ZIPP MANUFACTURING

A Zippkits R/C Boat

BUILDING INSTRUCTIONS

Frankfort, New York 13340
www.zippkits.com

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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

These boats were designed as legal hulls in the Crackerbox class.
There are other restrictions such as engine, exhaust, and length of hardware.
Bottom line: Read the rules before you build. It may save you time and money!

The IBox was designed to be legal for IMPBA Crackerbox racing.

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 (check the rules), as long as it has mounts for 5 inch rails.
If you use a Zenoah or similar, you will generally use a collet type of cable system.
If you use a Homelite, or similar sport engine, you will generally use a square drive type.

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
- 12x48 FLAT plywood (the thicker the better)
- Medium CA glue and accelerator
- Good quality 30 minute epoxy
- Epoxy finishing resin
- 2 feet of 6 ounce fiberglass cloth, 3 inches wide
- 3 inch length of 2x4, split in half
- 3 inch screws or nails
- 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 (Zenoah type engines)
- .250 24 inch cable w/welded stub shaft (Zenoah type engines)
- .250-.250 brass ferrule (sport "trimmer" type engine)
- 24 inch section of square drive cable ("trimmer" type engine- get from trimmer)
- ¼ inch stub shaft ("trimmer" type engine)
- ¼ inch thrust bearing ("trimmer" type engine)
- Tuned pipe or canister muffler (check the rules)
- 2 channel surface radio with 1 standard and 1 heavy duty servo (100 in/oz minimum)
- Throttle pushrod
- Rudder pushrod (at least "4-40" size)
- 2 pushrod seals (Zipp 3404)
- 16-24 ounce fuel tank and tubing (gasoline compatible)
- .250 strut (Zipp 3403)
- .250 drive dog (Zipp 3405)
- Prather 270 prop (starting point)
- Prop nuts (Zipp 3406)
- Cable grease
- Large rudder (water pickup type- Zipp 3402)
- 3 feet large silicone tubing (water line)
- 12 inch length of 11/32 brass tubing
- 36 inch length of 5/16 brass tubing
- Floatation (pool noodles, foam, etc.)
- Transom turn fin (Zipp3410)

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.

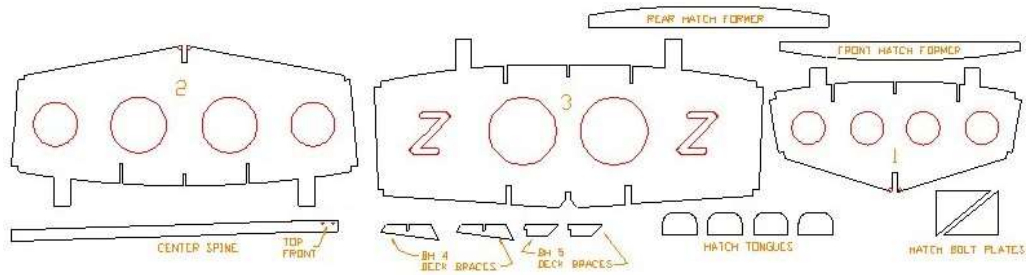
First, we need a flat work surface. Nothing else will do.
If you don't have a perfectly flat bench, you can make one with your piece of 12x48 plywood.
Simply screw a couple of 2x4's lengthwise to the bottom. Make sure the 2x4's are straight!
You can then put this on a bench, and shim the corners to make it steady.
Or, if you are really pressed for space, you can set it on a couple of saw horses.

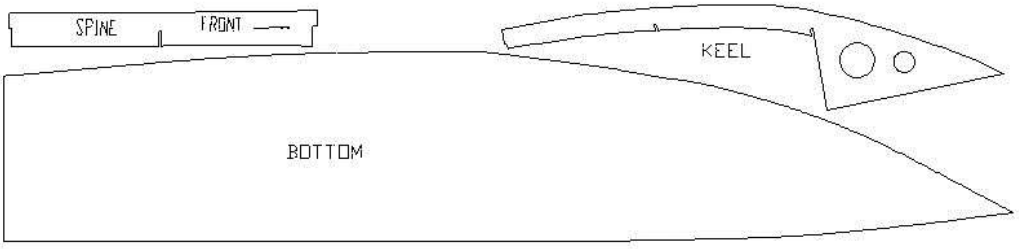
The Build

We are ready to start the build!

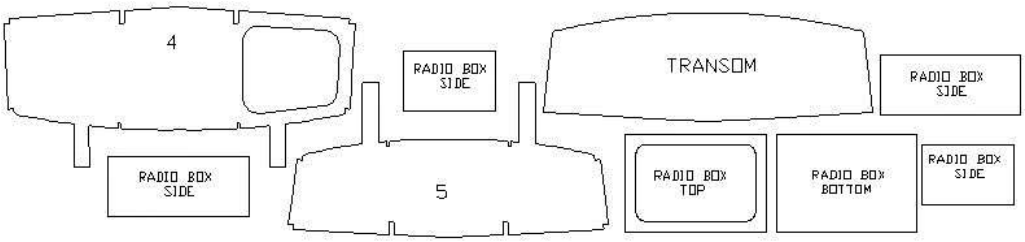
Remember- The boat is being built upside down. Any reference to the top or bottom refers to the boat's top or bottom. If you are going to attach something to the top, it would be closest to the bench. Right and left are always as you are sitting in the boat, or from the rear.
Got it? If not, stand on your head as you build…

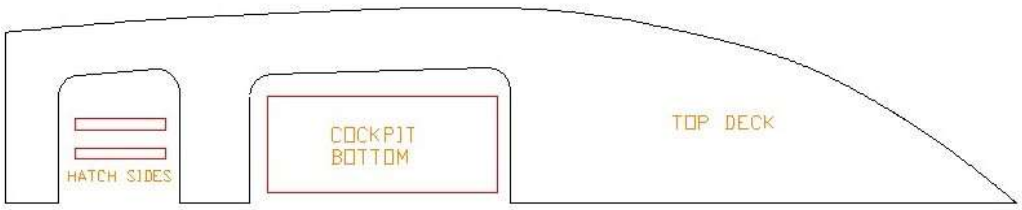
Let's identify the parts in the sheets. Don't remove the parts until you actually need them, as some look similar, but are not the same.

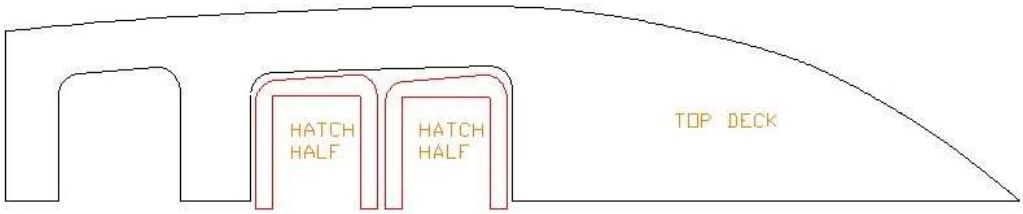


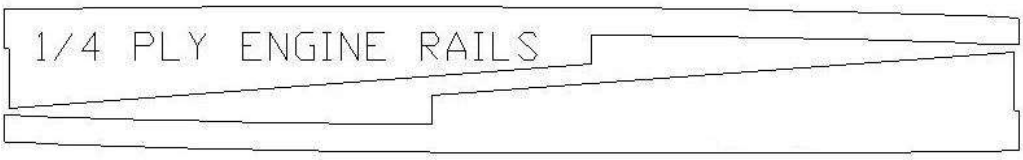


IBOX


4
RADIO BOX SIDE
TRANSOM
RADIO BOX SIDE
RADIO BOX SIDE
5
RADIO BOX TOP
RADIO BOX BOTTOM
RADIO BOX SIDE


HATCH SIDES
COCKPIT BOTTOM
TOP DECK


HATCH HALF
HATCH HALF
TOP DECK

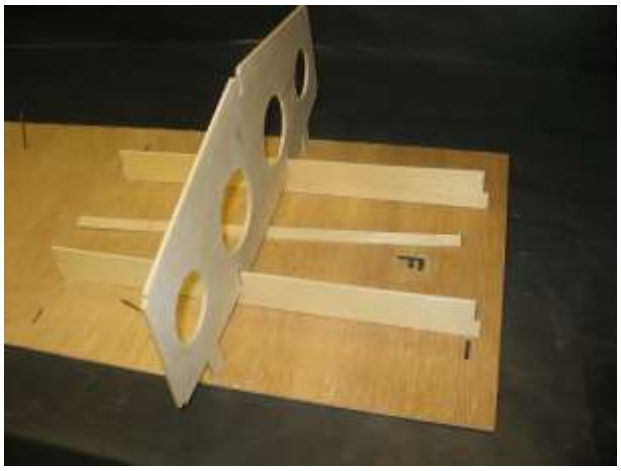

1/4 PLY ENGINE RAILS

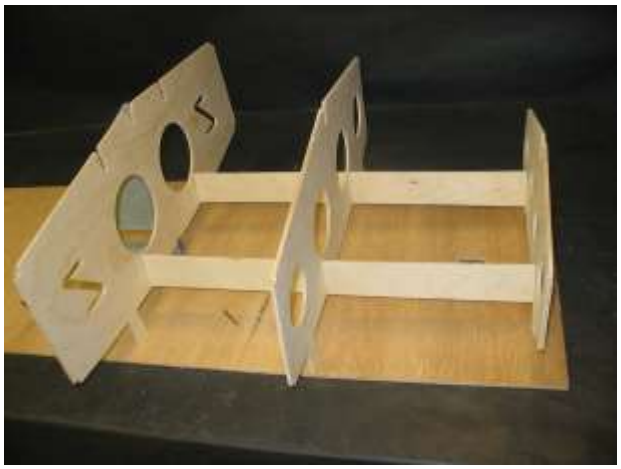
We like the Great Planes 11 inch bar sanders

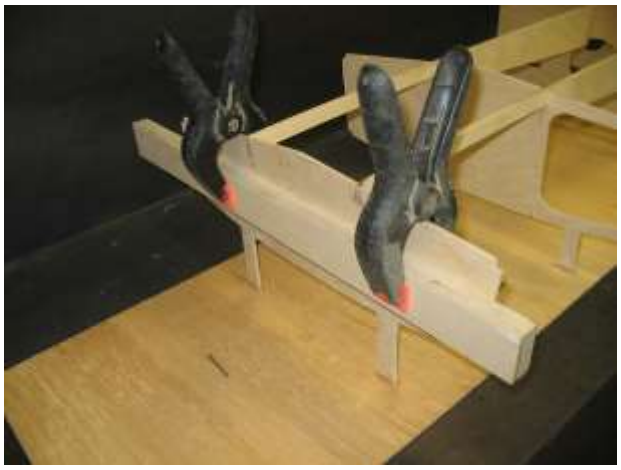
Your life will be much easier with one of these

Use good quality epoxy and finishing resin

Acid brush trimmed for fast epoxy application


Bulkhead 2 and spines


Bulkheads 1, 2 and three in place with the spines. Note that the holes in the spines face forward.

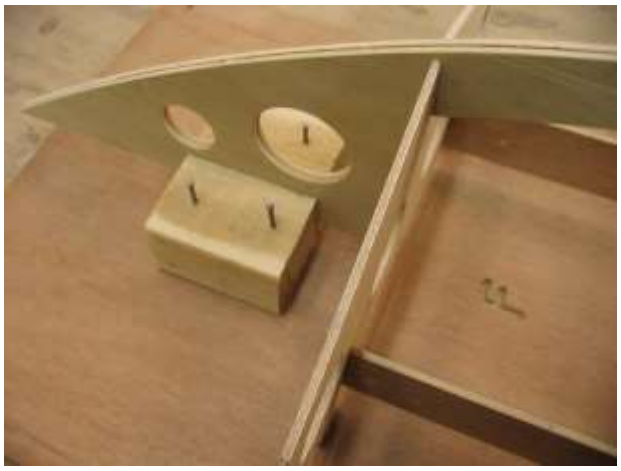

Block clamped to bulkhead 5, keeping it flat.

Let's get started.

Attach the jig board to your FLAT bench (or 12x48 ply) with screws, nails, clamps or whatever you need, to make sure it's attached to the surface.
Make sure the "F" is so that you can read it.
Remove bulkheads 1, 2, 3 and the (2) spines.
Sand the edges with 80 grit to remove the fuzz, as well as the little tabs that held them in the sheet.
Grab bulkhead 2 and the two spines. Push the center slot of the spines into bulkhead 2. Check the fit; it should be flush with the top of the bulkhead.
Put bulkhead 2 into the jig. The hole in the spines should face forward.
Put bulkheads 1 and 3 into the jig, engaging the spines in the slots.
Starting from the front of the jig, glue the tabs of bulkhead 1 to the jig.
Use a square to ensure that it's 90 degrees to the jig. Also make sure that the tabs don't protrude under the jig.
Use CA and accelerator.
Don't glue the spines at this time. We will glue them after we flip the hull over.
When dry and square, glue bulkheads 2 and 3 the same way. Use the square.
Make sure the "Z" on bulkhead 3 is readable from the back.
Remove both keels.
Sand as before.
Using CA, glue both keels together. Be sure that the keels are aligned with each other.
Clamp while drying.
Remove, sand and glue bulkheads 4 and 5 to the jig as before.
Make sure the cutout in bulkhead 4 is to YOUR RIGHT, when looking at the back of the boat (it will be on the left, for exhaust, when upright).
Find the two ¼ ply engine rails. Sand them smooth with 80.
Now look at bulkhead 5. Is it twisted or warped? If so, clamp a piece of wood to the back of it for the next few steps.
Check the fit of the engine rails into bulkheads 3, 4 and 5.
If ok, glue them in (the big end goes forward).

The keel should be dry by now.
Check the fit of the keel into bulkheads 1, 2 and 3.
If ok, glue it in, making sure the keel is centered on bulkhead 1.
This kind of looks like a boat, doesn't it?
Take a break, and give the glue a little while to completely cure.

Bulkheads, spines and engine rails in place.



Keel installed with support blocks.

Nail to hold stringers.

Place your two chunks of 2x4 on each side of the keel, against the bench.
Drill two pilot holes in each (so they don't split), and attach them to the jig and bench with screws or nails.
These keep the keel from bending or twisting as we attach the stringers. Put them about 1-1/2 inches in front of bulkhead 1.

Stringers

Next, we will install the stringers. Make sure you follow along closely, as these are very important to the final shape.

Grab the four 1/4x1/4x48 sticks. Carefully check them for knots or other imperfections. If you find any, be sure they are installed towards the rear, where the bend isn't so great.
When fitting the stringers to the notches in the bulkheads, they should be flush with the sides. Most of the time, the stringers are not exactly square, so if they are not flush with the sides, try turning them. They usually measure .250x.260 or so.
Having them flush will make building much easier.

Using CA, glue one of the top (closest to the bench) stringers to the notch in bulkhead 5.
You can lay it in the notch on bulkhead 4 while the glue dries; just don't glue it to 4 yet.
Hit the glue joint with accelerator. Hold it in place for 60 seconds or so.
When you are sure the glue is completely cured, glue to bulkhead 4.
If bulkhead 4 is twisted or warped, straighten it when you glue the stringers on.
They will hold it in place.
Hit that with accelerator, hold for 30 seconds or so, then move ahead to 3, then 2, then 1.
While the glue is curing on 1, bend the stringer to the keel, and hold it there until the glue joint on 1 is cured. It helps to drive a nail in the bench, near the front, to hold the stringers before trimming.

Top stringers installed.

The reason for gluing, holding for a few seconds, then moving forward is because the shape of the stringer changes as you move forward. Doing it this way, the glue has not completely cured, and can be "adjusted" a little, as you bend the stringer to the next bulkhead. If you waited until each glue joint was completely cured before moving on to the next one, the stringer would take on a straight, angular look, instead of the smooth curve it should.

With a pencil, mark the angle of the cut in the front of the stringer, to fit on the keel, as you bend it around.
Hold the front of the stringer firmly, and carefully cut on the line with your razor saw.
Or, you can simply hold the stringer in place, and cut it with the razor saw against the keel.

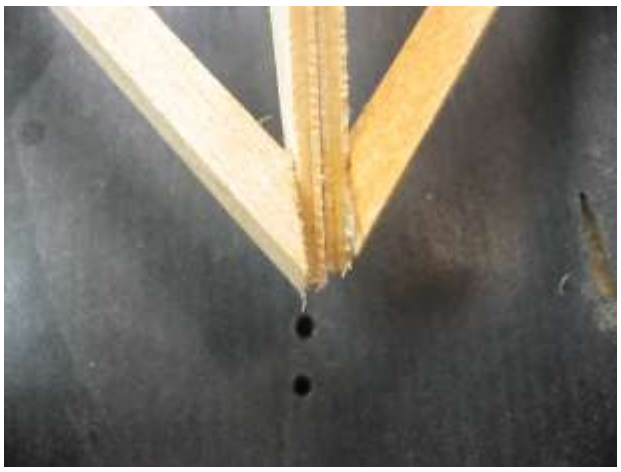
Don't glue it to the keel yet.

Note that top stringers are flush with top of keel.

Glue the other top stringer onto the bulkheads, exactly the same way as before.
Trim the front with the razor saw.

Now you get to glue yourself to the boat! Try not to…
Using CA, put glue on the ends of the stringers.
Squeeze both stringers together at the tip of the keel.
Make sure that both are even, and flush with the top of the keel.
Hit the joint with accelerator, and hold for a minute or so.

Try not to glue your fingers to the stringers! If you do, it could be rather embarrassing to have your wife try to free you. She will use that story for life!



Another view of top stringers.

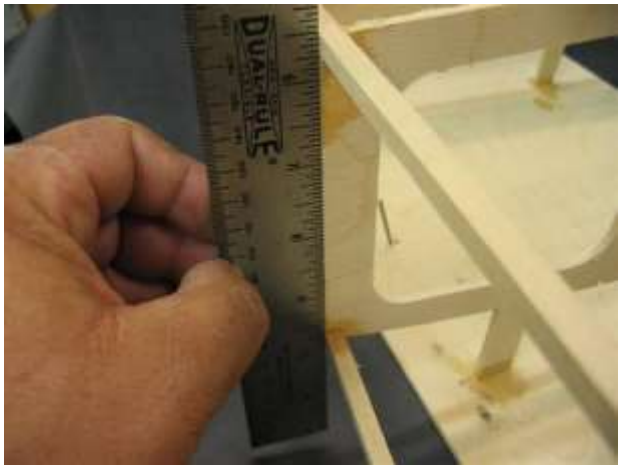
When you are sure the joint is secure, glue in the bottom stringers.
They have a little more bend than the top, but you are an expert now!

Glue them to the bulkheads exactly the same way.
When you are ready to glue them to the keel, make sure they are touching and slightly behind the top stringers (see photo).

Bottom stringers glued to top stringers. Very little keel contact.

When that is secure, put some glue in the area where they all join, to give it a little extra strength.

Time for another break. Give your beautiful boat skeleton at least 20 minutes to cure.
Call your wife in to look at it. She will either say "that's nice honey" or ask why you can build a boat in a few hours, but the shelf you were going to build will be 3 this year.



Blending stringers for a good fit of the side sheeting.

Blending the stringers

Before we can glue the side sheeting in place, we need to make sure the stringers are flat. Do this with your sanding block and fresh 80 grit paper. Sand the stringers, using your sanding block to blend them at the front.

Check to see if your sanding block sits flat on the stringers at all points. If it does not, the side sheeting won't either. The front of the stringers will need a fair bit of blending. The rear will need very little.

Side sheeting clamped in place.

When the sides have been sanded and blended, it's time to start the sheeting.

Dry clamp the side sheeting in place.
Clamp and adjust the sheeting so that it overhangs an equal amount on the top and bottom. Leave a little hanging off of bulkhead 5 as well.
When it looks good, make a reference mark somewhere that is easy to see. I make it between 3 and 4.
Mark a line on the stringer and the sheeting, so that you can align the marks quickly when gluing.

Remove the clamps.

Epoxy on front inside of side sheeting.

Using 30 minute epoxy, mix up about 1/2 ounce. Stir very well.
Using a small stick or acid brush, coat the stringers and bulkhead edges. Work quickly.
Make sure that all surfaces that will touch the sheeting are coated. Try not to use so much that it runs all over. Brush epoxy on the front 6 inches or so of the side, to help strengthen the high stress nose area.
Align the marks and start clamping, adjusting the sheeting for equal overlap on the top and bottom.
Clamp thoroughly, but be careful not to distort the stringers.
Using a new mixing container and applicator, do the other side. You may have to trim the front tip of the first side, so the second side fits.
Allow to cure at least 1 hour.

Checking the keel, bulkhead and side sheeting for flatness.

Bottom Sheeting

When the glue is fully cured on the side sheeting, plane and sand the side sheeting and stringers to match the angle and contour of the bulkheads.

Time to get intimate with your wood plane. If you don't have one, stop here. Go to the store and buy one. Really.

Side sheeting before trimming.

The mistake most people make with wood planes is trying to take off too much wood.
If you try to plane with the blade too deep, you will gouge and split the wood.
Adjust your plane to remove about 1/64 of an inch of material or so.

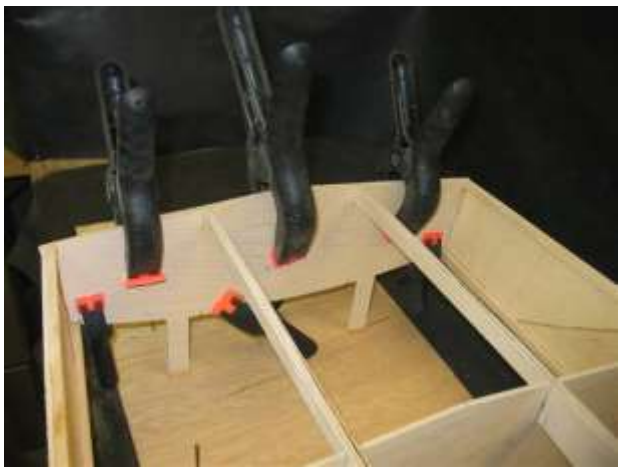
If you have never used a plane, practice on some scrap wood before planing the sides.

What we are trying to do with the plane is to shave the stringers and side sheeting to match the angle of the bottom.

Starting from the rear, hold the plane at the same angle as bulkhead 5.

Side sheeting after trimming.

Another view of trimmed sheeting and stringers.



Transom glued to bulkhead 5

Push down and forward, increasing the angle as you move forward.
Use the angle on the bulkheads to determine the angle that you hold the plane.

When you are close with the plane, switch to fresh 80 grit on your sanding block.

Match the angle of the bulkheads. Also, **lightly** sand half of the keel at the same time, so that the bottom sheet lays flat on the structure. Do not change the shape of the keel, just match the angle. The keel will have a slight "V" shape when you are done.
Be very careful not to sand the keel too much, or the bottom will not fit!

Sand the rear of bulkhead 5. Sand the stringers and sides flush with the bulkhead.
Using 30 minute epoxy, glue the transom to the back of bulkhead 5. Try to match the bottom "vee", and leave an equal overhang on the sides and top. Clamp until dry.

Make a mark in the exact center of bulkheads 4 and 5. Make this mark on the edge, so that you know how far to glue the sheeting.

Test fit the bottom sheeting in place. It should cover exactly half of the keel. Also, sand a gradually increasing bevel on the inside (center) edge, so that both sheets will meet squarely.
Make sure the front is accurately aligned with the center of the keel and that there is some overlap at the rear.

When satisfied with the fit, make an alignment mark on the bottom sheeting and the keel.

Cut about 8 pieces of wide tape, and set aside.
Mix about 1/2 ounce of 30 minute epoxy.
Using a small stick or acid brush, coat the stringers and bulkheads where the bottom sheeting will contact. Work quickly.
Also coat half of the keel.
Brush epoxy onto the first 6 inches of the front of the sheet, to help the glue joint here.

Align your marks and put a couple of clamps along the keel, clamping the sheeting firmly to the keel.
Check your center marks on bulkheads 4 and 5.
Wipe all excess glue off of the keel, as it will interfere with the other side sheeting.
If everything looks good, start wrapping the wide tape across the bottom sheeting.


Half of bottom clamped, taped and weighted.


Other half taped and weighted.


Another view of both bottom halves attached.

Start at the keel, and pull the tape tight as you attach it to the side.
Use as many pieces of tape as you need, to make sure the bottom sheeting is tight to the keel, side stringers and sheeting.
Look for any “crown” in the sheeting as a result of taping. If it exists, use some weights to flatten it out. Also put weight over the engine rail, to help hold it against the sheeting.

For very inexpensive weights, break up some cinder blocks. You can get many different shapes and weights, and their rough surface helps keep them in place.

After the glue fully cures (at least 2 hours), remove the tape and clamps. Check for any glue that may have squeezed onto the keel. Use a sharp knife to scrape any away.

Test fit the other bottom sheet, and make any adjustments before you glue.

Make sure that both bottom sheets meet as perfectly as possible.

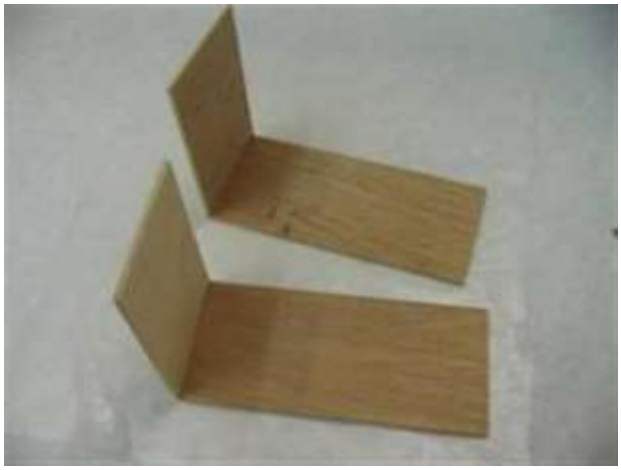
Take your time here. Start from the rear. Put the sheet in place, and note any areas that touch, keeping the sheeting from meeting perfectly. Use your block with 80 to sand these “high” spots. Move forward and sand, fit, sand, fit, until it fits perfectly. Be sure to sand a progressively sharper bevel, so that the bottom sheets fit tightly together.
Glue the other side of the bottom sheeting on the same way as the first, only this time you can’t use clamps.
Tape the crap out of it, put weights on it, and set aside.
Let’s build the radio box while the glue cures on the hull.

Radio Box

Remove all of the radio box parts: Two long sides, two short sides, the top and bottom, as well as the 1/16 ply top.

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.



Radio box sides glued as two assemblies.

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.

Glue the radio box top on.

This is the 1/8 inch Birch top.

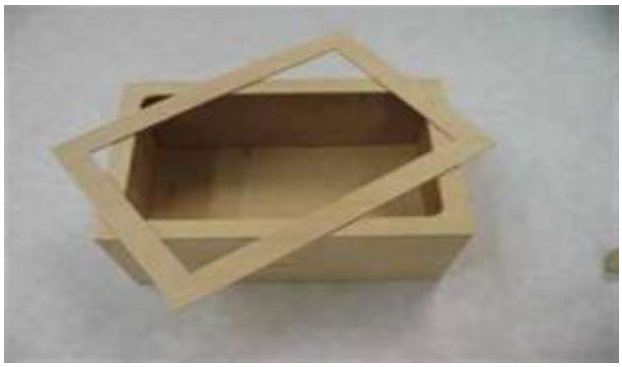
Take a break for a few minutes, so that the radio box glue joints can cure.

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

Sides joined flat on the bench.

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.



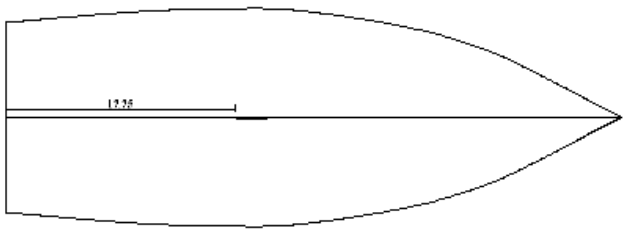
Getting ready to glue 1/8 ply top in place. Top and bottom 1/8 ply already done.

Sand the entire box with 180.

Stand back and admire your awesome radio box!

1/8 ply top installed, note lip for lid.

Note how lid fits nicely with ample area for sealing tape.



Skeg slot starts 17-3/4 inch from the transom

Back to the boat:

Make sure that it has been at least 2 hours since you glued the bottom sheeting to the hull.

With your razor saw, cut all the tabs that are holding your hull to the building jig.
Lift the hull straight up, to get it out of the two blocks holding the keel.

Ditch the jig. We don't need it any more.
Hey, this is really starting to look like something now!

After you finish admiring your cool new hull, let's move on.

Trim the excess bottom and side sheeting flush. You can use your small plane to get close. Finish with an 80 grit sanding block.
Don't spend too much time where the side sheeting meets the top, as we will come back to this area later.

Also glue in the two spines that you fitted earlier. Glue in the center spine. It butts against the keel, and overhangs at bulkhead 3. The two holes in the center spine indicate the top front.

Center Skeg

Measure 17-3/4 inches from the transom. This is the rear of the skeg slot. Make a mark in the center of the bottom. Measure 2-1/2 inches forward, and make another mark.

Drill 1/8 inch holes in the bottom at your marks. Use a straightedge and utility knife to cut the slot between the two holes in the bottom.

Check to see that the skeg fits properly. If not, find out why and correct it.

If all is well, pull the skeg out, and set aside. It will be epoxied in place just before painting.

Spines and center spine installed.

Sealing interior with epoxy finishing resin.

Seam glassed with 6 ounce cloth and epoxy resin.

Sealing Interior

Now we need to seal the inside. It is vital that all exposed wood be sealed.
We will also glass the rear keel area.

Mix up about 2 ounces of epoxy finishing resin. You can thin the resin with about 10% acetone, so that it brushes easily. Go easy on the acetone, as it will soften the epoxy glue joints if you use too much. It's pretty funny to get the inside sealed, and see the side pop off the boat because you thinned the sealer too much…Don't ask!

Start from the front.
Using a brush, coat all areas of wood inside the hull. Get inside the holes and "Z's".
Be careful not to get any resin in the bolt holes for the skeg.
Try not to get too much resin on the top edges of the bulkheads and stringers, as it will make it more difficult to sand later. Be sure to get the bottom edges of the spines.

Fiberglassing seam

Use 6 ounce cloth, about 3 inches wide. Make two pieces, one from the back of bulkhead 3 to 4, and one from 4 to 5.

Mix another 2 ounces of finishing resin.
Brush resin onto the center seam and lay the cloth down, centered on the seam.
Brush in a very heavy coat of resin, so that the cloth is completely wetted.

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.

After the hull sealer has had a chance to cure, let's get the hull ready for the top sheeting.

Another view of glassed seam.

Trim the building tabs, and sand the bulkheads to match the top contour.
Using a utility knife and 60 grit paper, cut and sand a taper on the front of the deck joiner.
It should go from nothing at the front, to full thickness about 4 inches from the front.
Take your time, and make a smooth progression.

Deck formers installed in bulkheads 4 and 5.

Use your plane to shave the top stringers (and sides) to the contour of the bulkheads.

Do this the same way you did the bottom.
Use 80 grit to finish it up. Be sure not to round the edges.

Checking deck formers with straightedge.

Glue the deck supports into bulkheads 4 and 5.
Use a straight edge between the bulkheads to check the deck supports.

Deck joiner tapered at nose.

Floatation installed. Use plenty!

Floatation

Now is the time to put floatation in the hull.
DO NOT OMIT THIS STEP! Without floatation YOU WILL LOSE YOUR BOAT!
Don't ask me how I know…

You can use white, pink or blue foam, pool noodles, plastic bottles, almost anything that floats.
Stay away from spray in foam; it has too many disadvantages for this use.
If you use blocks of foam, make them as big as you can.
You can get pool noodles at the dollar store or Wally World.
Be sure the floatation will not interfere with the top sheeting.

Let's get this puppy closed up!

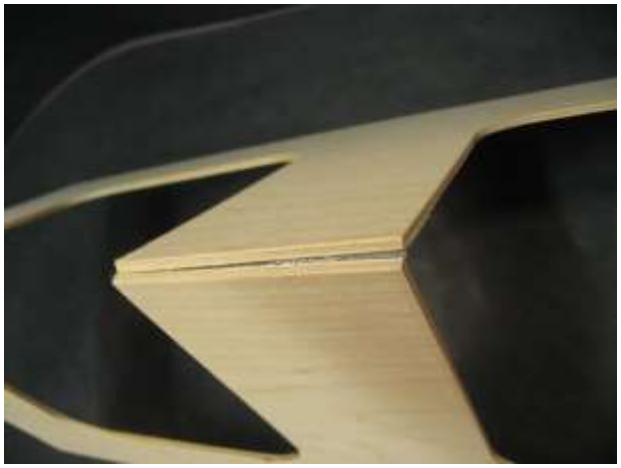
A boat stand is a good idea at this point.
You can make a boat stand out of PVC pipe or wood.

Top deck installed. Use tape and weights to get it right.

Deck pieces taped tightly together.

Top Sheeting

This is probably the most difficult step in building this boat. Take your time, and do whatever you need, to get the deck attached properly.



Deck "hinged" for glue application.

Top Sheeting

Sand the two top sheets. Carefully sand the inside edges, as we will be gluing them together.

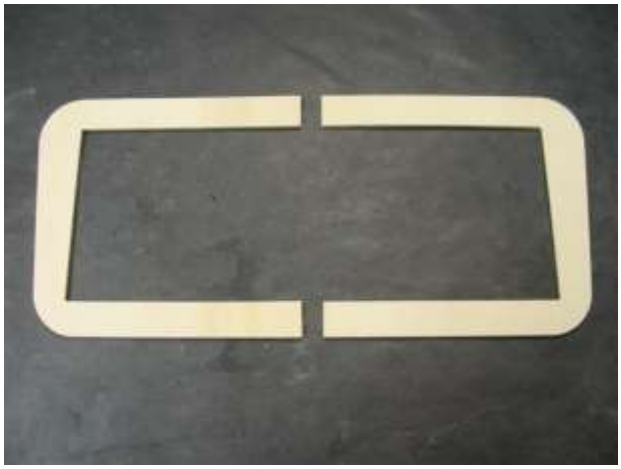
Place the two top sheets on the bench. Arrange them so that the good sides are facing up.
Using wide tape, tightly tape them together in 4 or 5 places. Run a piece of tape down the entire center seam, including the two rear areas.
Press the tape down firmly.

Flip the joined sheets over and “hinge” them open.
Apply 30 minute epoxy in the joint.
Place the assembly flat on the bench, and wipe any excess glue off of the seam.

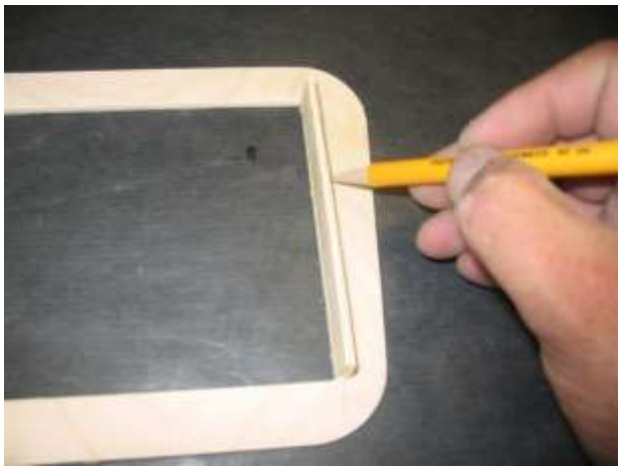
Take your time. Use lots of tape!

Put a few pieces of tape across the seam, to hold it tightly together. Let sit for at least 2-3 hours (overnight is better).

One piece top deck installed.



Hatch before joining halves.



Mark 1/8 from side of cockpit opening.

When the deck is fully cured, remove the tape and sand the seams. Determine which will be the “good” side.

Cut about 20 pieces of wide tape for the next steps. A shipping tape dispenser works very well for this.

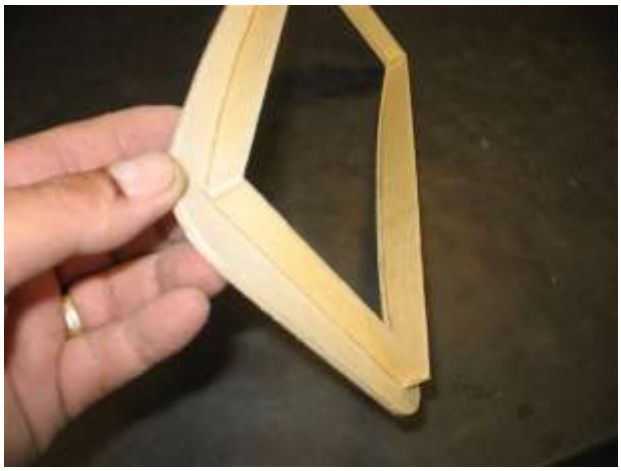
Lay some newspapers on your work surface, and place the deck on the papers “good” side down.

Mix about 1 ounce of epoxy finishing resin. Do not thin it.
Using a credit card or similar, squeegee some epoxy on the bottom side of the deck. Do the entire surface. This will waterproof the underside of the deck. Get it pretty thin. The resin goes a long way.

Using a stick or acid brush, coat the tops of the bulkheads, stringers and deck supports with finishing resin.
Start taping the deck down.
Align and tape the center of the deck at bulkhead 3. Then align and tape at the nose, then center of the transom.
Start taping the sides.
Tape tightly.
Check all around to make sure that the deck it tight against the top of the hull.
Continue adding tape until the entire deck is in contact all the way around. Check the transom from behind, and add tape if needed. Check bulkhead 3 as well. If needed, you can use wide strapping tape to really put some pressure on the deck. Wrap it all the way around, if you do.
When everything looks good, add weights to the deck center area.
Allow to cure overnight.

After the deck sheeting is fully cured, use your plane and 80 grit to sand flush.
Give the whole boat a good sanding with your 80 grit block.
Use wood filler to fill any gaps or gouges, and to build up the nose, if necessary.

After the filler is dry, sand it with 80 grit, using light pressure.
At this point, you can round the deck where it meets the sides.
Do not round any other edges. We need them sharp.



Cockpit front, rear and sides glued in place.

Hatch

Remove the following parts from the sheets, and sand them smooth:
Hatch halves, cockpit front, rear and sides, cockpit bottom.
Make a mark 1/8 inch from the side cutout. You can use one of the cockpit sides as a gage.

Cockpit floor installed.

Using CA, glue the hatch halves together, making sure they are aligned properly.

Glue the cockpit front former to the front of the hatch (front of hatch is wider than the rear).
Glue it flush with the cockpit cutout, and make sure it's 90 degrees to the hatch, and touching your mark.

Glue the cockpit rear former the same way. Use accelerator. Be sure the formers are attached to the hatch along their full length.
Glue the cockpit sides between the front and rear. Sand to fit if needed.
When dry, sand the bottom of the cockpit, and glue the cockpit bottom in place.

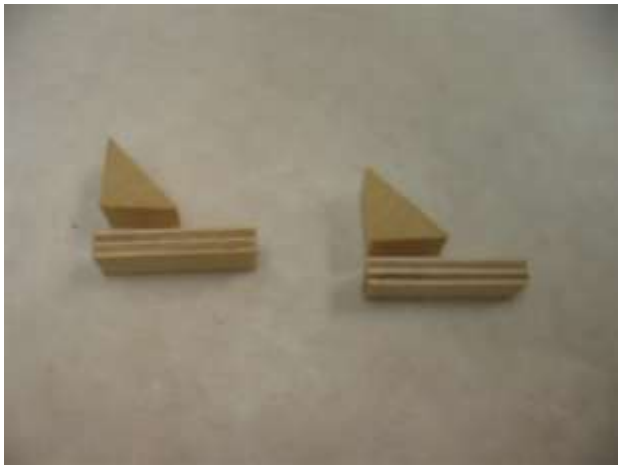
Fitting hatch to deck. Take your time here.

Hatch opening with tongues and bolt plates installed.

Check the fit of the hatch in the deck opening. If it doesn't fit, sand the hatch to fit, not the opening. Be sure to leave a 1/16 gap all around, to account for your finish (paint, clear coat, etc.).

When satisfied with the fit of the hatch, glue two hatch tongues in place on the front of the hatch, two tongues to the front of the hatch opening in the deck and the two bolt plates to the rear of the deck. Use epoxy, and be sure to sand before you glue.

Hatch with tongues installed.



Servo mounts.

Next, we will mount everything we need, to make this boat go!

Rudder servo on mounts.

Rudder servo mounted in radio box.

Radio:

Find the 4 pieces of ¼x1-1/2 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 1/16 gap between the servo case and the mount. Drill on the marks with a 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.
Lay the servo box on its side, opening towards you.
Make a pencil mark ½ inch from the right side, inside the box. This is where the rudder servo will mount.
Get a piece of scrap 1/8 wood from the kit, and place this on the floor of the radio box, where the rudder servo will be.
With the radio box still on its side, glue the rudder servo mounts in with CA, aligning to your pencil mark. Make sure the 1/8 scrap 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.

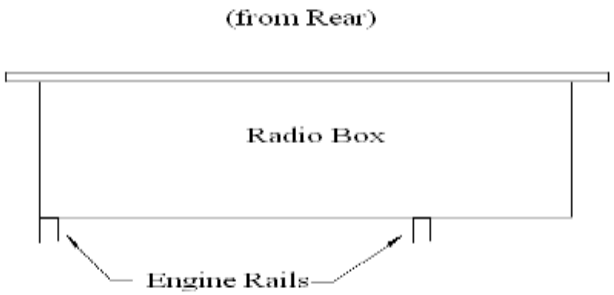
Alignment lines on transom.

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, and it works very well.

You can seal the inside, top and all four sides of the outside in one session.
You don't have to seal the bottom yet, as we will do that when we epoxy the radio box into the boat.
Allow to cure overnight.

Hardware:

Draw a line on the transom, from top corner to top corner.
Mark the center of this line, and put a mark 2-1/2 inches to the right of the center line.



Use a square to extend the marks to the bottom of the hull.
Assemble the strut to the brackets, and tighten the bolt until you can just move the strut in the bracket, but it won't move on its own.

Push the strut all the way up into the bracket until it stops.

Strut and rudder mounting.

Hold the strut assembly against the transom, so that the front of the strut is touching the bottom of the boat.
Center it on your guide line, and mark one hole location.
Drill the hole in the transom, and bolt the strut assembly on.

Check to see that the strut is aligned with your reference line, and mark the other three holes.
Drill the transom and install the three bolts and nuts.

Set the radio box on the rails, 1-3/4 inches behind bulkhead 4. It should be even with the left rail.

Assemble the rudder to the brackets.
Mount it the same way you did the strut, aligning the rudder blade to your reference line, 2-1/2 inches to the right of center.

Be sure to consider where the rudder arm will be, in relation to the servo arm when mounting the rudder.

Try to make it a straight line from the rudder servo arm to the rudder arm.

Skeg Mounting

Sharpen the skeg. Using a file and 220 grit paper, sharpen the skeg.

The front should be sharp, and the back flat.

Install the skeg in to the center slot. Use a thin file if needed, to remove any epoxy from sealing.

With the boat on the stand, shove the skeg all the way in. Note how it fits. If all is well, remove the skeg.

Use coarse sandpaper to rough up the bottom of the skeg lip where it will contact the hull.
Put a piece of clear tape over the skeg slot.

Mix up some 30 minute epoxy, about ½ ounce.
Coat the edges of the skeg slot and the bottom of the skeg lip with epoxy.
Push the skeg into the slot, piercing the tape as you do so. Put epoxy all around the edges of the skeg, inside the boat. Don't coat the top of the lip, as you may need to remove the skeg at some point.

Before the epoxy cures, sight from behind the boat, and see if the skeg is straight. If it is tilted to one side, put a piece of waxed paper over the skeg and epoxy, and use a weight to hold the skeg straight. You can also prop something against the skeg under the boat.

Let this sit for at least 3 hours.

If you ever need to remove the skeg, use a heat gun or propane torch to warm the aluminum, then simply tap it out from the bottom with a block of wood. Heat softens the epoxy.

Trim Tabs

Mount your trim tabs to the transom so that they are flush or just a hair up from the bottom.
Also mount them so that they are 1/2inch from the outside of the hull.

Turn fin

The turn fin should be mounted on the extreme right side of the transom, above the trim tabs. Make sure the fin is 90 degrees to the bottom. It will be canted outward with the hull level.

Note flat filed for drive dog screw.

Flex shaft assembly complete.

Flex cable prep: Collet drive engines:

(For square drive type engines, skip to the next section).

Get the flex cable, drive dog, prop and prop nut.
Put the drive dog on the stub shaft, then the prop.
Engage the drive dog into the prop, and slide this assembly back until the prop covers the first 2 or 3 threads on the stub shaft. Tighten the drive dog set screw.
Mark the stub shaft at the front of the drive dog.
Remove the dog and prop.
Measure 3/16 inch back from your line, and file a flat spot, about 1/8 inch wide and 1/16inch deep.
This is for the set screw. File off any burrs, and put the drive dog back on, tightening the set screw into the flat.
Put the prop and prop nut on. Slide the flex cable into the strut, until the drive dog touches the rear of the strut. Tape the front of the cable to the bottom of the boat for now.

Stub shaft prep: Square drive type:

Get the stub shaft.
Put the drive dog on the stub shaft, then the prop.
Push the prop into the drive dog, and slide both until the prop covers the first 2 or 3 threads on the stub shaft.
Tighten the drive dog set screw.
Make a mark on the stub shaft at the front of the drive dog.
Remove the drive dog and prop, being careful not to disturb the mark on the stub shaft

Measure 3/16 inch back from your (drive dog) line, and file a flat spot, about 1/8 inch wide and 1/16inch deep.
This is for the set screw. File off any burrs, and put the drive dog back on, tightening the set screw into the flat.

Put the thrust bearings on the shaft, in front of the drive dog.
Slide the stub shaft into the strut, until the thrust bearing touches the back of the strut.
Make a mark on the front of the stub shaft, where it enters the strut.
Remove the stub shaft, and make another mark ½ inch in front of your mark.
Cut the stub shaft at this mark.
The stub shaft should stick out the front of the strut by ½ inch, when assembled.
Use a marker to “paint” the cut end of the shaft. Make this area ½ inch long, and about half the diameter of the shaft.
Slide the ferrule on the shaft, and tighten the set screws into the “paint”.
Remove the shaft and ferrule, and grind or file flat spots for the ferrule set screws on the marks you just made.
File off any burrs, and reinstall this assembly in the strut.
Put the prop and prop nut on. Put the ferrule on the stub shaft, and lightly tighten the set screws. Slide your flex cable into the front of the ferrule, and tape the front of the cable to the bottom of the boat for now.

Mount the engine as far forward as possible.

Mark bottom 15-1/2 from transom.

Use a 1/4 drill bit to help align engine.

Custom mounts being installed.

Center of Gravity

Mount engine as far forward as possible!

Engine mounting

Use scraps of wood to angle it so that the collet (or square drive) points to the hull bottom, at least an inch in front of bulkhead 5.
Mount the engine as low as possible, but make sure the mounts don't touch the bottom.
Mark the rear hole locations on the engine rails.
Remove the engine and drill the rear holes.
Mount the engine to the rails at the rear.

Put a ¼ inch drill bit in the collet. Block up the front of the engine, and mark the rails.
Make sure the drill bit is pointing to the center of the boat, and at least an inch in front of bulkhead 5.
Also use it to determine the exact location of the hole for the stuffing tube in the hull bottom.

If using a square drive, find a drill bit that fits snugly. Around 3/16.

Remove the engine and drill the front mounting holes.
Remove all the hardware.
Bolt the engine back in, using all 4 mounts.
Mark the location of the hole for the stuffing tube.
Cover the engine to keep dust out of it.

Stuffing tube

Drill a 5/16 hole, about ½ inch behind your mark for the stuffing tube. Use a round file to elongate this hole to match the angle of the engine.

To get the exact angle, you can wrap masking tape on the drill, and slide the 11/32 stuffing tube over that, to get it centered.
When the hole is opened up properly, the stuffing tube will slide onto the drill bit and tape without

Keep an eye on skeg mount when placing engine. You may have to get creative with one engine mount bolt.

Stuffing tube glassed in place and filled with filler.

Fuel tank and hold down blocks.

interference.
Slide the stuffing tube in until it is about ½ inch away from the collet, and mark the other end about ½ inch past where it exits the bottom of the boat.

Cut the stuffing tube on your mark, and roughen the outside surface with sandpaper.
Wipe the tube with alcohol, and set aside.

Cut some fiberglass cloth into strips about ½ an inch wide.
Slide the stuffing tube into place, and put tape on the hull bottom, around the stuffing tube, to keep epoxy from running out.

Mix about 1 ounce of epoxy, and coat the hole and stuffing tube where it enters the hull.
Don't be shy, use plenty.
Place your cloth strips under, above and around the stuffing tube to hull joint. Make sure the cloth is fully wetted. Don't get any resin in the stuffing tube.
Let sit at least 2 hours.

Epoxy the four 1/2x1/2 plywood pieces in place to hold the fuel tank. Sand the sealed bottom before gluing. When dry, drill pilot holes for screw hooks. Be sure hooks do not penetrate the hull bottom. Waterproof these.

When cured, carefully remove the engine. It may be easier to loosen the collet first.
Remove the tape from the hull bottom and fill any small voids around the stuffing tube with wood filler. Allow to dry then sand.

Set aside.

Put the rudder on with a couple of screws.
Set the radio box in place on the ply rails, about 1-3/4 inches behind bulkhead 4.
Drill a small (1/8) hole through the transom, in the approximate location of the rudder pushrod.
Put a piece of small wire through the hole, and see how the rudder servo arm lines up with the rudder arm.
If you are way off, you can easily drill another small hole, and fill the first one later.

Plan your throttle arrangement at this time, and drill any necessary holes, as the radio box will be permanently attached to the boat in the following steps.

Another view of tank mounting.

You should have all of the blind nuts installed for the hardware at this time.

Sand the tops of the rails where the radio box goes.
Mix up about ½ ounce of 30 minute epoxy.
With a small brush, coat the bottom of the radio box, and the tops of the rails.
Set the radio box on the rails, 1-3/4 inches behind bulkhead 4, and flush with the left rail.
Make sure the box is in correctly (rudder servo in rear).
Put some weight in the box to hold it in position
Double check that the box didn't move, and go away for an hour.

After the radio box is cured, make the rudder pushrod.
You have several options as to what to make it out of. Just make sure it's strong and stiff
We like to use a 4-40 pushrod from the hobby shop, which is threaded on one end.
We attach the rudder end with a 4-40 ball link, and the servo end with a solder clevis.

Shaft tube and cable

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

Slide the 5/16 shaft tube into the 11/32 stuffing tube until it protrudes into the boat about ¼ inch.
Mark the shaft tube on the bottom of the boat where the 11/32 stuffing tube ends.
Make another mark about 3 inches beyond the first.
Remove the shaft tube.
With a propane torch, heat the 3 inch area of the shaft tube you marked.
Heat it until it changes color, to a purple color. Don't get it red hot.
It only takes about 10 seconds to get it to change color.
Let the tube cool at room temperature. DO NOT quench in water. It must cool slowly. The shaft tube is now annealed, and will bend very easily.

Bolt the engine back in.
Slide the shaft tube into the stuffing tube until it touches the collet.
Carefully bend the annealed portion of the shaft tube with your fingers, so that it is parallel with the bottom of the boat, and about ½ inch below.

Measuring depth of shaft tube in strut.

Shaft tube with smooth bend.

Shaft tube installed.

Collet type

Slide the strut onto the far end of the shaft tube, until it stops. Mark the tube, pull the strut off and measure how far it went in. Write this down.

Bolt the strut on with 2 bolts. Make sure you can adjust the strut freely.
Set the strut so that its centerline is about ½ inch below the bottom of the boat, and parallel.
Adjust the shaft tube so that it is aligned with the strut. You can turn the tube slightly in the stuffing tube, so that it's next to the strut.
Make a mark where the front of the strut is, and remove the tube.
Make another mark back from your first, using the measurement you wrote down earlier.
Cut the shaft tube here, and file the end smooth.
Remove the strut, slide the shaft tube into the stuffing tube and slide the strut onto the end of the shaft tube. It should easily bolt to the transom.
If not, find out why and correct it.
When satisfied with the shaft tube, mark the front and cut it to the same (distance from the collet) as the stuffing tube. File any burrs.
Reinstall the strut and shaft tube (again?).
Loosen the collet and slide your assembled flex shaft in until it bottoms out in the collet. Do this several times, and make sure it goes in about ¾ of an inch.
Tighten the collet slightly with two wrenches.
Measure the distance from the back of the strut to the front of the drive dog. Subtract 1/8 inch from your measurement.
Remove the cable assembly and cut the cable by the amount you just determined.
To cut the cable, use a motor tool with a cut off disk, and file or grind the end smooth.
Put the cable back in, and there should be a 1/8 inch gap between the strut and drive dog.
The actual running gap will be ¼ inch, as we will pull the cable back 1/8, to keep it from bottoming out in the collet.
You must have this ¼ gap when running, as the cable will "wrap up" and get shorter in use.


Note 1/4 inch gap between drive dog and strut.

Cable

Square type

Bolt the strut on with 2 bolts. Make sure you can adjust the strut freely.
The stub shaft and ferrule should be in the strut.
Set the strut so that its centerline is about ½ inch below the bottom of the boat, and parallel.
Adjust the shaft tube so that it is aligned with the strut. You can turn the tube slightly in the stuffing tube, so that it's next to the strut.
Make a mark about ½ inch forward of the front of the ferrule.
Remove the shaft tube and cut on this line.
Reinstall the shaft tube and make sure you have about ½ inch between the rear of the shaft tube and the front of the ferrule.
When satisfied with the shaft tube, mark the front and cut it to the same (distance from the collet) as the stuffing tube. File any burrs.

Slide your squared shaft into the shaft tube, and into the engine. Be sure it is all the way in the engine (or clutch).

While holding the cable in this position, mark the cable at the front of the ferrule. If you can't get a good mark on the cable, try wrapping a little masking tape to the area first.

Remove the cable.

Make another mark 3/8 behind the first, and cut the cable here. Remove the strut, reinstall the cable.

Install the strut, slipping the cable into the ferrule. You should have about 1/8 inch of fore and aft "play in the cable. If all is well, remove strut and cable.

Remove the ferrule from the stub shaft.

If the cable is used (weed trimmer), then clean the cable as follows:

Heat the last 3 inches of the cable with a propane torch until it starts to smoke. Move the flame back to maintain a temperature that just causes the cable to smoke. Do not overheat the cable. If the cable gets red hot, it will be ruined…

Continue heating the cable until it stops smoking.

Let the cable cool, then use a clean wire brush to make it shiny.

Put the cable in a vice so that ½ inch is sticking straight up. Measure to be sure you have ½ inch.

Put some liquid silver solder flux on the cable.

We use Stay-Brite silver solder and flux (hobby shop).

Put the pointed end of the ferrule onto the ½ inch of cable. Put another drop of liquid flux into the ferrule.

Cut 4 pieces of silver solder about 1/8 inch long, and drop them into the ferrule, so they are on the end of the cable.

Use your propane torch to heat the base of the ferrule slowly, until the solder melts and flows. Remove the heat and don't touch until cooled.

Finishing

Sand the entire hull with 80.
Fill any dings, dents, craters, valleys or chips with wood filler.
When dry, sand again with 80. 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.

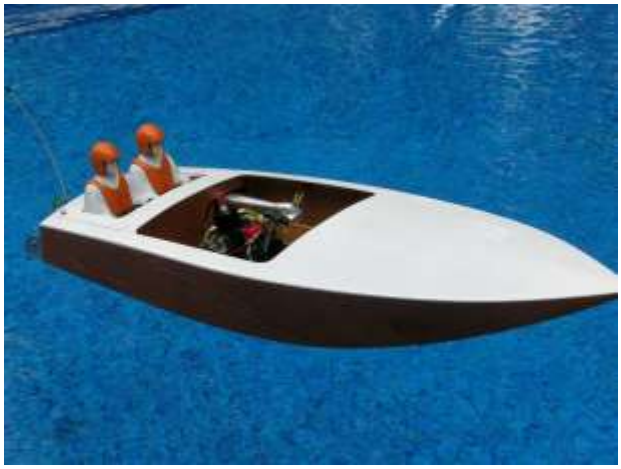
Put the boat on your stand. This is where it will live, when it's not in the water.

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.
Install the rudder assembly

Install the sharpened and balanced prop and prop nut on the flex shaft.
Install the fuel tank 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 outlet.
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 pushrods to the outside of the radio box. Make sure the seals are centered on the pushrod holes. Allow to dry.

Install your antenna.



Setup

Adjust the strut so that its center is about ½ inch below the bottom of the hull. Try to get it about 3 degrees negative with the rear hull bottom.
This means that the prop should be lower than the front of the strut.

Grease the flex cable.
Slide the cable through the strut, into the engine collet.
Leave a ¼ inch gap between the drive dog and strut (collet drive only).
Tighten the collet.

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

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 the trim tabs are flush, and not up or down. Use a small straightedge to check.
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 drop 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 about 3 degrees nose high?

How about the turns? Does the nose 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 "CrackerBox Tuning Tools" sheet to help you sort out any problems.

Cracker Box tuning tools

Strut: Depth- Lower to loosen the boat, higher to wet the boat. Imagine that the prop wants to always ride at the same depth in the water. If you lower the prop, you are lifting the boat out of the water. The reverse is true for raising the strut; it lowers the boat in the water.

Strut: Angle- Negative to push the bow down, positive to push the stern down.
This is a course ride angle adjustment. Small changes in the strut angle make large changes in ride attitude.

Trim Tabs: Inner- Use these for fine adjustment of the ride attitude.
Outer- use these for fine adjustments to turns, as well as to control torque and prop walk. Use of a very sharp prop helps eliminate both.

Rudder: Trim- Use this to make the boat go straight. The rudder should be parallel to the hull centerline. Anything less will rob speed. If you have to trim left, it's probably prop walk.

Rudder: angle- Use this to control the nose in turns. Kicking the bottom of the rudder Forward will cause the nose to rise in the turns. Kicking the bottom back will cause the nose to drop in the turns. It only takes a little; 5 degrees either way would be too much for most hulls.

Turn fin: This is mounted to the right side of the transom, and 90 degrees to the bottom of the hull. Make sure that there is never any fin area forward of the pivot bolt (kick it back slightly).

CG: This is the longitudinal (fore and aft) balance of the hull. Monos are usually 30-35 percent of the hull length, from the transom. This is the pivot point for turning. A forward CG keeps the hull wetter, preventing blowovers. Limits absolute top speed due to drag.
An aft CG keeps the hull out of the water, and usually blows over with very high speed. That's why they call it a "balance" point…

Prop: The prop is very important to speed, as well as overall handling of the boat.
You can (and should) experiment with many props, lifting and non lifting, to get the best speed and handling from your boat. Always sharpen and balance your props! A sharp prop helps reduce "prop walk", and a balanced one usually stays together!

Troubleshooting

Boat bounces in the straights-	Strut too high CG too far back Speed too slow
Boat blows over at high speed-	CG too far back Strut not negative
Boat "plows"-	CG too far forward Strut too high Strut too negative Inner tabs too low
Boat is very "light" and unstable-	Strut too deep Inner tabs too high
Boat needs left trim to go straight-	Prop walk Prop walk Prop walk Rudder not aligned correctly Prop walk
Boat slides too much in turns-	CG too far forward Skeg bent outward Turn fin too small Skeg too small
Boat hooks in turns-	CG too far back Skeg bent inward Turn fin too big Skeg too big
Boat "chine walks"	Center or outer tabs too high Strut too deep
Boat is slow and won't turn-	**Get a Zippkits boat!**

Initial setup:

- Set strut parallel with bottom, and the prop centerline about ½ inch below the bottom.
  The strut will almost touch the bottom at this setting.
- Use the Zipp 470 prop (or a Prather 270).
- Trim tabs should be about 1/16 inch higher than the bottom of the hull bottom.
  Set the tabs parallel to the bottom with a ruler or straight edge (they will be 1/16 from the ruler).
- Run the boat, and adjust the strut so that the boat is fast, and runs flat, or flies level.
  If the boat starts to chine walk (rock from side to side), move the strut up 1/16 at a time until it doesn't.
- Adjust the strut depth and angle to get the boat running well. Don't touch the tabs until the strut is set…
- When you have the hull running nice and flat in the straights, it's time to get the turns working.
- When you adjust the trim tabs, remember that they are very sensitive. ¼ turn will be noticeable.

- Look at how the boat turns. Does it hop and roll in the turns? If so, drop the right outer tab ½ turn, and try again.
  What you want to see is the entire right side of the hull in the water when it turns. This is very evident if you watch where the water breaks from the hull as you go into a turn. It should quickly move forward as you deflect the rudder.
- Reduce the rudder throw until the boat will just turn on the buoys, and then increase it a little bit.
  You will never need any more than this, and too much can flip the boat easily.

Once you get the turns working, use the other three tabs (together) to adjust the hull's ride from day to day, as conditions require. If in doubt, make it wet. The water is NEVER calm when there are 5 or 6 other boats out there.

If you use a stinger (surface) drive, you will probably use a larger prop, but the rest of the adjustments should be done the same way.

When you get the boat turning correctly, it will actually pick up speed in the turns!

Take the time to get everything right, and you will be rewarded with an incredible running Crackerbox!