

## Basic Foam Boat Construction Guide

The following instructions provide basic information necessary to build a custom light Styrofoam boat. This will require cutting, sanding, and gluing foam, and cutting wood. You are responsible for quality and performance of your boat. Read instructions and understand them before proceeding. It is best to take your time. Let glue from one step cure before proceeding to the next. You will need...

**A Place to Work** – Building a boat can be a bit messy. It is important to work somewhere where messes can be cleaned up easily and if glue gets away from you, it does not ruin anything important. Outdoors or a shop is a good idea. It is best to cover work surfaces with newspaper, plastic etc. Some paper towels for wiping excess epoxy is important.

**Cutting & Marking Tools** - Mark your cuts with a dull pencil or a permanent marker. Foam may be cut with a hack saw blade, serrated knife, band saw, etc. Pins shown below may be cut with a saw. Transom will require sawing. Always be careful with sharp tools and power tools. Wear safety glasses and keep your fingers (and other body parts) away from cutting tools. As an alternative you may buy a Transom from RadioControlOutboards.com. Cutting Styrofoam is a bit messy. It creates foam saw dust. It is important to work in a place where the mess is not a problem or cleans up easily.

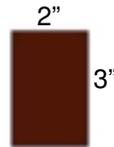
**Epoxy** – Regular epoxy works well. Watch out when using the dual syringe dispensers. Sometimes they get stuck and when you push hard they break loose and a whole bunch of epoxy squirts out. You will also need something to mix the epoxy and something to mix it on. Popsicle sticks and round tooth picks work well. Often you can mix epoxy on the parts to be glued. Otherwise a piece of a cardboard box works great. It is always a good idea to use items which can be discarded after use. Once glue is used, it is very handy to throw them into a trash bag.

Do not use other types of glue on your foam. Most solvent types of glues will dissolve foam. Other glues may not form a strong bond. If your transom falls off you may lose your motor. Be careful with epoxy. Once it gets on anything it is impossible to get off. Before gluing boat pieces, it is a good idea to glue some scrap to test bond and to get a feel for the amount of epoxy required.

**Sand Paper and Sanding Block** – Course 60 or 80 grit sandpaper and a wooden block. It is best if the block has sharp edges. A piece of 1 x 4 about 8" to 10" long is good. Wrap the paper tightly around the block.

**Foam Plank** - Available at most home improvement stores. A plank of 1" thickness is preferred. These are often found in pink, blue and, white planks. Pink and blue types are preferred as they are stronger.

**Transom** – A piece of wood 2" x 3" x 3/8" to 5/8" thick. 3/8" is best because it is lighter. For long term durability it is best if this is sealed with a sealer, stain, varnish, urethane, ect. As an alternative you may buy a Transom from RadioControlOutboards.com.



**Pins and a Rubber Band** – These are used to hold battery. You can use almost anything for pins. Regular wooden pencils or 1/4" dowels both work well. Before cutting to length, use a pencil sharpener to make points. However, there are many other ways to hold a battery. If you have another idea, try it. The point of these boats is they are easy to make and it is easy to try different methods.



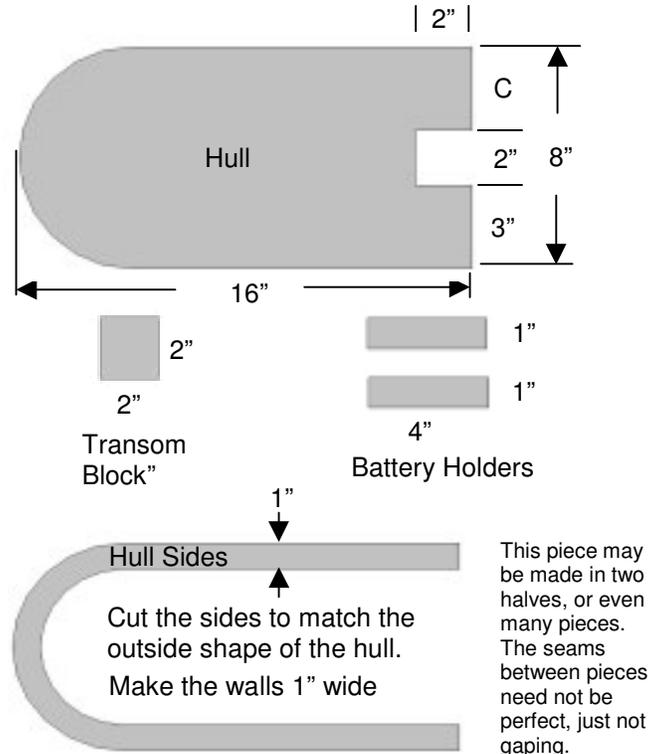
### The Basic Boat

A capable boat must be large enough to be stable. It must have a strong mounting point for the motor and must hold a battery. It must float and move through the water well. Beyond these, many features may be added to establish any appearance desired.

For the Syncro30 the minimum recommended light boat size is 8" wide by 16" long. At 7.4 volts the Syncro30 is capable of pushing larger light boats. At 11.1 volts it is best to stay closer to the minimum. **Hull shown here has a rounded bow, but other shapes will work. Bow may be**

**pointed, square or any shape desired.** The other foam shapes needed are a 2" x 2" block, battery holders and sides. Cut your pieces per the following drawings.

Notice 2" x 2" notch cut into the back end of hull. This cut out will be used to help hold the transom. Notch also moves motor into back of boat for improved stability. It is important to cut the inside of notch as smooth and vertical as possible. The 2" x 2" block will help hold transom.



The next step is to attach pins to the battery holders. For open boats pins may be attached to the center of battery holder sides. Battery is then held in place with a rubber band stretched between the two pins and over top of battery. Alternatively, pins may be attached to end of the battery holder so the band may be stretched around the back of battery holders. With this, a front deck may be placed over front end of boat. See later section on boats with a deck.

Before any glue is applied, spear the pointed end of the pins into the side



Pin in center for open boat

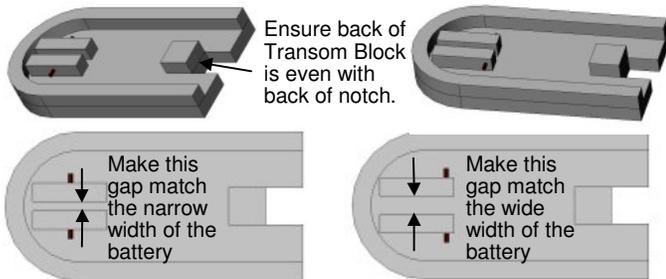
Pin at one end for boat with a deck.

of the battery holders. Position pins according to the type of boat you want. Push pin in about 3/4" and pull back out. Mix a small amount of epoxy and smear some inside hole. A round tooth pick works good for this. Some epoxy may also be put on the pin. Re-insert pins. Set these aside and allow epoxy to set.

There are many ways to hold the battery. In all cases, with a boat powered by a Syncro30, we recommend the battery be mounted as close to the front of the boat as possible.

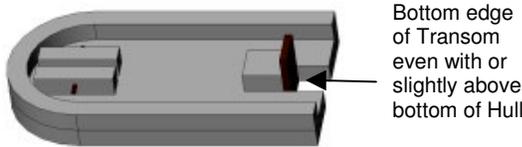
For attaching pieces to hull, always glue smooth factory surface of piece to smooth factory surface of hull. It works very well to mix epoxy directly on piece. Mix equal amounts of the two epoxy components directly on the surface to be bonded to hull. Spread epoxy across the surface. Complete coverage of the piece is best but it doesn't take a lot of epoxy.

Attach, Hull Side, Battery Holder, and Transom Block to Hull as shown here. Do one at a time and let cure before proceeding to the next. As you do each one, be sure to press pieces together and set them down on a level surface. You may tape them in place but it is not necessary. Always check alignment of pieces as they cure. Sometimes they tend to wander. **Be sure back edge of Transom Block and edge of notch are aligned.**

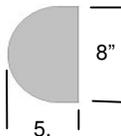


### Open Boat

Once the epoxy holding parts has set, transom may be added. **Important!** The Syncro30 will apply a great deal of force and torque to transom. The bond between boat and transom must be strong. Before gluing, make sure surfaces are flat and even and transom fits well. If necessary you may sand surfaces to get a good fit. It is important to let epoxy cure overnight before sanding. Use enough epoxy to get a good bond. To add transom, mix some epoxy on surface of Transom Block and Hull where transom will be located. Press transom against these surfaces into epoxy. Bottom of transom is to be even with or slightly above bottom of hull. It must not protrude below bottom of hull as that would cause unwanted drag. Let this epoxy set.



For the boat with a deck, cut a deck which matches shape of front end of boat. This may be made from same foam as the rest of the boat. Alternatively, deck may be made from many other materials. 1/8" plywood and thinner foam from hobby stores also work well.



Epoxy this piece to the top front of boat. While not absolutely necessary, bottom edges of boat may rounded by sanding. This works best with a fairly coarse sand paper and light pressure.



Once edges are rounded the boat is ready for water. Just add motor to transom and battery and a rubber band. Be sure to secure motor well. It is important to compress pads on transom per the motor instructions. As an extra precaution one may tie a piece of string to a snap swivel from a fishing tackle store, tie string around a small piece of foam and glue the foam to the top surface of hull near the motor. The snap swivel may then be attached to one of the holes on the top of motor transom clamp.

### So Many Other Possibilities

While the boats shown work well, there are many other features and possibilities. Alternate styles of transoms, battery holders, and even entire boats are possible. The boat may be larger and of different shapes. Additional features may be added. Windshields, seats, awnings, steering wheels, gas tanks, lights, and graphics are all possible.

Structures such as consoles, seats, and even cabins can be made with the foam. Soft foam from a hobby store makes great seat cushions. Use a fine point marker to draw piping and stripes on the cushions.

Common household objects may be used to make additional features. With a big enough piece of clear mylar packaging film one may make a

windshield. Just cut it to size. Fold the bottom edge over about ninety degrees and glue or tape that edge along the back of the deck.

Steering wheels are a little harder. A round disc glued to a good round toothpick can work. One place to get a disc is to cut out the bottom of a small white or light colored soft plastic bottle. Anything you can glue the toothpick to and is round will work. Poke or drill a hole in the middle of the disc for the toothpick. Glue the two together and glue the toothpick into the dashboard (the back surface of the deck).

It is possible to use markers to add graphics to the boat. Plan ahead and draw graphics, boat names, license numbers, etc. directly on the boat.

The only limit to these boats is what you can think up and make. Because they are so simple, it is easy to make more than one. Of course the Syncro30 may be easily moved from one boat to another.

### Making Your Boat Turn Better

Because the boat has a flat bottom and is very light, there is not much grabbing the water up front. Under full throttle the boat may tend to push sideways and not turn as well as you might want. Releasing the throttle and turning at slower speeds will help.

As an extra measure you can add a small fin to front of boat. However, this will add drag and slow the boat. It also make the boat harder to put down on a flat surface. Cut a piece of a thin plastic about 1" x 2" from the lid of some sort of food container such as a margarine or butter tub. At a point near the front of the boat, but where hull rides in the water at full throttle, mark a line about 1" or 2" long which runs from front to back. Be sure it parallel to the boat's centerline. Otherwise the fin will tend to turn the boat in an undesired fashion. Using a knife, cut a slot about 1" long at the line. When doing so, make sure the knife is perpendicular to the bottom of the hull. It is OK if the slot goes through the hull. **Be careful, keep your hands clear of the knife on the far side.** Typically you can simply insert the piece of plastic into the slot. This allows removal for storage. But for a more permanent fin, you may epoxy the fin in place. If you do, it is a good idea to scratch up the part of the fin which will go into the hull with sand paper.

### Avoiding Pitfalls – Important Stuff to Know

When making boats of this nature there are a couple of things to keep in mind. Knowing these things can prevent bad performance and outcomes.

Do not add a wall at the back of boat. The design is purposely open at the stern. The 1" thick hull is, by itself, enough to float the boat. The walls on the side of the boat are only there to prevent water washing over the boat while it is running. With no wall at the back, any water that gets on top of the hull will drain off the back of the boat. As a result, when the boat is run in reverse, water may flood the back of the boat. This will not hurt the Syncro30 and will run out as the boat moves forward.

While the transom clamp on the Syncro30 is very effective, one may go one step further to prevent loss of the motor. Tie a piece of string to a snap swivel from a fishing tackle store, tie string around a small piece of foam and epoxy foam to top surface of hull near motor. The snap swivel may then be attached to hole on top of motor transom clamp.

The battery and wires should not lie directly in water, but a little water splashing on them is not a problem. At 7.4 or 11.1 volts most fresh water will not significantly short out your battery. On the other hand, salt water will. The Syncro30 is not recommended for salt water applications. When making a boat, the design should not create a situation where the battery or wires lie directly in water. In the designs shown the battery sits on top of the hull. Any water which splashes onto the battery or wires will run off. Do not create a boat where the battery sits in a pocket in the hull. If this is done, water will run into the pocket and the battery will be sitting in this water.

Do not use any solvent based products on the foam. Spray paint will dissolve the foam.

Be sure to read the Boating Guide at RadioControlOutboards.com before setting out. It has some good tips to keep your boating safe and to avoid issues.