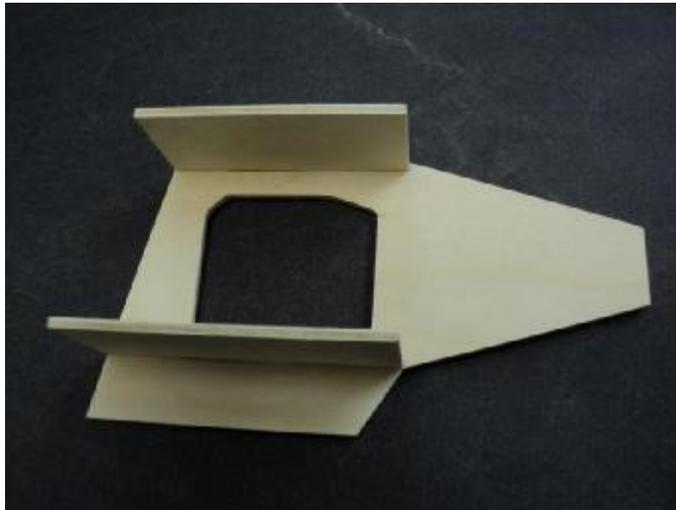
Use weights so that it is in contact at all points and be sure that it is centered on the lid frame.

Double check to make sure the deck is in the correct position and in contact all around.

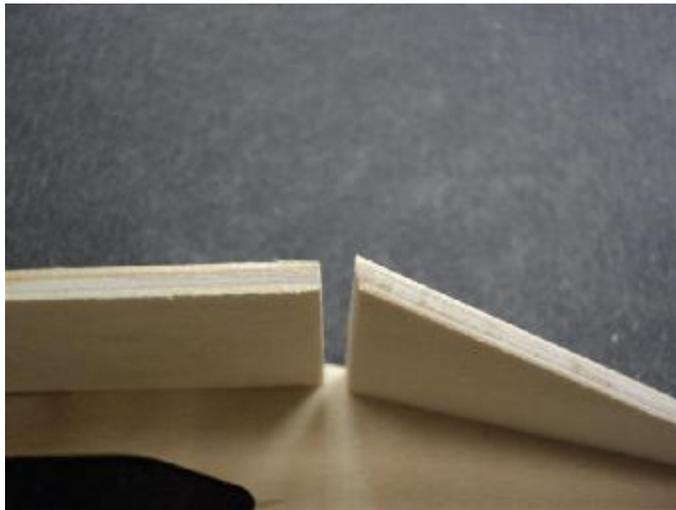
Allow to cure.

## Carb Shield

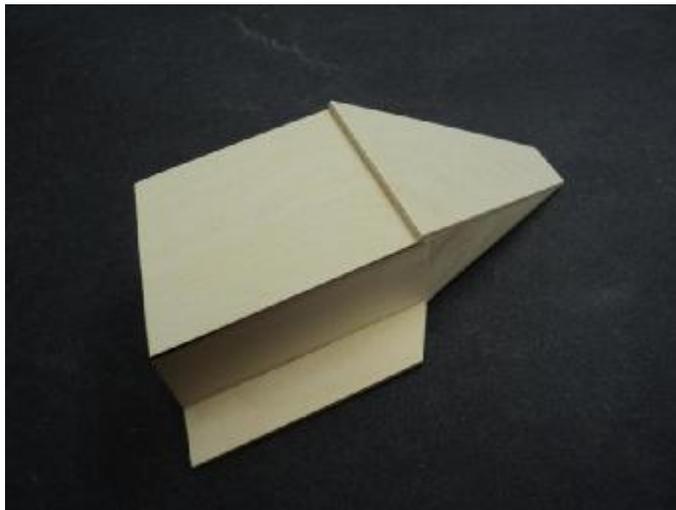
The carb shield included in this kit is designed to prevent engine damage from water ingestion. Be sure to ALWAYS run some sort of shield, as even a fine mist can damage your engine...



Top and bottom glued to base.



Bevel sides to fit.



Completed carb shield.

Assemble the carb shield base (CS Base) to the CS top and CS bottom. Make these 90 degrees to the base.

Prepare the CS sides by sanding a bevel where they meet the top and bottom.

Glue these in place.

Sand for the lids.

Glue the aft lid in place.

Sand it to match the angle of the sides and glue the FWD lid in place.

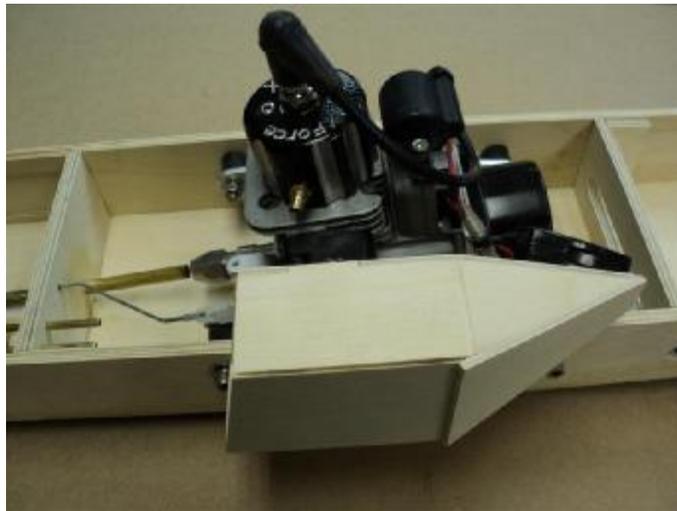
Sand the assembly.

Install your engine and carb.

You will need to cut the tub side for carb clearance. Only remove enough material to clear the carb as removing too much will weaken the tub.



Carb shield mounted to tub.



Another view.



Mist shield glued in place ahead of carb.

Put the carb shield in place over the carb, against the tub side.

Try to keep any part of the carb from touching the shield.

Align the shield to your satisfaction and mark the two mounting holes.

Note that you may have to trim the base slightly to clear one engine mount bolt.

Drill the holes with a 5/32 bit and glue in the 4-40 blind nuts from inside the tub.

Attach the shield with the two 4-40 screws and washers.

With the shield in place, sand a bevel on the small CS shield and glue it to the front of the carb opening as shown. This provides additional protection from mist.

## Fuel Bag Mount

The fuel bag mount is  $\frac{1}{4}$  ply. Drill a  $\frac{1}{16}$  hole in the center and screw the eye in place.

Glue this in the center of the tub, just behind the forward boom tube. Coat with epoxy to seal. The fuel bag can then be held in place with a zip tie.



Fuel bag mounted.



Pipe mount.



Pipe mount inside tub.



Acid brush bent for "all up and under".

## Pipe mount

We used a Zipp 2016 pipe mount with the lower portion cut off.

Try to get the pipe mount in the "bait box" area of the tub so that you are not drilling into the radio box.

We simply bolted this to the tub side.

Note that our tuned pipes are handmade and not perfectly concentric. While this makes no difference for performance, it does mean that you can rotate the pipe to get the distance from the mount to the tub correct.

Remove everything in preparation for sealing.

## Sealing

Use epoxy finishing resin, West Systems epoxy, or our favorite, Klass Kote epoxy paint to seal the inside of the tub.

Brush a coat of epoxy into all areas in the tub. Be sure to get the servo mounts and the underside of the lid frame. Use an acid brush bent at an angle to do this.

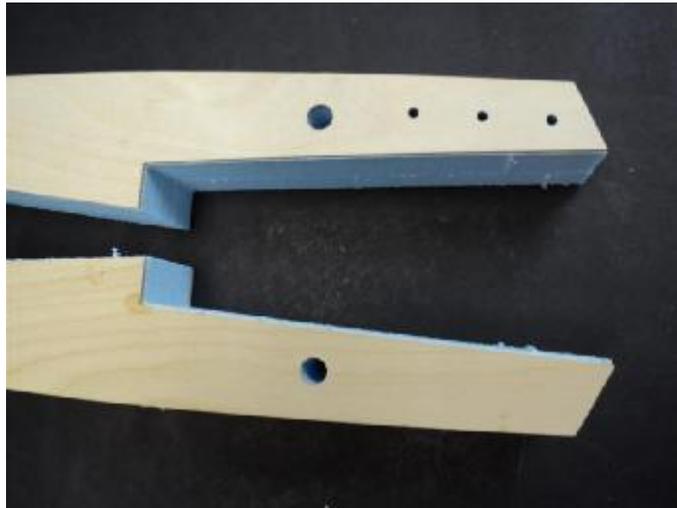
Seal the inside and outside of the carb shield.

You can also seal the inside and outside of the ski as well.

Allow to cure, sand lightly and apply a second coat to everything.



Sponson parts. Dowels not shown.



Be sure to make a right and left sponson...



Aluminum plug inside.

## Sponsons

The sponsons are assembled in a specific order for a reason. It is not the fastest way, but it's the only way it can be done right.

Gather all of the parts for the right sponson.

The right sponson holds the turn fin, so it has dowels in it,  
Grab the right foam sponsons.

Test fit the 5/8 inch wood dowels in the 3 rear holes. Also test fit the 2 aluminum plugs.

They should be a nice fit, without slop. Prepare the sponson inside and outside plates by lightly sanding the edges.

Put the RH sponson outside (3 big holes) on the bench.

Mix up some 30 minute epoxy, and coat the inside of the sponson plates and both sides of the foam sponsons.

Laminate the foam sponsons and add the 1/8 ply sponson plates.  
Work quickly.

Put epoxy in the holes, and insert the 3 wood dowels.

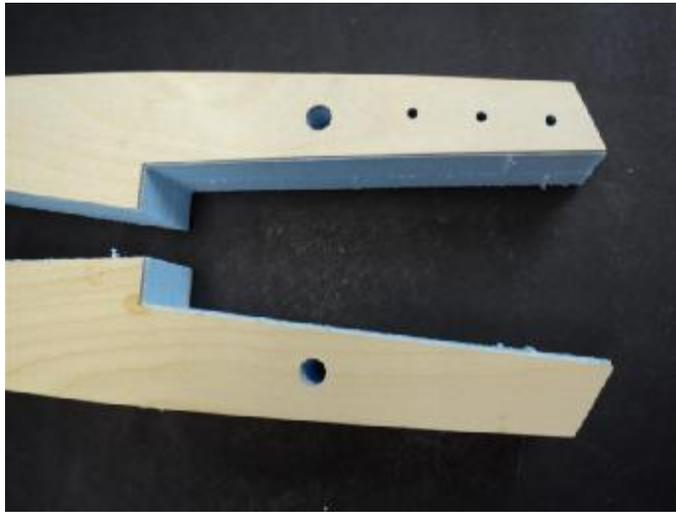
They should bottom out on the outer plate and stick up above the inside plate.  
Work quickly.

Use the aluminum sponson plugs to make sure all pieces are properly aligned.

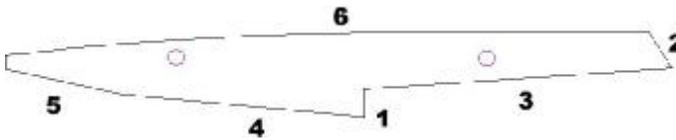
Use tape and small weights to hold the sponson and check the length of the sponson with a straightedge or ruler. It should be straight and flat.

Allow to cure on waxed paper.

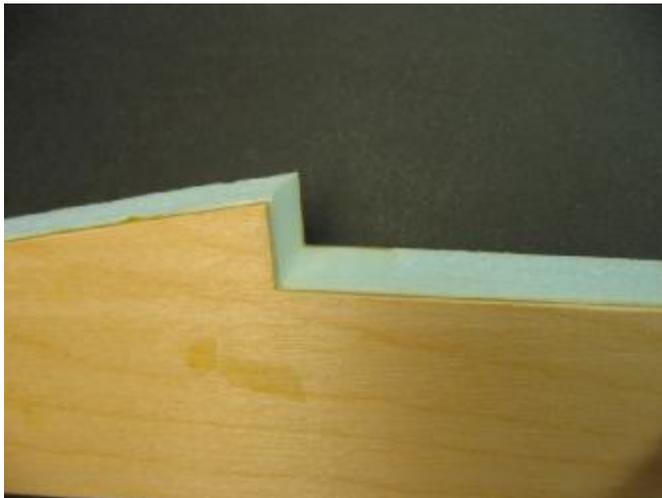
Remove and the aluminum plugs from the sponsons and wipe off any epoxy.



Sponsons are mirror images. Dowels are on right sponson.



Sponson sheeting order. Needed for correct overhangs.



Sharp inside corner.

While the right sponson is curing, you can glue the left sponson. Everything is the same, except the left sponson has no dowels and both plates are the same.

Glue the plates and foam as before, and weight or clamp until cured.

When the sponson sides are cured, let's do the sheeting. This is where the strange order comes in. The sheeting is done in this order because it has to overlap in a specific way.

Follow along and you won't have any trouble. If something doesn't seem to fit, stop and find out why. Epoxy is impossible to remove from foam...

Grab all the sheeting pieces.

Use a file to sharpen the inside corner of the sponson step as shown.

Use your sanding block with 80 grit paper to sand the foam flush with both sponson plates.

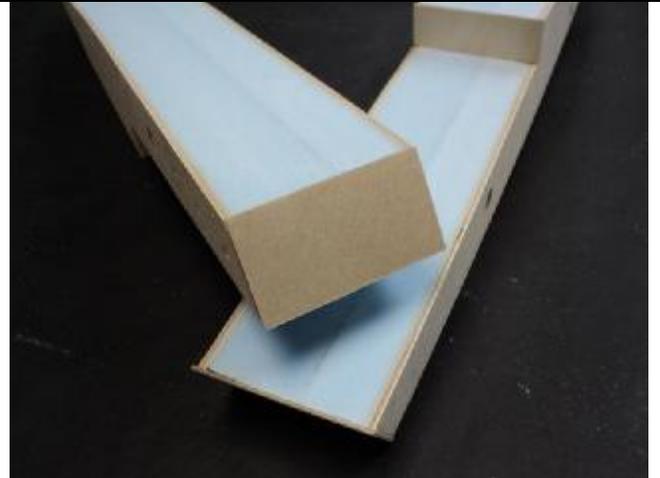
Using epoxy, glue S-1 in place on the sponson step. Use masking tape to hold it in place while it cures.

It's okay to repeat the steps on the other sponson. S-1 and S-2 are 1/16 ply.

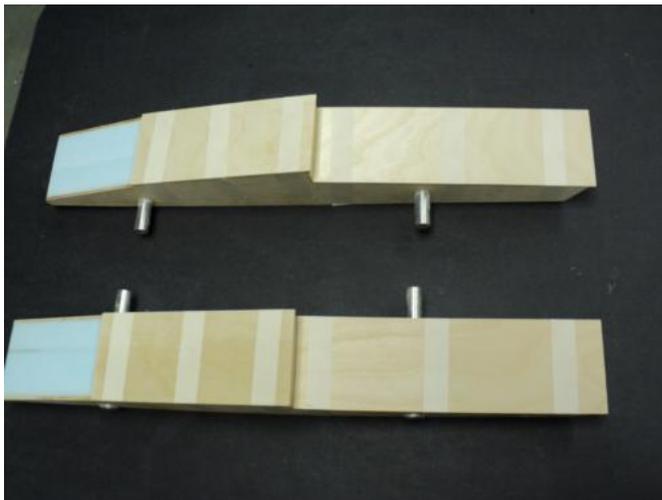
Glue S-2 to the sponson rear. Once these have cured, sand the bottom and sides of S-2 and S-1 flush.



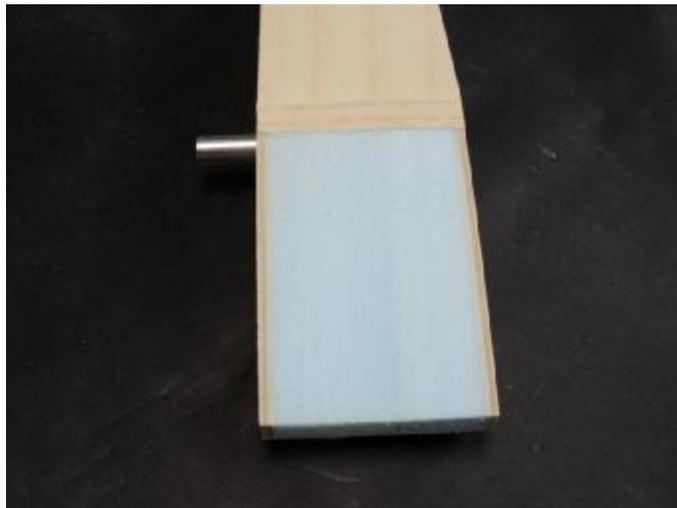
1 glued in place and sanded flush.



2 glued in place.



3 and 4 in place, with overhangs.



Note sharp bevel for 5. Just like tub and ski.

Glue S-3 in place. S-3 is 1/16 ply.

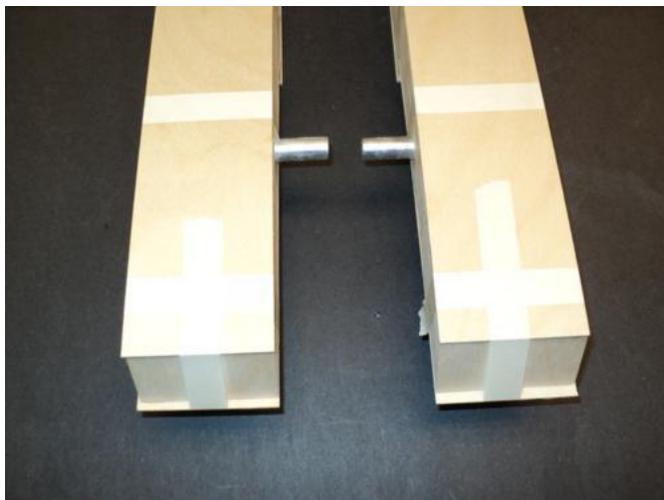
Glue S-4 and leave an overhang in the rear. S-4 is 1/8 ply.

It should be aligned to the "break" where the sponson bottom changes angle (for S5) and overhang at the rear.

Once S-4 is cured, sand the front of S-4 flush with the forward bottom. This is exactly like the forward tub bottom. Do not round any corners.



Sponson sheeted.



Top sheet (6) being glued in place.



Pine sponson nose block in place. One nose rounded.

Glue S-5 in place. Match the rear to just cover the bevel you sanded in S-4. Leave the rear of this square, just like the tub bottom. S-5 is 1/8 ply.

Sand the top of the sponson, and glue the sponson top on (S-6). S-6 is 1/16 ply.

When cured, sand the front until it is flat and square. Glue the pine sponson tip in place with epoxy.

When cured, sand the nose block to a nice blunt tip. Also sand the top sheeting, S-2 and the tips flush with the sides. Do not sand off the overhang on the sponson bottom.

Leave all corners sharp and square.

If you have not done so, repeat on the other sponson.

You can now epoxy the aluminum sponson plugs in place.

Glue the plugs in place so that the right sponson has the wood dowels.

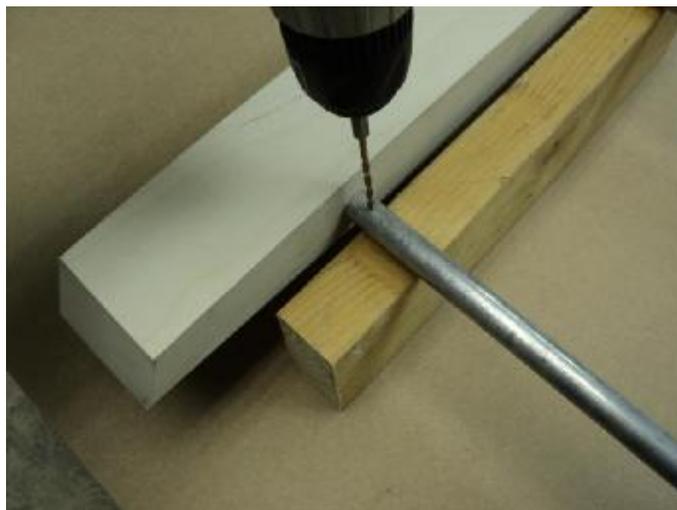
The sponsons should be a mirror image of each other.



Measuring for sponson alignment. Don't bypass this step.



Sponson assembly ready for drilling.



Drilling for boom tube screws.

## Sponson Alignment

**\*This is a critical step in building your boat. Make sure that you fully understand what we are doing, and don't skip this step!\***

We need to make sure that both sponsons are exactly correct with reference to the tub. If they are off, the boat will never handle properly.

The process is simple. Take your time, measure often and it will be fine.

Slide the boom tubes in the tub.

Measure at the front and rear.

The tubes will stick out about 9-3/16 inch from either side. This measurement is not critical.

We want both tubes to be exactly the same length. In other words, we don't want any toe in or out on the sponsons.

If they are very different, sand the longer tube with 80 grit on a block. Assemble, measure and sand until both the front and rear are exactly the same.

If they are slightly off (less than 1/16 inch) simply put the shorter tube in the front. A little toe in will not hurt a thing. Toe out will be a disaster...

Mark the tubes front and rear if necessary.  
Remove the tubes.

Put the sponsons on the boom tubes. You may need to clean the inside of the aluminum tubes so the plugs will fit in. Use an Exacto knife for this.

Set this assembly on a couple of 2x4 pieces of wood.



6-32 screw...

We want a nicely supported, flat base before we drill the boom tubes.

If you try to drill these holes with the tubes in the tub, you will certainly induce some twist. Not good.

When everything is looking good, drill a 5/32 hole through the aluminum boom tube and the sponson plug.



And nut.

Put the supplied 6-32 screw and locknut in place. Do this for all 4 corners.

## Ski

Test fit the ski to the tub.

The rear of the ski should line up with the rear of the transom, and the front should blend into the tub bottom.

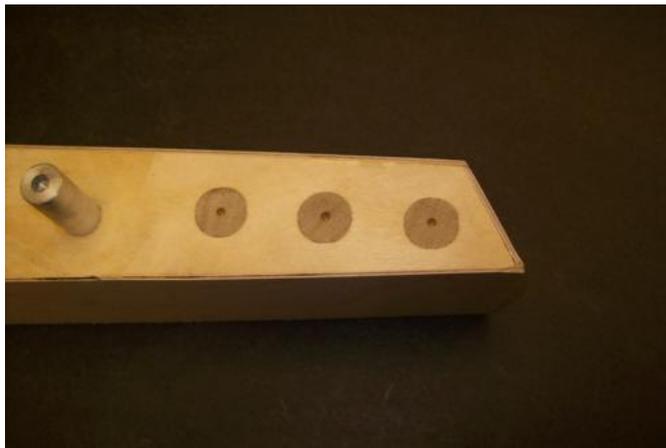


Ski glued to bottom sheet.

Measure from both sides and make small alignment marks for the ski. It should be centered on the tub bottom.



Note that ski ends at transom, not overhang.



Holes center punched for turn fin screws.



Holes drilled in sponson for turn fin.

Using 30 minute epoxy, seal the bottom of the tub in the area of the ski, and epoxy the ski in place. Be sure that the inside of the ski is sealed with epoxy.

Tape and weight the ski, check alignment, and allow to cure.

## Turn Fin

The turn fin is a critical part of the handling of the JAE gas outrigger.

Take the time to get this correct, as the number one reason the boat does something stupid is the turn fin.

Check to see if the fin is flat (front to rear). The rolling process can induce a slight "cupping" of the fin. If you find this, file or block sand until it is gone.

Sharpen the outside (RH) of the turn fin. Make a bevel at least 3/8 inch wide along the front and bottom of the fin.



Note long bevel on turn fin.



Turn fin in place. Note nuts on inside.

Mark the center of the turn fin dowels.  
Drill 3/16 holes on your marks. Drill these holes using a drill press if available. Drill only about half way, flip the sponson over and drill from the other side.

Attach the turn fin with the supplied screws, nuts and washers.

Note that you can later fine tune the fin with the oversized, slotted holes.

Remove the turn fin in preparation for finishing.

## Finishing

Sand the tub and sponsons, but be sure to leave the rear overhangs.

Fill any holes or imperfections with wood filler.  
Sand everything with 150.

Seal the tub and sponsons with epoxy finishing resin or Klass Kote epoxy.

Be sure that all wood is sealed.

Scrape off as much epoxy as you can. It will make sanding easier.

Also seal the radio box top.

When cured, sand with 150 and recoat with epoxy. This coat will use far less resin than the first.

When this cures, wet sand the bottom of everything with 220.

If you are painting sand the entire boat with 220. Now is the time for primer. Wet sand the primer with 400, and use spot putty to fill any imperfections. Wet sand with 400 and lay on a heavy coat of primer. Wet sand with 600-800 and paint.

Use fuel proof paint or fuel proof clear.

## Final Assembly

Bolt the strut to the transom. Make sure that the strut is straight up.

The strut needs to be at the very bottom of the ski for the proper propeller depth. Make the ski parallel with the bench (0 degree angle).

Slide your drive dog onto your flex shaft, then your prop. Leave about half of the threads showing past the prop.

Tighten the drive dog set screw.

Remove the prop and measure the exact location of the set screw from the end of the shaft.

Remove the drive dog and file or grind a flat spot on the shaft about 1/8 inch wide. Put the drive dog back on the shaft, aligning the set screw in the flat you made.

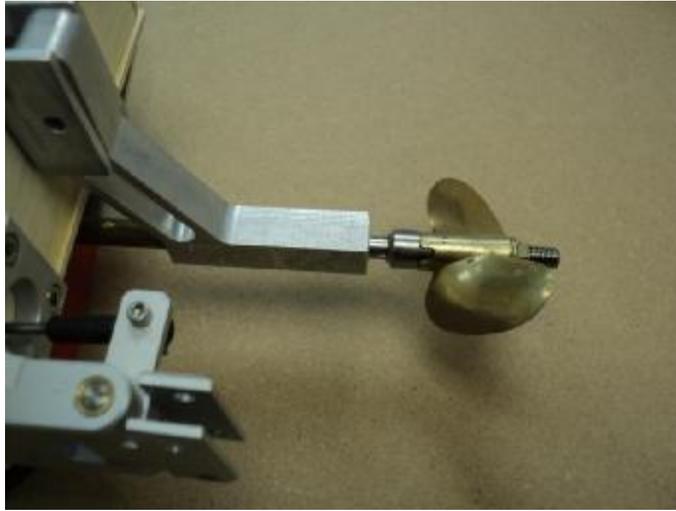
Push the flex shaft into the shaft tube, and into the collet. Make sure that the shaft goes all the way into the collet. Measure the distance from the back of the strut to the front of the drive dog. Subtract 1/4.



Shaft with flat spot for drive dog screw.



Drive dog, prop and prop nut in place.



Note 1/4 inch gap at drive dog.

Cut this amount off of the flex shaft. This allows you to put the shaft all the way into the collet, and still have a 1/4 gap between the strut and drive dog. This is needed because the flex shaft will twist slightly at high speeds, and actually get shorter.

Bolt the rudder in place. Be sure that it is straight up and down.

## Setup

Put the boom tubes in place and slide on the 5/8 boom tube clamps.

Note- if you want to protect the tub from the collars rubbing, you can use some rubber washers for a garden hose. They are the correct size...

Bolt the sponsons on with the 6-32x7/8 screws and locknuts.

Turn on the radio.

Make sure that the steering trim is in the center. Move the steering servo arm so that it is straight down. Put the servo arm screw in.

Mount the throttle servo arm so that it is at about 2 o'clock with the trigger at neutral.

Put the servo arm screw in.

Install the servos and pushrods again, only this time, glue pushrod seals in place with Goop. Wrap your receiver and battery pack with foam

Assemble the fuel bag and mount with a zip tie

Mount the rudder and attach the pushrod.

Screw the ball link in or out to center the rudder. Check for correct rudder movement. Attach the throttle pushrod clevis to the carb arm, and put an EZ connector in the servo arm. Set the carb so that it is slightly open with the trigger at neutral.



Ready to rock!

Open the throttle and check to see if you get full open. If not, move the Z bend out farther on the servo arm, farther in on the carb arm, or adjust your throttle end point in your radio until it does.

Also push the trigger (brake) to make sure that the throttle closes fully. You should remove the throttle stop screw on the carb.

Take the time to get this right. If you don't, your boat won't shut off and will be embarrassing and dangerous.

Mount your switch with a waterproof switch cover.

Make sure that your tuned pipe is mounted to the tub.

Make sure your prop is sharpened and balanced.

Grease the flex shaft with cable grease or high quality marine grease.  
Install the flex cable.

Hook up your fuel and water lines.

## Running

The main thing is to get the boat running smoothly and turning well. After that, try different props and pipe lengths.

For a bunch of help tuning and running, go to some of the R/C boating web sites. One of the most popular is International Waters ([www.intlwaters.com](http://www.intlwaters.com)).

Good luck and happy boating!

# Additional information

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## **International Waters Website**

**[www.intlwaters.com](http://www.intlwaters.com)**

Excellent forum for information on R/C boats  
lots of general JAE discussion

## **Klass Kote Epoxy Paint**

**[www.klasskote.com](http://www.klasskote.com)**

Phone (612) 243-1234

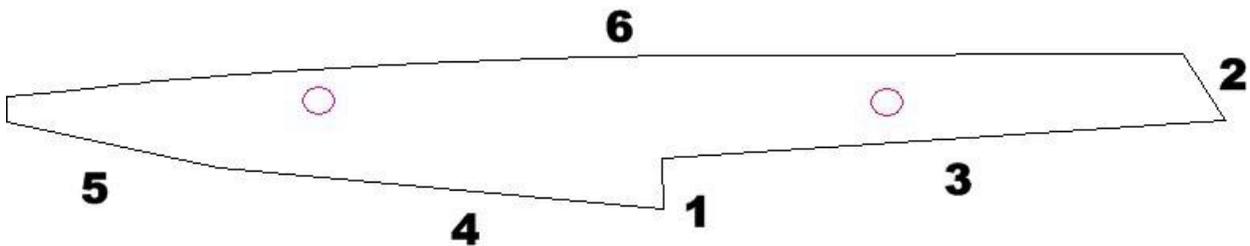
Source for the best epoxy paints in the world!

## **Servo City**

**[www.servocity.com](http://www.servocity.com)**

Phone (620) 221-0123

Best servo prices around



# Setup and Adjustment

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Make absolutely certain that the boom tubes are the same length, and the sponsons have NO toe out. A slight bit of toe in will not hurt anything, but toe out will be devastating.

Set the turn fin so that the top of the fin is parallel with the top of the sponson.

If using an adjustable strut, set it flat on the ski (0 degrees).

Set the rudder so that the right side is parallel with the tub (slight left trim).

Set rudder throw to **10 degrees right and left**. Use the least amount of throw on the servo arm, and use your radio's ATV or end point adjustment to reduce it further. Do not exceed these throws!

Run the boat. If it looks loose at full throttle, adjust the fin angle back slightly. Measure from a convenient point, like the rudder. Adjust the fin 1/16 inch, no more.

Do not exceed 1/16 inch increments. The fin adjustment is very, very sensitive, and it is easy to go too far.

As you adjust the fin forward, the boat rides loose, and adjusted back, the boat rides wet.

Don't try to shim the strut right or left. This does nothing.

## Tips

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Do not change the ride attitude or height. Leave the AOA alone...

The boat will not turn sharp left. You can make left corrections, but if you push it, it will flip.

Try different props. The ABC 2818/2 R (round tip) is a good start.

Do not cut the rudder. You need all you can get to control prop walk.

If you are running a larger prop than 2.8 inches (71 mm) due to a high torque engine, you may experience excessive prop walk. This is simply because there is not enough rudder in the water to prevent this.

To counter this, you can mount a small fin to the rear part of the ski. We can supply this free of charge if you need it. Just contact us.

When you finish your rigger, why not send us pictures for our web site?

We would love to see them.

Pictures of the boat sitting in the water are our favorite...