



# Vac-U-Tow™

## Model Towboat Kit

### For Radio Control

Manufactured by Vac-U-Boat™  
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Conyers, GA 30012  
[philpace@vac-u-boat.com](mailto:philpace@vac-u-boat.com)

**Length: 21.5 in. Beam: 6.5 in. Draft: 2 in. Displacement: 6 lbs.**

**Thank you for purchasing this Vac-U-Boat Towboat kit.** Although engineered to be easy to build, it has features that you may only see in more expensive kits. The brass and stainless steel drive system is very durable and should provide years of service with very little maintenance. The H.I.P.S. “High Impact Poly Styrene” hull is lightweight and strong. It is trimmed by a rubber rub rail that will greatly reduce the chance of damage during a collision. At full throttle, it runs at a normal walking pace making it easily controlled by inexperienced operators while retaining the realistic properties of full-sized towboats.

There is plenty of room inside for your radio gear and batteries. The motor is pre-installed in the motor tray. At 7.4volts, it draws only .95 Amp cruising at full throttle. With a two channel radio, electronic speed control and average servo use, the total draw can average 1.3 Amp. With a new, fully charged 2,000mAh 7.4 volt rechargeable battery, Vac-U-Tow will run for 1.5 to 2.0 hours. With this setup, about 42 ounces of ballast weight is necessary. This means that you can substitute heavier batteries or add electronic gear without overloading the hull. Oilite® sintered bronze bushings support the precision stainless steel prop shaft in a custom-drawn brass stern tube. A syringe of non-toxic, plastic-friendly Synco Superlube® synthetic grease is included for filling the stern tube. The brass motor-prop shaft coupling uses an acetal plastic dogbone that has self-lubricating properties to minimize wear. The injection-molded rudder and flankers are formed over solid brass shafts and are supported at the rudder arm with Oilite® bushings. Screws are stainless steel. DU-BRO™ E/Z Connectors are provided to attach the stainless steel pushrod to the servo and rudders.

The boat can be painted with plastic-compatible hobby spray paints or plastic-friendly paints like Rustoleum® Painter's Touch 2X or Krylon® Fusion For Plastics. Avoid lacquer or standard enamel paints as they may damage the plastic. The kit includes vinyl decals for doors and windows. White vinyl decals frame the clear window openings of the pilot house.

Please read the following information, warnings, tips and tricks before building this model. Use caution with glue, the plastic bags, and small parts if children are around. Read the labels of all adhesives, paints, and electronics purchased for this hull. Use extreme care with hobby knives when cutting plastic.

Remember to turn on the transmitter first, then the boat's receiver. Mount the boat switch on the cabin wall so it will be easy to locate. Teach your child to turn off the boat before lifting it out of the water. Even a plastic prop can be hazardous to their little fingers.

Enjoy your Vac-U-Tow. If you have any questions, you can contact me at [philpace@vac-u-boat.com](mailto:philpace@vac-u-boat.com).



## WARNING:



**CHOKING HAZARD** - Small parts. Not for children under 3 years.

**WARNING** - To avoid danger of suffocation, keep plastic bags away from babies and children. Do not use in cribs, beds, carriages or play pens. **THESE PLASTIC BAGS ARE NOT TOYS.**

**WARNING:** Brass parts in this kit contain lead, a chemical known to the State of California to cause cancer and birth defects and other reproductive harm. Bronze and brass alloys can contain .03% to 3.7% or more lead.

**WARRANTY AND RETURN POLICY:** Vac-U-Boat Hull Kits are sold direct from Vac-U-Boat. If you purchased this from a dealer, contact that dealer on any matter of return. Once you open and inspect this kit and for any reason you do not wish to keep it, return all of the parts to their bags and repack the kit into its box along with a copy of the receipt. (Keep an original for your records.) Mail to me via the United States Post Office, Parcel Post with “Delivery Confirmation”. Please do not use any Express Mail carrier or send COD. I cannot be responsible for such higher-than-necessary shipping costs. Upon receipt of the complete kit, I will reimburse you the original cost plus the cost of the return postage shown on the package and mail those funds to the name and address on the receipt copy. I will replace any defective part found during the assembly or operation of the boat for a period of six months after the purchase date. This warranty does not cover damage caused by abuse, misuse, improper spray paints, alteration or accident. It does not cover consequential damages. You may have other rights, which vary from state to state. **Caution: Never leave the boat in a hot car. It will melt!**

**CUTTING PLASTIC: Adults only!** A sharp pair of sewing scissors is best to trim around the parts. Cut through sharp corners in the plastic with a hobby knife. While H.I.P.S. is tough, it will tear. When cutting out openings like the top of the Cabin and the rear hatch, drill 1/8” holes at each corner then score the opening with the tip of the hobby knife. (Just a deep scratch.) Trace the score 3 or 4 more times and you will cut through the plastic. As you cut through the plastic, hold the knife at a side-angle to keep the blade from binding in the cut. Don’t hurry. Draw the blade slowly along the plastic to prevent over-cutting. Think about where the blade would go if it slipped. (Like, into your leg or arm!) Be safe! Most small parts are pre-trimmed for your convenience.

**GLUE:** You will need about two ounces of 30-Minute Epoxy. Most epoxies that cure in 30 minutes or more are waterproof. Epoxy is used for the prop shaft, motor tray, rudder and flanker bearings & ballast weights. Where specified, a filler should be added to make the epoxy less brittle, increase the volume, and to thicken it. Dry plaster, baby powder (cornstarch), or micro-spheres all work well. Mix the two parts of the epoxy together first. Then, add 2/3rds of the same volume of filler material and fold them together until blended. Medium CA (super glue found at hobby stores) is best for gluing the H.I.P.S. together when attaching the Internal Tray to the Hull, 1st Deck & Cabin to the Hull, and the Upper Pilot House to the Lower Pilot House. If you are inexperienced with the hazards of CA Glue, epoxy works fine but cures slower. With epoxy or CA, scuff the mating surfaces with medium sandpaper for a stronger bond. Tubes of Model Cement found where plastic model cars are sold will work. Both the regular kind or the “non toxic” type will work. Model cars are made of the same type of plastic as this boat. However, because the sheet plastic is so thin, it will melt more easily if you use too much glue. CA provides the strongest seam but must be used in a well ventilated area. Epoxy works great. Both CA and Model Cement are permanent. If you think you will ever want to separate the upper and lower hulls, then glue them with filled epoxy or another sealant. You will have to scuff the surfaces of plastic to help the epoxy bond to the plastic. Gentle prying will separate the parts. Experiment with the glues using the scraps of H.I.P.S.

**AVOID SILICONES** Aquarium sealants, and silicone caulks that have a “vinegar” smell as they cure can damage electronic circuitry. The “vinegar” smell is acetic acid.

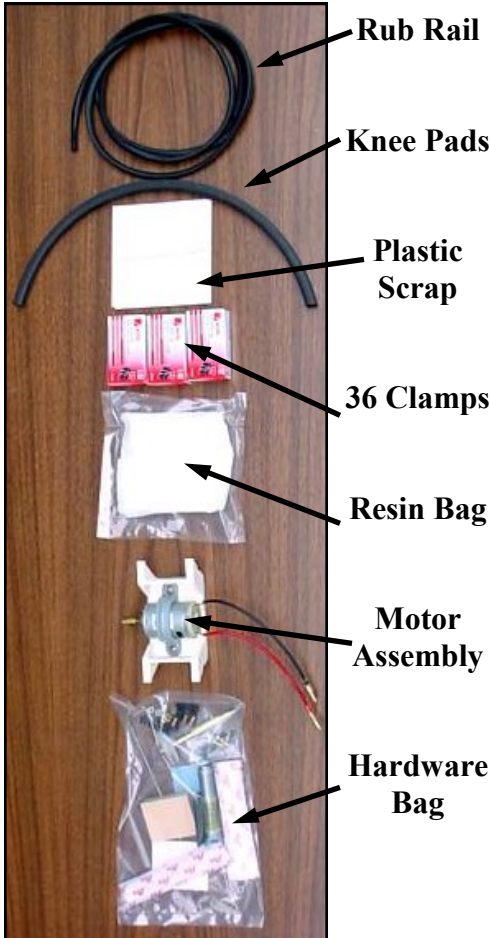
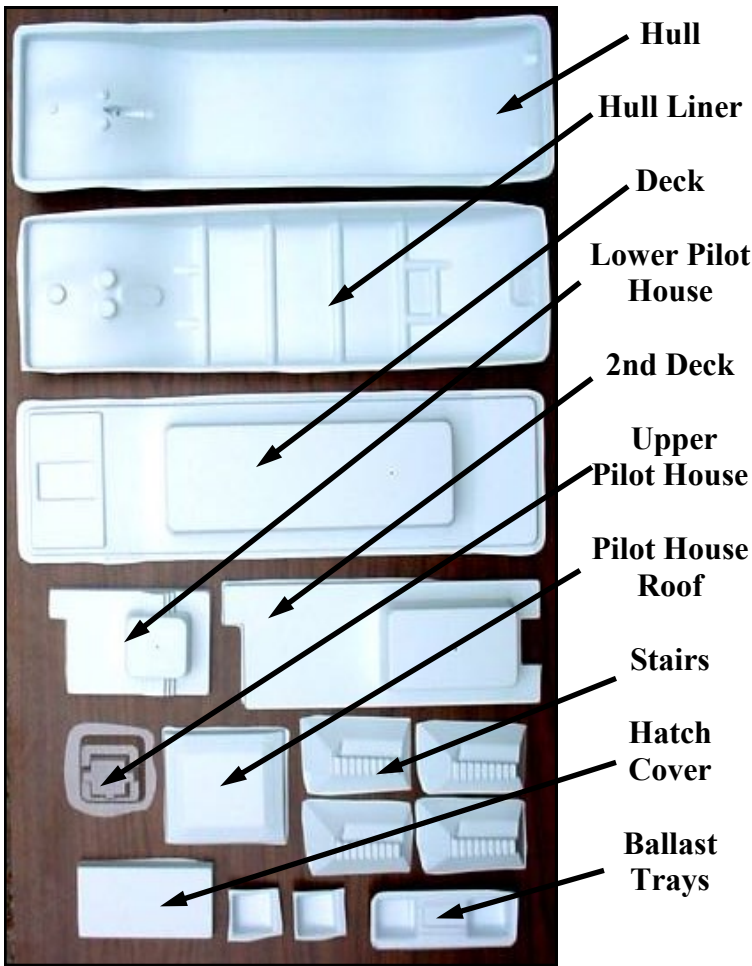
**PAINT:** The boat can be painted with plastic-compatible hobby spray paints or plastic-friendly paints like Rustoleum® *Painter’s Touch* 2X or Krylon® *Fusion For Plastics*. Avoid lacquer or standard enamel paints as they may damage the plastic. Use spray paints that are safe for plastics. The short cans of “Hobby Enamel” labeled for use on plastics work well. Avoid regular Krylon® enamel or other household enamels and lacquers. When buying them, if the lid isn’t sealed, remove the cap to see if someone “test sprayed” the can. If it has any paint residue on the spray nozzle, don’t buy it. It is likely clogged because it was not properly cleared by inverting the can and spraying the paint out of the nozzle. (See the can’s directions.) No sanding is necessary with plastic-friendly paints. They will bond with the H.I.P.S. as long as the plastic is clean. Don’t get grease or oil on the plastic as it can repel the paint. If in doubt, wash your hands with liquid detergent before handling the plastic. Test the colors on the scraps to see if a coat of clear is necessary.

**NEVER USE LACQUER OR AUTOMOTIVE PAINTS ON H.I.P.S. PLASTIC.** It will soften the plastic and greatly shorten its life span and may completely melt the plastic. Don’t be fooled by test spraying auto paint onto plastic scraps. They may be thicker than the model parts and will be less affected. Avoid the short cans of lacquer you will find at hobby stores. Ask for hobby enamel. Check out the Painting Tips section of our web site for more help.

# Hull Kit Contents:

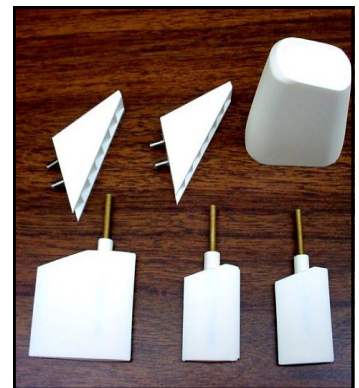
Fifteen piece high impact polystyrene hull assembly (pre-trimmed or marked for trimming), "545" size Johnson electric motor prewired with leads and capacitors, Motor-Tray, Motor-Shaft Coupling Assembly, Prop, custom drawn brass Stern Tube assembly with stainless shaft and Oilite® bearings, synthetic Stern Tube Grease, Rudder and 2 Flankers with solid brass Shafts & Oilite Bearings, stainless steel Pushrod with 4 Du-Bro® E-Z Connectors, stainless steel Screws & Locknuts, resin & stainless steel Push Knees, rubber Rub Rail and Push Knee Pads, Velcro for mounting the Hatch, 2nd Deck, Pilot House and Pilot Roof, 36 gluing clamps for assembly, sandpaper, a vinyl decal set, and instructions.

**To complete this hull kit, you will need:** ADULT SUPERVISION, 15-minute epoxy, medium CA glue, (Regular or non-toxic model cement will work fine but CA "super glue" is needed for the end joint of the rubber rub rail) electric drill with bit assortment, screwdrivers including a tiny Phillips screwdriver for servo screws, scissors, hobby knife or Xacto® knife, ballast weights (a carton of 5,000 BB's or lead shot work well), pencil, masking tape, light sewing-machine oil, a can of plastic-friendly spray paint or non-toxic type brush paints compatible with plastic.



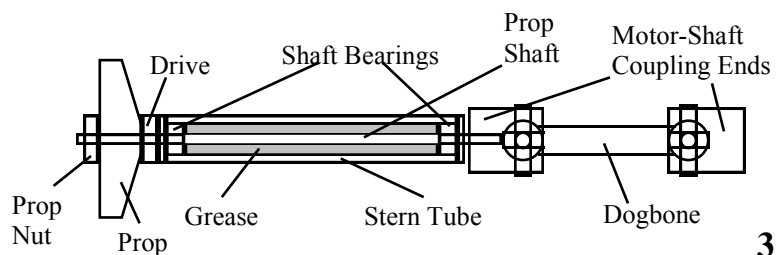
## HARDWARE BAG

Fine Sandpaper, Medium Sandpaper, White Plastic Block, Foam Block, 3 Rudder Arms, 3 Rudder Bearings, 4 Tow Knee SS Locknuts, 2 strips Velcro, 5 Set Screws, 4 E-Z Connectors, Coupling End, Dogbone, Prop-Shaft Assembly, 3 Hex Wrenches, Synthetic Grease, SS pushrod.



## RESIN BAG

Tow Knees with SS bolts, Stack, Rudder, 2 Flanking Rudders.



## To complete the radio-controlled boat, you will also need:

A two-channel 2.4ghz radio, (rudder & throttle), with one standard servo. Optional 2nd servo for separate Rudder/Flanker control. More channels for other features.



You can use a two-stick model or a pistol-type radio like R/C cars use,



An Electronic Speed Control (ESC) with forward and reverse,



A 7.2 volt rechargeable NiMH battery (six cells) or 7.4v LiPo (2 cells), (Batteries up to 12 volts can be used for more power.)



A Battery Charger. Inexpensive wall chargers will work fine



but "Peak Detection" chargers are best for your batteries



**This boat kit can be painted before or after assembly, as you like. If you paint before assembly, keep paint off of areas where glue will bond the plastic. Paint can prevent proper adhesion of the glue. These instructions are presented with no painted parts for clarity. The rubber Rub Rail and Tow Knee Pads should be installed only after all painting is completed. Read the text below each photo before performing that step. Take your time and enjoy building this kit.**



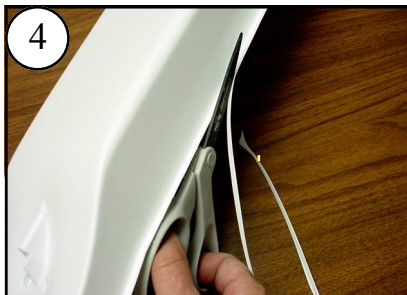
Using the prefilled syringe, Squeeze the Super Lube into the Stern Tube until it comes out the other end.



Push the Prop Shaft into the stern tube. This will push out the excess grease. Wipe off the excess with a paper towel. Be careful to keep any grease off of the brass Stern Tube. Clean it with a cloth dampened with glass cleaner.



Mark the stern tube 1 inch (25mm) from the end of the rear bearing near the prop. Wash your hands to remove any grease.



Trim the hull along the pencil mark on the underside of the flange. May be easier to cut if you invert the scissors as shown.



Cut straight across, along the front line at the Tow Knees. (Ignore the slight bump in the line at each Knee.



Use a 3/4" wood scrap (better) or the foam block as a backing block when drilling the holes for the rudder and flankers. Place under each before 4 drilling.



7 Use a sharp 1/4" drill bit. Use slow gentle pressure. The plastic is very thin. Keep bit centered in recess as you drill.



8 From the top, the finished holes should look like this. Don't worry if the hole is not perfect, or is torn.



9 The Hull Liner reinforces the Hull floor & provides a mold for the Rudder Bearing epoxy.



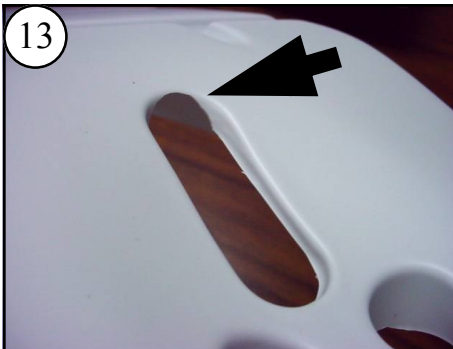
10 Trim at the line. It is easier to cut in this direction with the scrap to the left of your scissors.



11 Cut off the caps of the 3 rudder molds. Cut just below the rounded top edge. Very thin plastic here. Use a new sharp blade.



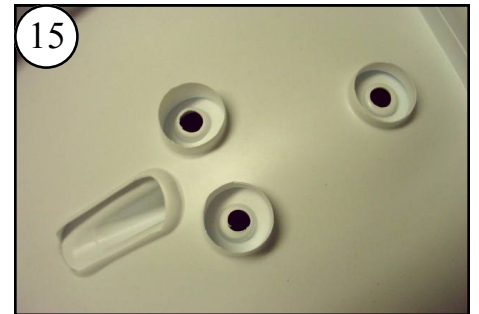
12 Use a hobby knife to score and cut the Stern Tube opening from the underside of the Hull Liner.



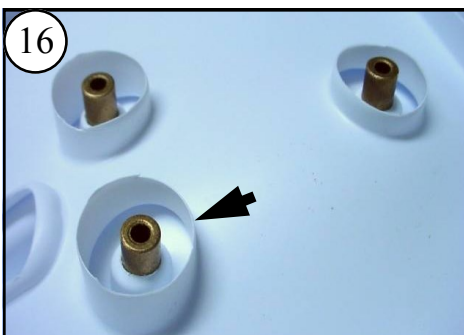
13 At the front (bow) of the Stern Tube opening, trim away the raised flange to allow room for the tube to extend forward.



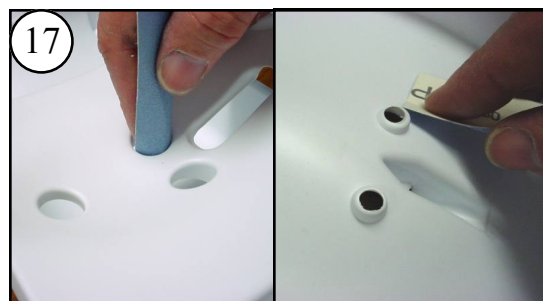
14 From the underside of the Hull Liner, drill 7/32" holes about 1/4 inch from each end of the four floor reinforcements. These will allow trapped moisture to dry.



15 Test-fit the Liner into the hull. Push it rearward until it stops against the stern of the hull. The cups form molds for epoxy to secure the 3 rudder bearings.



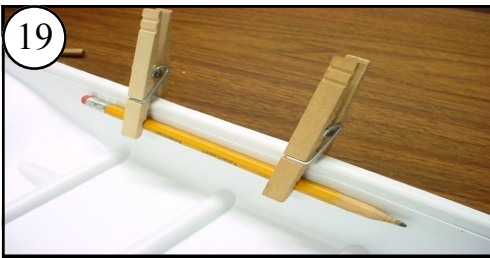
16 With the bearings seated against the hull, check the height of the mold cups. Trim until they are just below the top of the bearings.



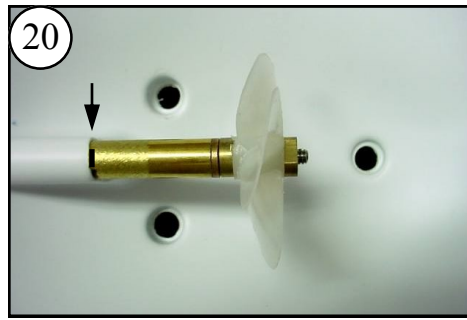
17 Use the medium sandpaper to scuff the insides of the mold cups on the Liner. Scuff the inside of the Hull around each rudder button, and inside the slot where the stern tube will be mounted.



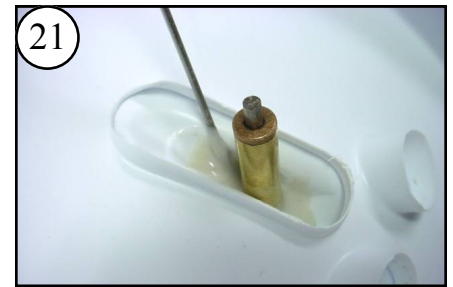
18 Clean any debris from the Hull. Using these lines as a reference, put 4 beads of medium CA on the floor, and 2 beads on each side of the hull.



19 Set the Liner into the Hull stern-first to align the rear, then press into place. Hold for 1 minute. If necessary, you can clamp the sides as shown



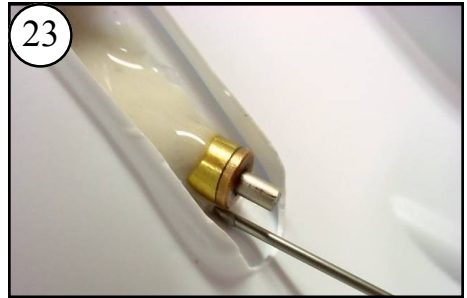
20 Insert the Stern Tube Assy into the hull. The mark should be just visible at the end of the molded strut.



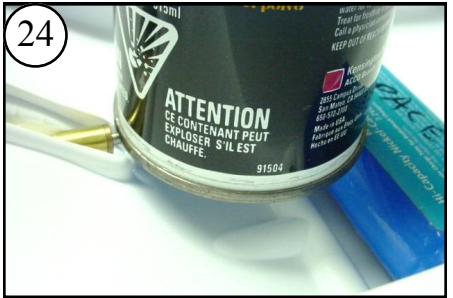
21 Tilt up the Stern Tube. Put filled epoxy on top and under the tube. Put just a little under it. Twist the Stern Tube to distribute.



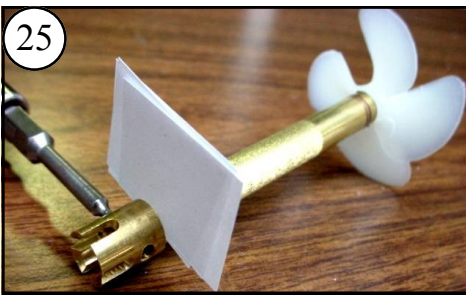
22 Press the Stern Tube down into position. Check the mark on the underside. Keep epoxy away from the bearing.



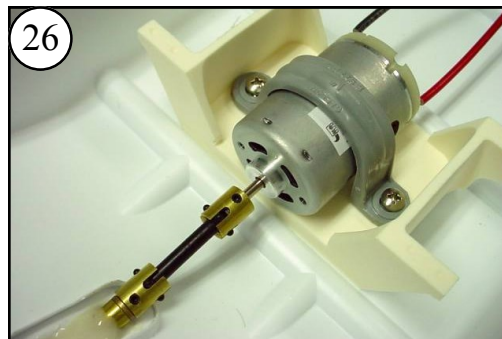
23 Scoop out any epoxy under the end of the Stern Tube. Use alcohol to clean off any epoxy on the bearing.



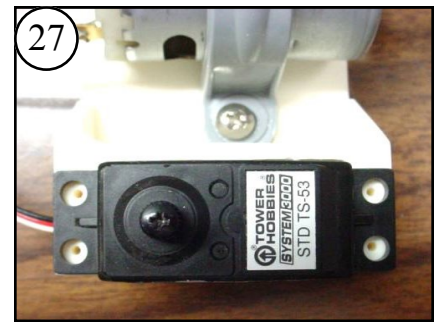
24 Hold the Stern Tube in place until the epoxy fully cures. I used a spray can to hold it down.



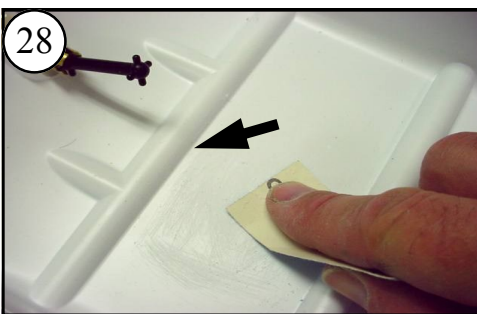
25 Install the Prop Shaft Coupling End onto the Prop Shaft. Make sure there is a 1mm space between the Coupling and the Stern Tube. 3 pieces of paper will make a good gauge for the clearance needed.



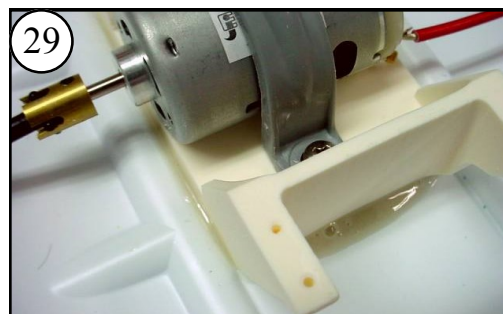
26 Test-fit the motor assembly. The dogbone should have about 1/16" of forward and backward play.  
**Viewed from the stern, the rudder servo will be on the left of the motor.**



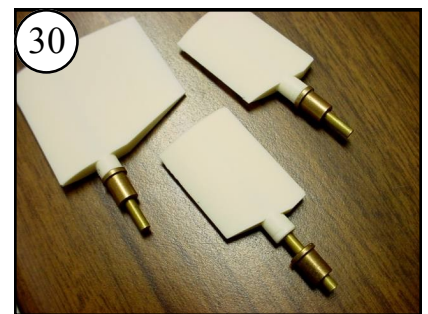
27 Compare your servo to the drill reference marks on the motor mount. Drill 1/16" holes for the servo screws. Do not install the servo yet.



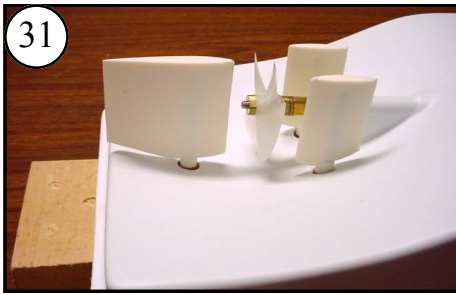
28 Scuff the mount area of the Hull Liner, and the underside of the Motor Mount with medium sandpaper for best adhesion. Sand the inner edges of the floor braces too.



29 Apply filled epoxy to the underside of the Motor Mount. Set the Motor Assembly in place. Adjust to align the Motor Shaft to the Stern Tube. Let the excess epoxy flow out as shown.



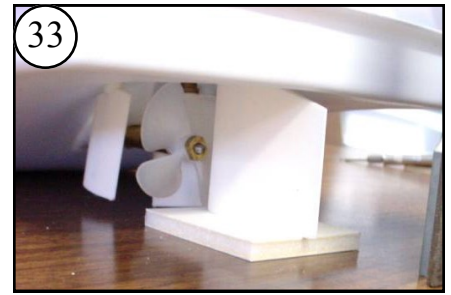
30 Slip the Rudder Bearings onto the Rudder and Flankers. Make sure they spin freely. If binding, check the shaft for plastic residue.



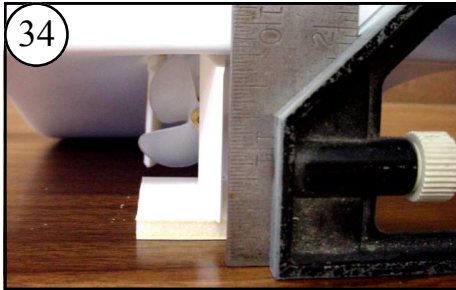
31 Insert the Rudder and Flankers into the hull. Make sure they fit fully into the recessed holes. Trim the drilled holes to center if necessary.



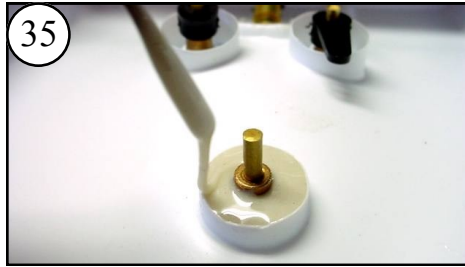
32 Put a weight into the hull to hold it down. Set the Rudder onto the supplied white block. Use a scrap wedge to make the rear of the hull level to the table.



33 Adjust the rudder until it sits square (front to rear) onto the block.



34 Use a Book or Square (shown) to vertically square the rudder (left to right). Check that the stern of the hull is still parallel to the table top.



35 Once the rudder is aligned, take filled epoxy and carefully fill the gap between the Rudder Bearing and the Liner's mold cups. Keep epoxy off of the bearing. Let fully cure.



36 Set the two Flankers onto the block. Square them in both directions. You can use the rudder to check their alignment as shown.



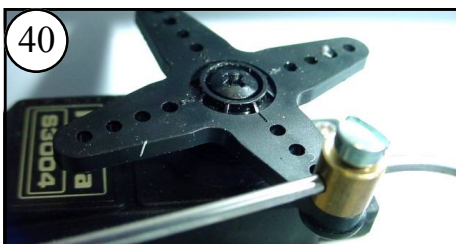
37 Add filled epoxy around the Flanker Bearings. Check their alignment and adjust before the epoxy cures. Let the epoxy fully cure.



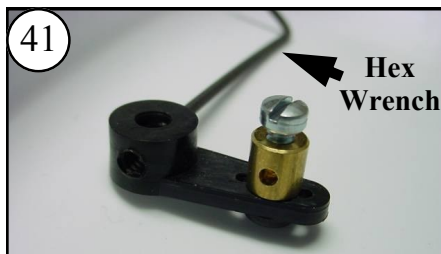
38 The 3 rudder bearings have been washed of oil so the epoxy will stick to them. Add a droplet of oil to the shaft. Rotate to distribute. Wait 5 minutes to soak in. Wipe off excess.



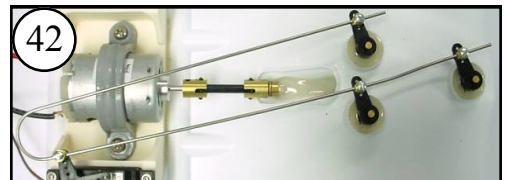
39 Install your Rudder Servo with the supplied screws, rubber mounts, and grommets. The servo's wire points toward the front of the boat.



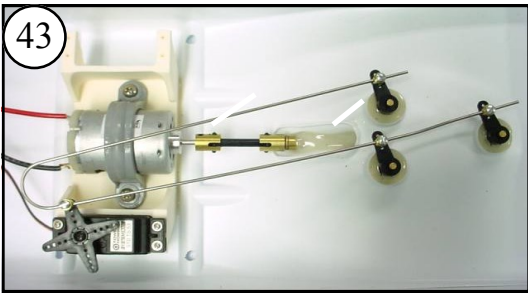
40 "Center" your Servo. Connect your radio gear and energize the servo with the transmitter stick & trim adjustment centered. Install servo arm as shown. Install EZ Connector in outer hole of arm.



41 Prepare three Rudder Arms with EZ Connectors as shown. Install the shaft set screw so that the rudder's screw faces forward (bow) and the flanker set screws face rearward (stern). The EZ-Connector is in the middle hole of the arm.



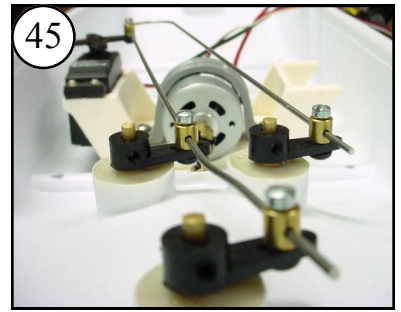
42 Holding the rudders straight, install the Rudder Arms at an angle shown above. Tightening the Arm Set Screw may cause the arm to bind against the bearing. If so, loosen the set screw and raise the arm on the rudder shaft, retighten. The rudders should freely rotate without binding.



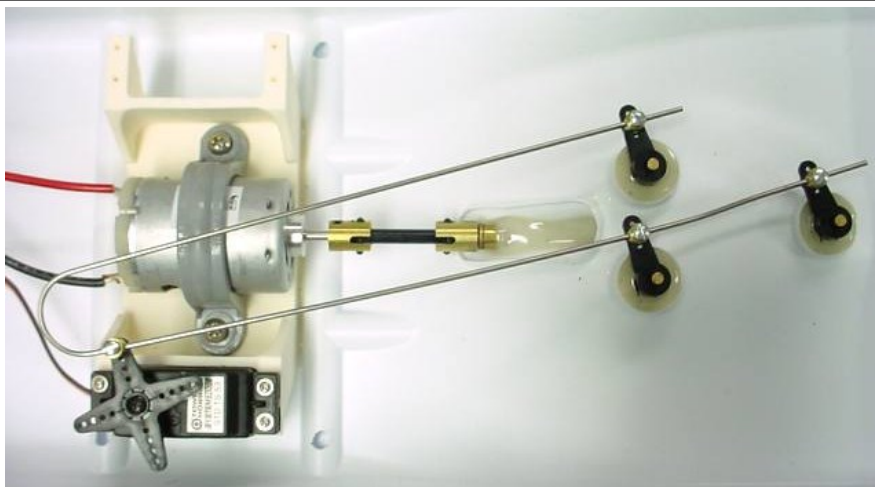
43 Install the long end of the Pushrod through the servo, then through the Left Flanker, Right Flanker and Rudder as shown.



44 Check the Rudder and Flankers to see that all are parallel to the Stern Tube.



45 Check the operation to see that the pushrod doesn't bind against the rudder arms at full left and right turns.

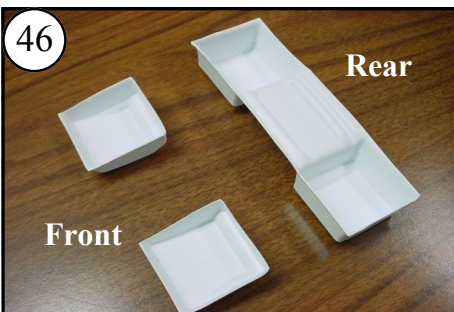
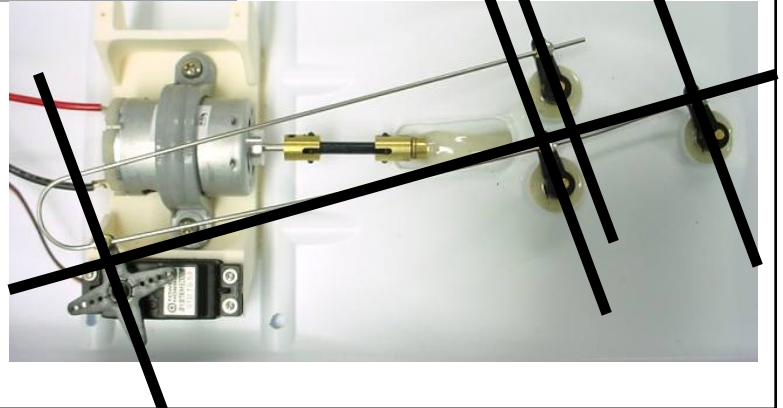


### Rudder Alignment Note

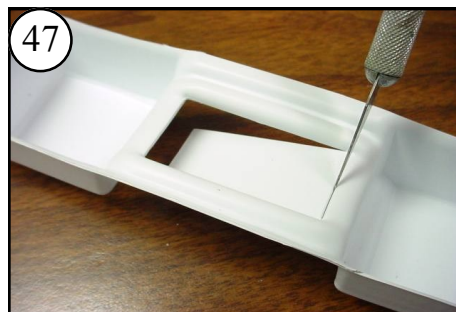
When the rudder and flankers are straight-forward and parallel, from the top of the hull, the linkage should look like this.

When setting up the rudders to the servo, the servo arm and the rudder arms are each approximately 90 degrees (square) to the pushrod.

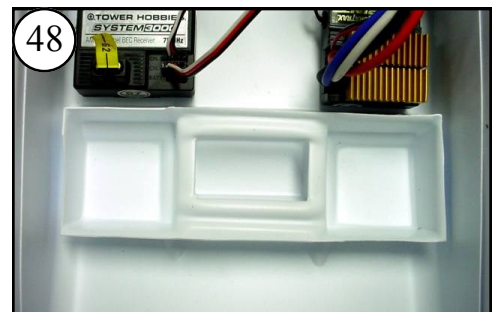
Run the servo to its left and right limits to ensure that the rudder arms aren't binding against the push rod, as they reach the end of their travel.



46 Trim the the Ballast Trays. These hold the Ballast Weights and allow easy adjustment of the waterline.



47 The Bow Ballast Tray has a cutout for a servo used in an Optional Barge Catch Accessory.



48 The round curves in the bottom of the trays match the floor reinforcements. Do not attach them yet.

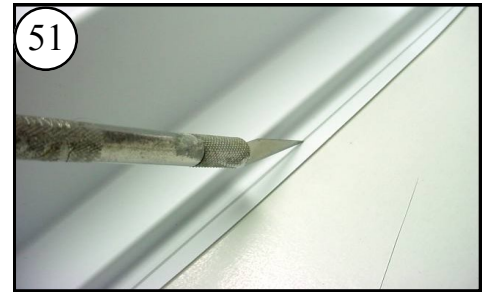




49 The rear Ballast Trays sit on either side of the Stern Tube as shown. Later, they can be attached with a small piece of Velcro for easy removal and adjustment.



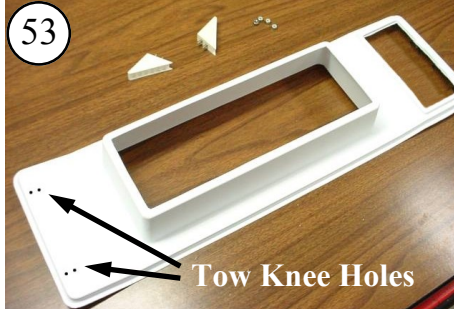
50 Trim the side of the Deck. Like the Hull, it may be easier to trim the sides holding the scissors upside down.



51 The Deck can be trimmed with a Hobby Knife by scoring the plastic along the trim line 3-4 times until the plastic separates.



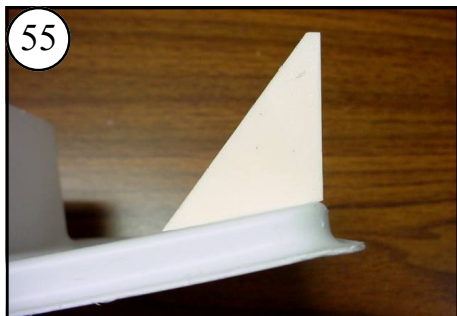
52 The Deck and Hatch openings have a recessed edge that is already marked with a pencil for trimming.



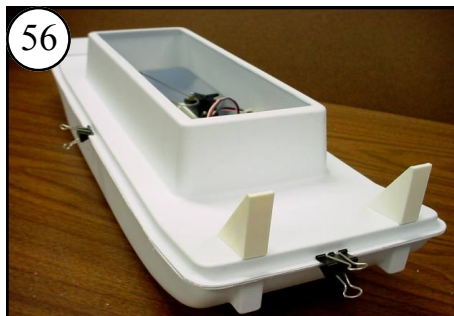
53 Trim the Deck opening and Stern Hatch opening with a hobby knife. Drill the 4 Tow Knee mounting holes with a 5/32" drill bit.



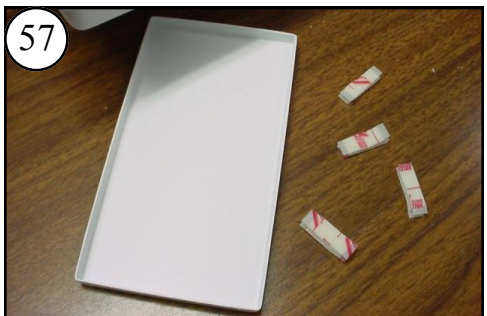
54 Attach the Tow Knees with the galvanized steel nylon locknuts. Tighten with a 5/16" wrench. If they are not square to the front of the deck, adjust the holes with your drill or hobby knife.



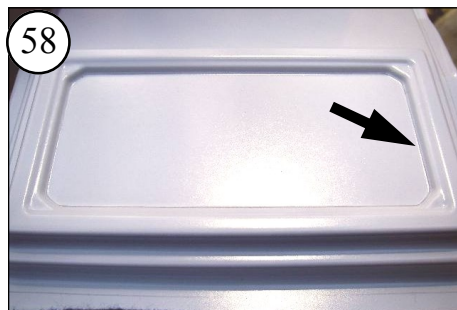
55 The front edge of the Tow Knee should be even with the front edge of the deck as shown. It



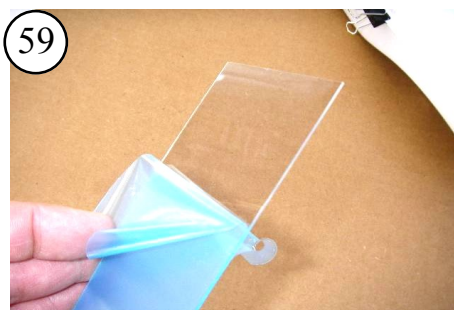
56 Temporarily clamp the Deck to the Hull to check the alignment of the Tow Knees.



57 Trim the Hatch Cover. Cut 4 pieces of Velcro approximately 1/4 inch long.



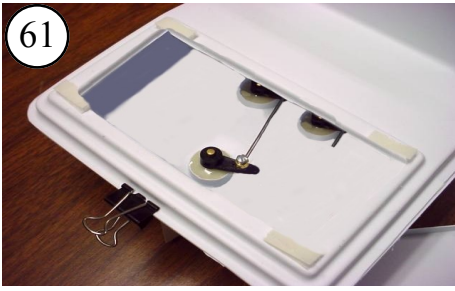
58 Trim the rear hatch opening along the marked pencil line. Score repeatedly with a hobby knife until the plastic center is free.



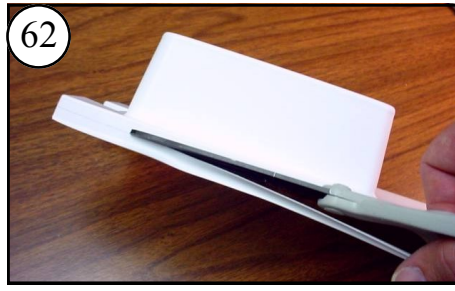
59 Peel the protective plastic off of the hatch cover. Set the clear cover into the hatch opening. Use scissors to round the corners for a good fit.



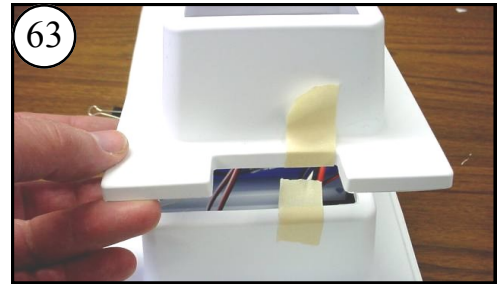
60 Install the set screws for the rudder arms so they can be reached from the hatch. Flankers on the rear (stern) side and rudders on the front (bow) side.



61 After the boat is painted, and the clear hatch cover taped in place to waterproof the hull, attach the outer hatch cover with hook & loop at the corners.



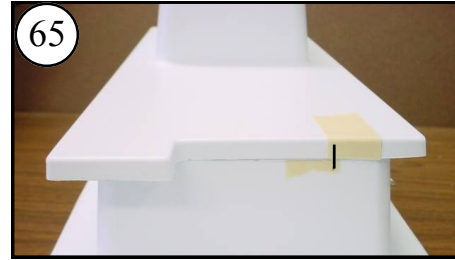
62 Trim the 2nd Deck. Easier to cut with the waste to the left of the cut. Use a Hobby knife to trim the inside corners. Cut opening in the top the same as in the Deck Cabin.



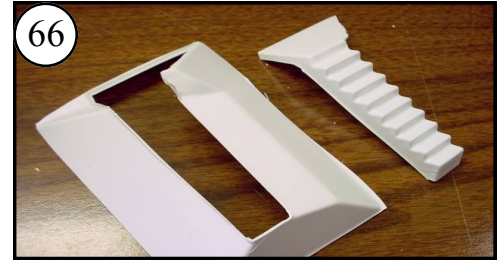
63 Put tape on the Bow of the Deck and 2nd Deck as shown. This will help mark their locations once you center the 2nd Deck onto the Deck.



64 Use a ruler to measure the left and right overhang of the 2nd deck to center it on the Deck. When centered, mark both pieces of tape.



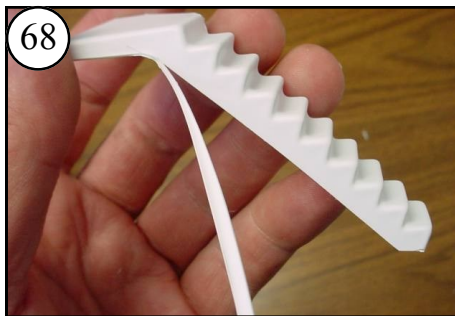
65 Repeat this at the stern of the 2nd Deck. This will allow you to remove the 2nd deck to install the Stairs on the Bow & Stern of the Deck.



66 One set of stairs is marked for rough-cutting. Transfer the marks to the other 3 sets. One is a spare, in case you mess up. Cut with scissors or a hobby knife.



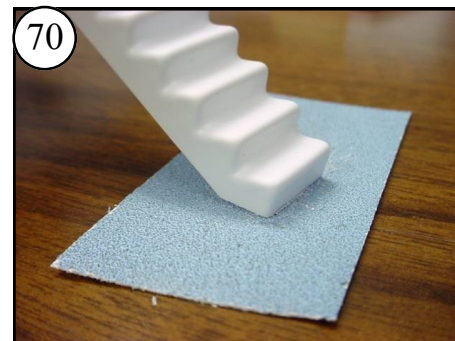
67 After rough-cutting, trim the sides of the stairs with scissors so they are flat. Trim the bottom step so its height is equal to the other steps.



68 Trim the side as much as necessary to get the look you want.



69 Trim this inside top corner to be flat so it will mount flush against the side of the Cabin. This top step will serve as a guide to align the 2nd Deck onto the Deck.



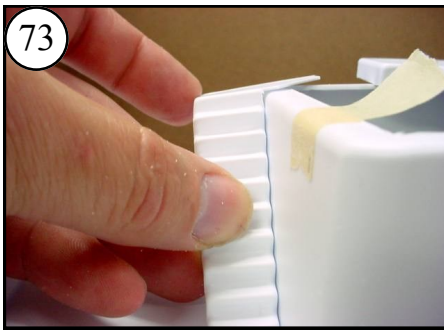
70 Holding the stairs level, sand the bottom to make an even-flat surface for gluing to the deck.



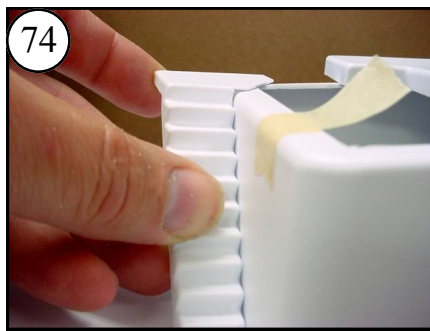
71 Round the bottom corner to conform to the curve at the base of the Cabin.



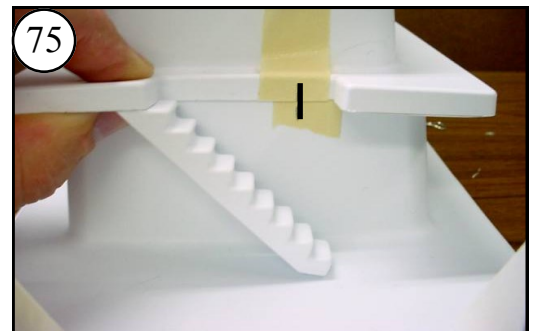
72 Test-fit the stairs to the Cabin wall. They must fit flush for the glue to bond well.



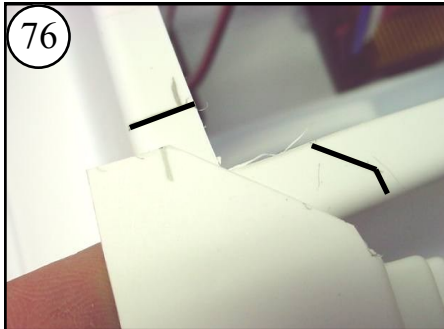
73 How you attach the top of the Stairs to the Cabin can determine if they sit level.



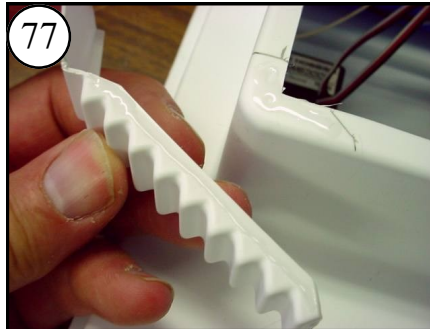
74 Rolling the top flange inward will level the upper steps. Too much and they could slant to the right.



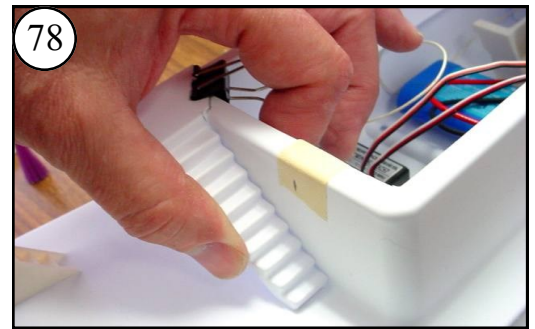
75 Holding the Stairs against the 2nd Deck Landing, slide the 2nd Deck to center it using the reference marks you made.



76 Carefully lift off the 2nd Deck while holding the Stairs in place. Using a pencil, outline the top of the stairs on the Cabin top. (Stairs pulled aside to show mark.)



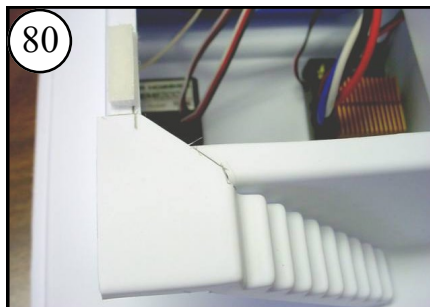
77 Put medium CA glue on the Cabin Top (inside the marks), side and bottom of the stairs.



78 Align the top onto the Deck and clamp. Swing the Stairs against the Cabin and down onto the Deck. Hold in place 1 minute.



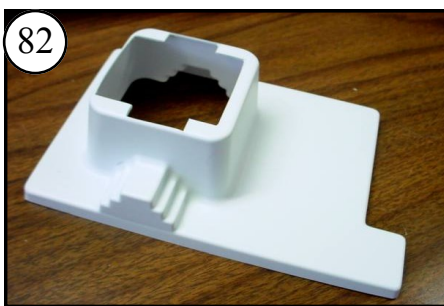
79 Remove the marked tape. The stairs should look like this. If the glue does not bond immediately, you may need to hold it in place longer.



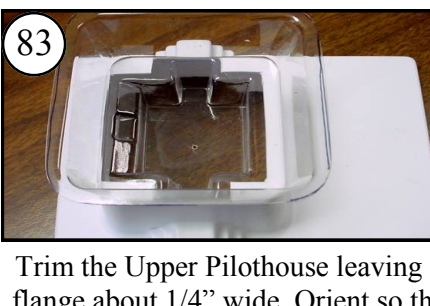
80 When installing Velcro to attach the 2nd deck, place it next to the stairs, not on top of them.



81 Use 6 small pieces of Velcro to secure the 2nd Deck to the Deck. The two pieces at the center will help prevent sag in the 2nd Deck.



82 Trim the Lower Pilothouse as marked. Cut straight across under the stairs. Cut the top carefully to avoid cutting the side of the pilothouse.



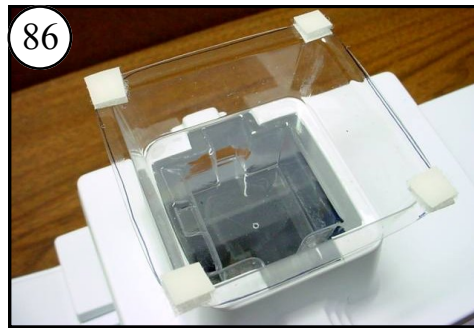
83 Trim the Upper Pilothouse leaving a flange about 1/4" wide. Orient so the "control panel" faces forward. Glue with CA on 4 corners. Will cure slow. Place a light weight on the top of the Pilothouse to hold for 5-10 minutes.



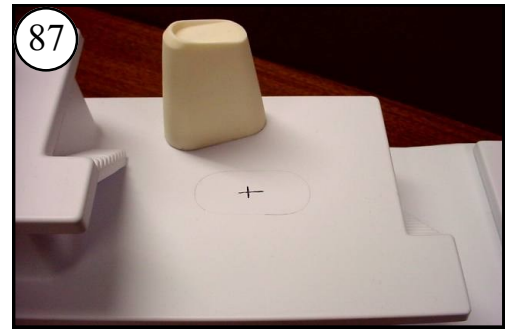
84 Center the Pilot House on the 2nd Deck and mark with tape as before. Trim and install 3rd stairs. Secure the Pilot House with 4 narrow pieces of Velcro as shown. **11**



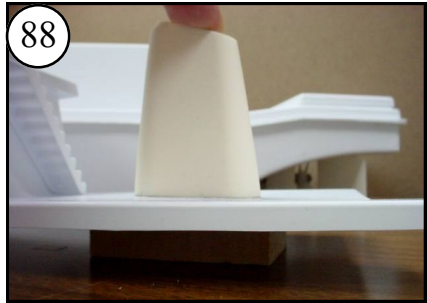
85 Trim the Roof and cut 4 small 1/4" pieces of Velcro.



86 Place Velcro on 4 corners. It is easier center the roof if you lay the Roof upside-down on the table and press the Pilot House into it.



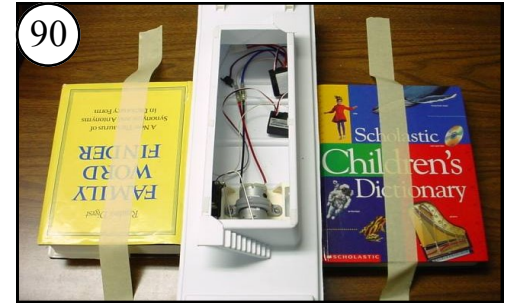
87 Mark the center of the 2nd Deck for the Stack. Center the stack and with a fine pencil, outline it on the deck.



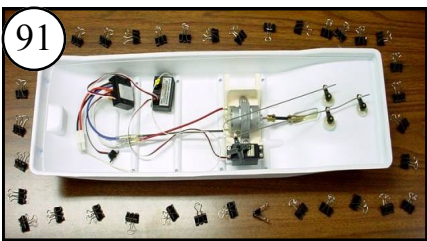
88 Sand the bottom of the Stack and the spot where it will attach. Support the deck with the foam block. CA the stack to the 2nd Deck.



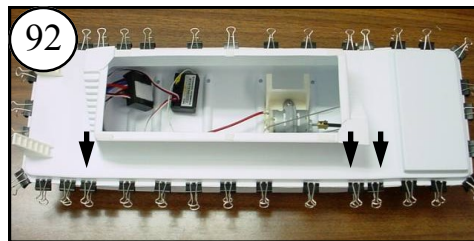
89 Do a final operational check before gluing the Deck to the Hull.



90 Push the sides of the Hull in a little as they stick out relative to the Deck. This will prevent the CA from bonding them out of alignment.



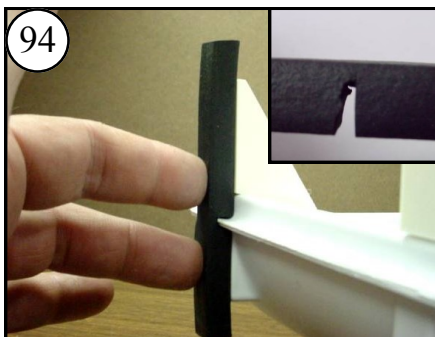
91 Unfold and distribute the 36 clamps around the hull. Put a continuous thin 1/8" bead of medium CA on top of the flange. Use your finger to guide the tip of the bottle of CA. Thin plastic gloves would keep the CA off of your fingers.



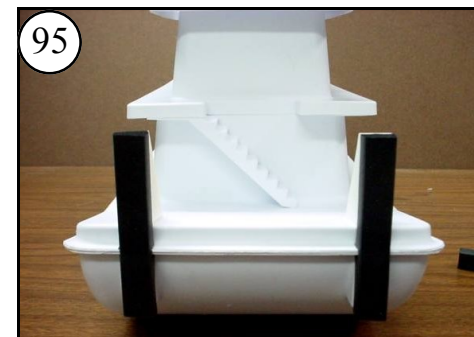
92 Set the deck squarely onto the Hull. Put one clamp at the center of the Bow and Stern. Align the sides quickly (if you didn't use the books in figure 90) with 3 clamps on each side. Then clamp next to where the hull changes angle (▼). Fill in with the rest of the clamps.



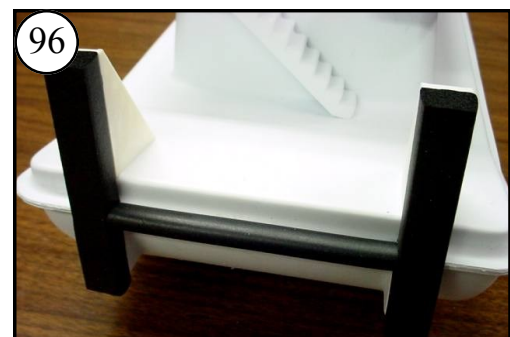
93 Pads for the Push Knees are cut by pressing a hobby knife or razor straight down through it. One side is slightly wider than the other. (Top of inset photo) Glue wider side to Push Knee.



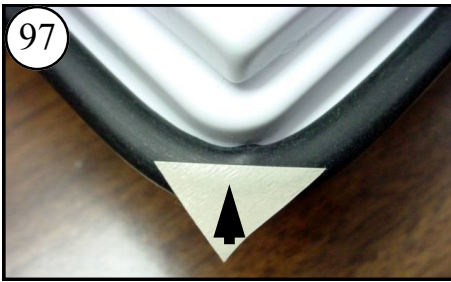
94 Cut a piece 1 inch longer than the height of the Push Knee. Notch it for the flange as shown in the inset photo.



95 Mark each end and trim carefully. Test fit first, then glue the Pads to the Push Knees with medium CA.



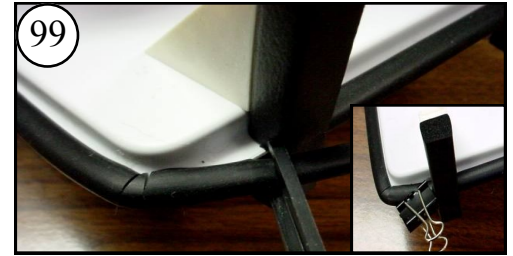
96 Cut a short piece of Rub Rail and press between the two Push Knees.



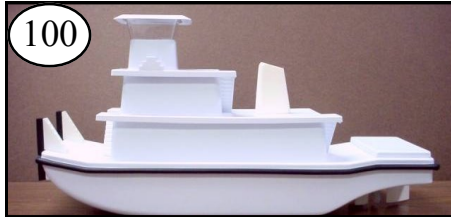
97 Locate the center of the Rub Rail. Begin at the middle of the stern and work it onto the Hull Flange. At the corners, mark each corner with a piece of tape for notching.



98 Each corner must be notched twice. Space between the notches determines how rounded the corner will be. Close like this will make a sharp corner. Practice with scraps until you make a good tight rounded corner.



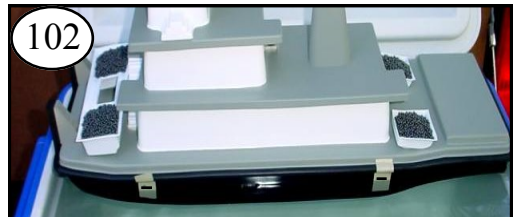
99 If you cut the rail short, grip and pull it sliding your fingers along the rail. It will stretch a little. Turn the corner at the Bow, trim with scissors, clamp with CA to the Hull Flange.



100 The structure is complete. Now you need to properly ballast the boat. You will need lead shot, BBs, or any small heavy metal to increase the weight of the hull so it will sit lower in the water.



101 Set the boat on a flat surface. Put masking tape on each side as shown, to mark the waterline. Measure 1-3/4" (44mm) up from the table and mark the tape.



102 With all battery and radio gear installed, set the boat in a container of water. Add ballast weight to the Ballast Cups until the water line matches the 4 marked points.



103 Pour the shot into a plastic bag. Add just enough epoxy to coat the shot. Knead until coated and pour back into the ballast tray. Secure each tray to the inside of the hull with a piece of hook & loop.

**You are done!** Once the paint is fully cured, attach the decals. Instructions are on the **Tips & Tricks** section. For best transmitter reception, ensure that your receiver is mounted inside the boat above the waterline.

**Now go find some water and have fun!**

## Tips & Tricks

**PAINTING TIPS:** It will take 2 to 3 coats of most hobby paints to give a good even color. Never try to get full coverage with the first coat. It will run every time! You should be able to see through the first coat. The best tip about any kind of spray paint is to let the paint "flash" between coats. A coat of paint has "flashed" when it is dry to the touch. Don't touch the boat. Touch the masking paper or somewhere where a fingerprint won't show in case you touched it too soon. Hobby enamel will take 5 to 15 minutes to flash depending on the temperature. Different colors can take different times to flash. A coat that has flashed properly will support the next coat and prevent it from dripping. The second coat will take longer to flash than the first. Be patient!

Practice on a scrap stood on it's end. Your goal is to get coverage without runs. Avoid spraying hobby enamel on very humid days. Humidity can cause the paint to "blush" leaving a cloudy appearance to dark colors. Most hobby enamel's instructions say to recoat within 2-3 hours or after 48 hours. Most are dry enough in an hour (warm weather) to mask and repaint without the masking tape peeling off the paint. Paint a scrap at the same time you paint the boat. When dry for about an hour, try your masking tape on the scrap first. If it works well, then mask the hull you are painting. It really takes 48 hours to fully cure. If you recoat after the 2-3 hour deadline, but before 48 hours, your new coat may wrinkle the uncured coat. After the spray paint has fully cured for three days, you can apply the decals. "Non-toxic" model paints are safest to brush on, for the painter and the boat.

**DECALS:** Apply only after the paint has fully cured. Cut out the desired decal from the assortment. Separate the paper backing from the front mounting tissue. The decal will adhere to the mounting tissue. Carefully align the decal on the hull and press into place, smoothing it with your fingernail. Peel off the front tissue paper. It is almost impossible to remove the decal without destroying it, so make sure it is where you want it before pressing it into place. The decal set includes several types of Doors, Portholes, exterior weatherproof Lights (small ovals), Window frames for the Pilot House, and two V's for "Vac-U-Boat" to put on the Stack. Use masking tape or other methods to align the doors and windows so they will be square and properly spaced from the floor. On the Pilot House, install the rear decal first with the bottom of the decal aligned with the bottom of the Upper Pilot House, and centered. Then install the two sides, aligning them to the center of the steps. Finally apply the front window decal. Use an empty door frame decal to trim the side center windows. This creates the Pilot House doors, with windows in their top half.

**WATERPROOFING - FLOTATION:** If the water is choppy or you are playing competition games with the boat, make sure the rear hatch clear inner cover is taped all around. There is plenty of room in the Bow for flotation. A couple of inflated Ziplock<sup>®</sup> snack bags with the opening pressed and taped closed, makes a nice form-fitting float.

**REPAIR:** In swimming pools, long hair can wind up on the prop shaft between the Drive Dog and the Stern Tube Bearing. If this happens, the shaft will bind and slow or stop turning. To repair, lightly grasp the Motor-Shaft Coupling End to block the shaft rotation. Use a 1/4 inch wrench to loosen the Prop Nut several turns. Unscrew the Prop & Drive Dog 3-4 turns together, by turning the Prop. Remove the hair and re-tighten the Prop with Drive Dog & install the Prop Nut. Don't store the boat in direct sunlight. This will shorten the life of the plastic.

**MAINTENANCE:** Before running, place a droplet of light oil between the Drive Dog and the Stern Tube Bearing. Rotate the prop to distribute the oil & wipe off the excess. After running, check the inside of the boat for any water. Leave the 2nd Deck off for a day to allow any moisture to dry. Learn the recommended battery charging, handling and storage methods for your battery type. For recreational use, the grease in the stern tube will not need to be refilled or replaced unless water is leaking through the shaft. For constant use, like in a rental boat, you can remove the prop shaft and re-grease the stern tube annually or as needed. To access and relube the Stern Tube, unclamp the motor, remove the Coupling End from the end of the Prop Shaft, pull out the prop shaft. Squirt new Stern Tube Grease into the Stern Tube from the outside. Catch the overflow with a napkin on the inside. Push the Prop Shaft into the Stern Tube catching the additional grease that will be pushed into the boat. Reassemble all parts. Tighten the first Coupling End set screw against the flat of the shaft, then tighten the other. Be sure to properly space the Coupling End from the end of the Stern Tube to prevent binding of the shaft.