

EL CID

By Hal Kelly

**Build this sportboat in days
for less than \$100. It'll
provide hours of safe fun for
youngsters of all ages**

El Cid is a mini inboard hydro that's powered with a 4 H.P. air-cooled engine. Its top speed is about 16 mph with a 100 lb. teenager aboard. It features a "dead man's" throttle that shuts the motor off when the driver lets go of the throttle, so there's no danger if the operator falls off the boat. Safe enough for an eight-year-old, it's a great little boat for the young to start out on. Use is limited to well-protected waters, of course.

Light weight is important to this hull, so lightening holes must be cut in some structural members, and all planking is of $\frac{1}{8}$ -in.

plywood except for the $\frac{1}{4}$ -in. plywood sponson planking. Framing is of spruce or cedar, in $\frac{1}{2}$ -in. and $\frac{1}{3}$ -in. thicknesses. If you can't get $\frac{1}{2}$ -in. stock, buy $\frac{3}{4}$ -in. lumber and use a planer jointer to bring it down to size. Your lumber yard will do it for you for a modest fee. Motor mounts are cut from 2-in. x 4-in. fir.

Start construction by making up the transom and ribs. The transom is cut from solid $\frac{1}{2}$ -in. cedar stock, and is carefully notched for the keel and battens. Use a circle saw to cut out the lightening holes; see Fig. 1. Cut $\frac{1}{8}$ -in. plywood to the same

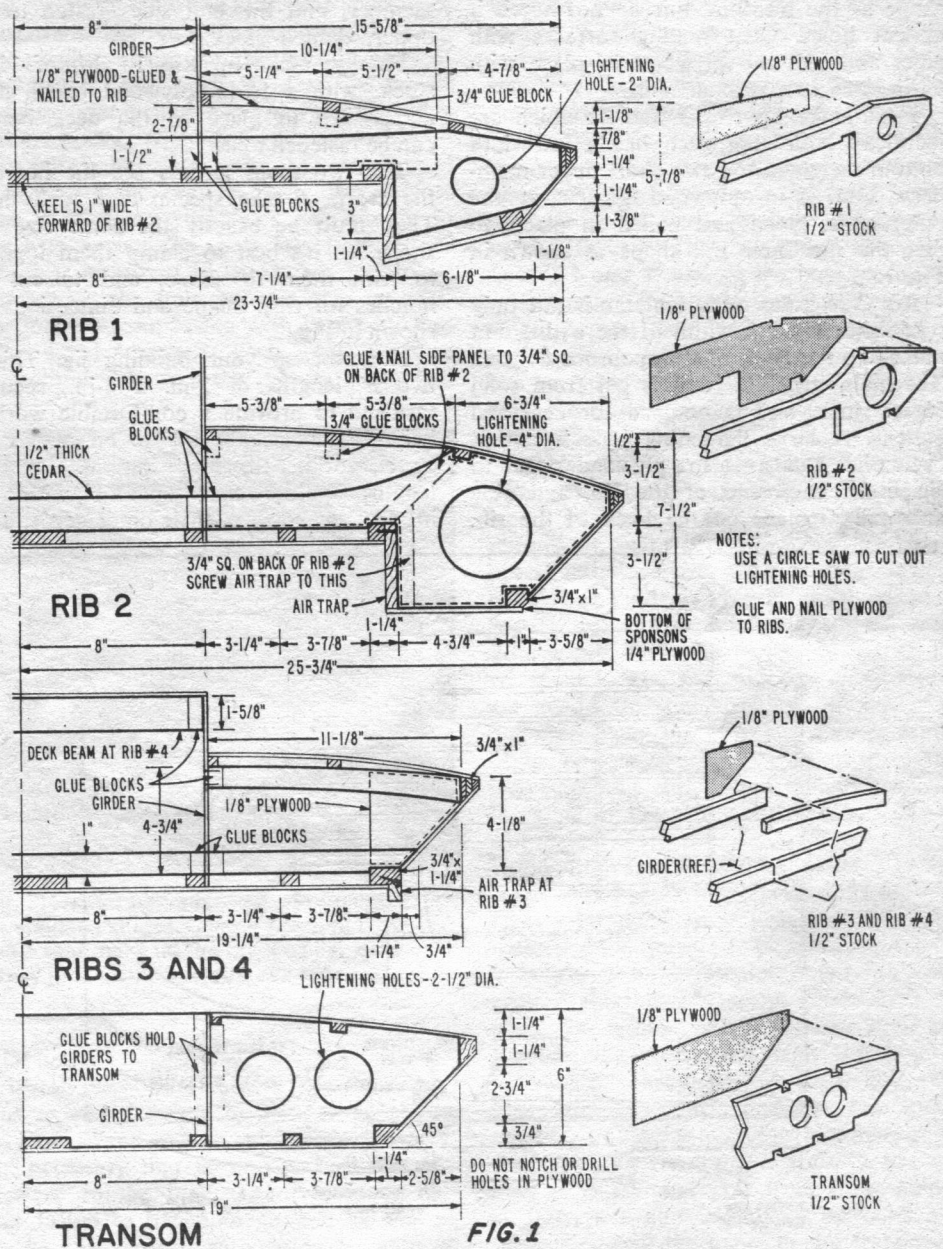


FIG. 1

Transom and four ribs are constructed first. Use a circle saw to cut out the lightening holes.

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shape as the transom, but do not notch it or cut holes. Coat mating surfaces with glue, and nail the plywood in place with $\frac{5}{8}$ -in. #16 bronze boat nails.

Next make up ribs 3 and 4, which are identical. Note that each has a full-width bottom member, and two short upper members. Use $\frac{1}{8}$ -in. plywood gussets at the outer ends, glued and nailed in place, to give the ribs their full shape as shown in Fig. 1.

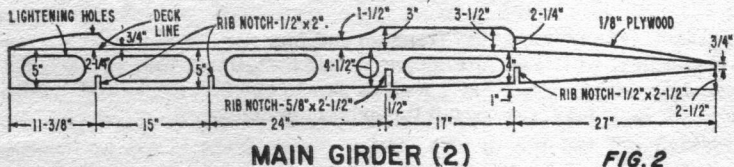
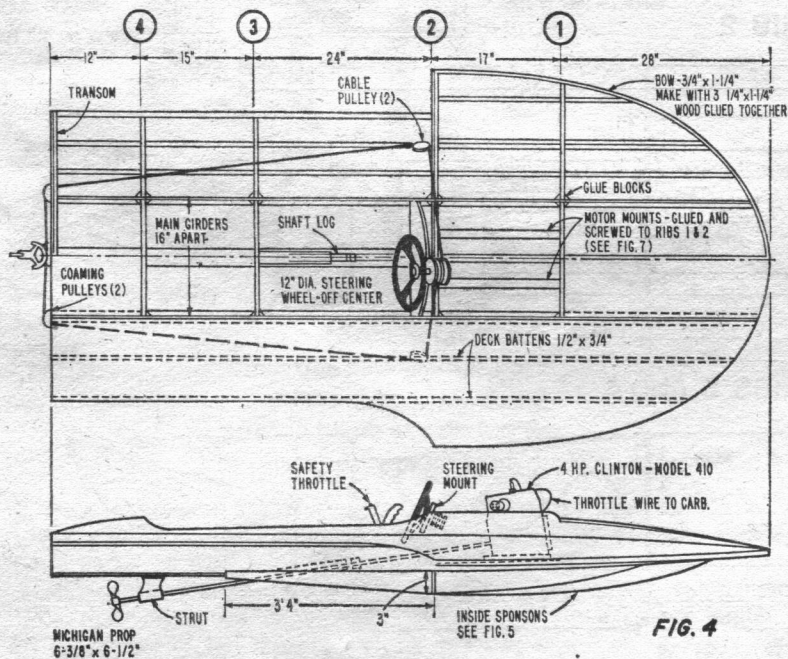
Rib 2 is quite important, as it not only establishes the full width of the hydro, but makes up the back of the sponsons as well. The main structural unit is cut from solid $\frac{1}{2}$ -in. stock, and is notched for keel and battens. A large lightening hole is cut at each end. Cut a $\frac{1}{8}$ -in. plywood panel for each end of the rib, and glue and nail in place on the back of the rib.

Note that $\frac{3}{4}$ -in. square stock must be glued and nailed to the back side of these panels as shown by the dotted lines. The lower block takes the fastenings for the air trap member, and the hull sides fasten to the upper, slanted block.

Finally, make up Rib 1, also of $\frac{1}{2}$ -in. stock, with a $\frac{1}{8}$ -in. plywood panel glued and nailed in place so the deck battens can be fastened to it.

The two main girders are the heart of the craft, so take special care with them. They must be exactly the same size and shape, so it's best to clamp them together to trim them to shape, and to cut the notches for ribs. Shape and dimensions are shown in Fig. 2.

Now set up your building jig. This is two 8' lengths of 2-in. x 4-in., securely fastened to provide a comfortable working height. They can be set up on saw horses or a workbench, for example. The two lengths should be exactly parallel, with a 16-in. distance between their outer edges. They



can be clearly seen in the photo, Fig. 3.

Clamp the two girders to the outside of the jig, as shown in Fig. 3. Adjust them carefully so they are at the same height, and the rib notches are in proper alignment. Fasten the transom to the girders with $\frac{3}{4}$ -in. square glue blocks on the outside ends of the girders. Slip each rib into its proper notches, and fasten it with triangular glue blocks. Nail transom and ribs in place with 1-in. wire nails.

Make up the keel of $\frac{1}{2}$ -in. stock. Note that it is 4-in. wide back of Rib 2, in order to accept the shaft log. Forward of Rib 2 it is only 1-in. wide. Set it into its notches on the transom, use glue on mating surfaces, and fasten with two 1-in. flat-head wood screws at each joint. Be sure to countersink for the heads, and drill

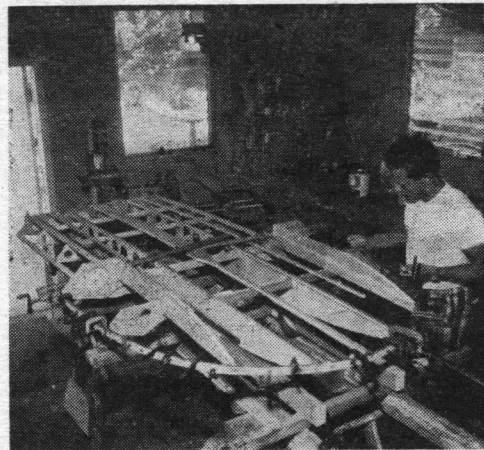


Fig. 3: Here framing is complete except for sponson chines. Clearly seen are 2x4's that make up the building jig. Note heavy pine clamps holding the bow.

pilot holes.

Install the bottom battens. The center battens extend forward of Rib 1, as shown in Fig. 3 and the drawing, Fig. 4. It is not necessary that they extend all the way forward to the bow. The two inner battens fasten to the main girders, as well as to the ribs. Fasten with glue and nails at each joint.

The bow piece that bends around the front of the boat and along the sides of the sponsons is made up of three pieces of $\frac{1}{4}$ -in. x $1\frac{1}{4}$ -in. cedar. Glue is applied to them, and they are bent as a unit, while the glue is wet, around the frame and are

fastened to ribs, girders, and battens. Use plenty of clamps, as shown in photo, Fig. 3, until the glue is dry.

Use solid $\frac{1}{2}$ -in. stock for the inside sponson pieces, cut to the shape shown in Fig. 5. Clamp the two pieces together and trim to exactly the same shape before installing them with glue and nails to the outer battens (chines) and to ribs 1 and 2.

Use $\frac{3}{4}$ -in. x 1-in. stock for the outside sponson battens. These take a considerable bend near the bow. Soak the front section of these in hot water so they will take the bend with ease. They are glued and nailed to ribs 1 and 2, and to the bow piece.

Carefully fair all the framework so plywood bottom side, and sponson planking will lie flush against it. Sponson members can be faired with a hand plane, then trued with a file, or with coarse sandpaper on a sanding block.

Plank the two sides first, behind the sponsons. Clamp a section of $\frac{1}{8}$ -in. plywood in place, trace the outline on it, remove it, and cut the panel to shape, but slightly oversize. Coat mating surfaces with glue, and nail each panel in place with $\frac{5}{8}$ -in. #16 bronze nails, spaced about 2-in. apart. Trim the panels flush with the framework. The two sponson chine panels are made up and installed in the same manner. Note that on each sponson the $\frac{1}{4}$ -in. bottom panel will overlap these side panels behind Rib 1, and will butt against the edge of the side panel forward of this rib.

Now make up the bottom panel. This is a single length of $\frac{1}{8}$ -in. plywood, 32-in. wide (it can be made up of two shorter lengths, with a butt joint, if necessary). Clamp it in place, mark the outline of the outer edge of the bow, and from inside the boat, mark the outline of all battens, keel, etc. Remove the panel and trim the bow to shape. Use a small bit— $\frac{1}{16}$ -in. is fine—and drill pilot holes for nails in the spaces marked for battens and other members.

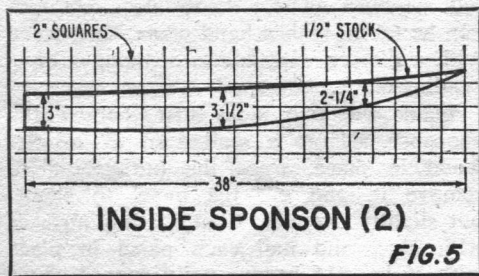
Check your framework carefully, to make sure it is squared and true. Coat mating surfaces with glue, clamp the panel back in place, and nail the panel to the framework through the previously drilled holes. Have someone hold a weight under the framework where you are working so the nails will seat solidly.

Now the shaft hole can be drilled. Screw a block of wood in place temporarily on the keel inside the boat, where the drill

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will come through. This will prevent the keel member from splintering when you drill. Use a scrap of plywood to make up a template that gives you the proper angle, and nail it in place lightly on the keel alongside the center line on the outside of the hull. Use an auger with a $\frac{7}{8}$ -in. bit, after notching the keel with a wood chisel to allow the drill tip to get a good bite. Be sure to keep the bit aligned with your template.

Remove the template, unclamp the girders from the building jig, and turn the



boat upright. Remove the temporary block from inside on the keel, and install the shaft log; make sure it is aligned with the hole.

The steering mount is a 16-inch length of $\frac{3}{4}$ -in. stock, 4-in. wide. Glue and nail it in place at an angle between the girders, above Rib 2. See photo, Fig. 6. The hole for the wheel shaft should be slightly off-side to the right. Install the deck battens in the same manner as the bottom battens and add the steering wheel pulleys. These must be bolted—not screwed—to Rib 2. Give the entire hull interior three good coats of paint or varnish, as desired.

When the interior is dry, deck panels can be cut from $\frac{1}{8}$ -in. plywood, and glued and nailed in place in the same manner as the bottom and side panels.

Turn your boat upside down again, and fasten the airtraps in place with screws through the planking into the framing. Install the shaft and strut; also install a sponson fin on the back of the left hand sponson, if you plan on making any tight turns. For general use, this should not be needed. Install the rudder mount and the transom pulleys.

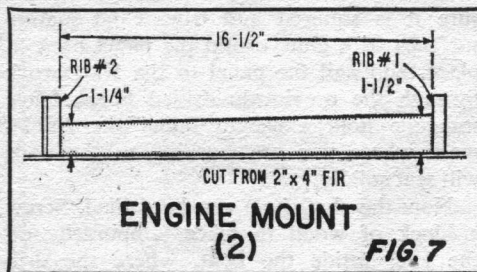
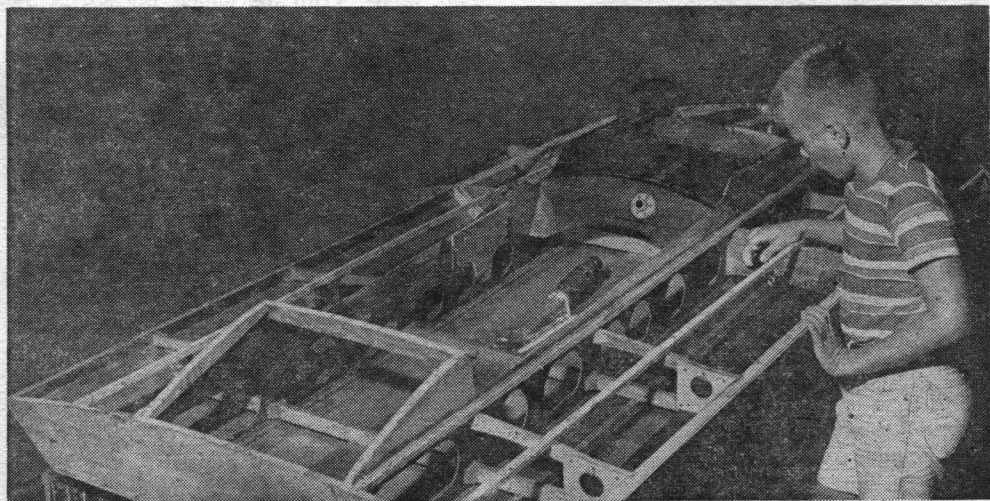


Fig. 6: Here the framework is right side up with shaft log and steering panel installed, as well as the deck beams and battens. Give interior of hull three coats of paint or varnish before you fasten the deck panel of boat in place.

Cut the two mounting blocks for the engine to shape, as shown in Fig. 7. These are glued and screwed in place between ribs 1 and 2, as shown in Fig. 4.

With the boat upright, the engine can be installed. It is the 4 H.P. Clinton, Model 110. Use care to get it set at the proper angle to the shaft, and bolt it to the engine mounts. A standard coupling can be used to attach the motor to the shaft. This will give you a straight drive, with no neutral or reverse, but these are not necessary on such a small boat. Mount the dead man's throttle on the left hand girder and attach its control wire to the engine. Rig the steering wheel and tiller lines.

Now the exterior of the boat can be finished with paint or varnish, as desired. Use at least three coats; allow each to dry thoroughly, and sand lightly before applying the next coat.

The standard JU racing class propeller can be used; it's a Michigan wheel, 6 $\frac{3}{8}$ -in. x 6 $\frac{1}{2}$ -in., and it lists for \$32.00; the Michigan AG 7-in. x 6-in. propeller, which lists at \$11.50, will provide just about the same speed. ■

BILL OF MATERIALS—EL CID			
Quantity	Size	Material	Use
3	1/2" x 4' x 8'	Plywood	Bottom, side, deck planking
1	1/4" x 4' x 8'	Plywood	Sponson bottoms
4	1/2" x 12" x 8'	Cedar or Spruce	Framing
1	3/4" x 11/2" x 10'	Cedar or Spruce	Cut into strips for built-up bow piece
1 lb.	5/8" #16	Bronze boat nails	
1 lb.	1/4" #14	Bronze boat nails	
5 lb.		Withhold marine grade plastic resin glue, or equiv.	
1 gal.		Paint or varnish	
1		Clinton 110 engine	
1	6 3/8" x 6 1/2" JU or AC 7" x 6"	Propeller	

The following items may be obtained from Williams Mfg. Co., 6450 Olympic, Bremerton, Wa. 98310, or Azusa Engineering, Inc., 16200 Arrow Highway, Azusa, Calif. 91702:

1	5'	Safety throttle
2	90°	Throttle wire
2		Coaming pulleys
		Cable pulleys
	13'	Steering cable
	12"	Steering wheel
	1'	Lifting handle
		Shaft log
		Strut
	3/4" dia. x 3'6"	Propeller shaft
		Rudder assembly

• Craft Print No. 372 in enlarged size for building El Cid is available at \$5. Order by number. To avoid possible loss of coin or currency in the mails, we suggest you remit by check or money order (no COD's or stamps) to Craft Print Div., Boat Builder, 229 Park Ave. South, New York, N.Y. 10003. N.Y.C. residents add 7% sales tax.

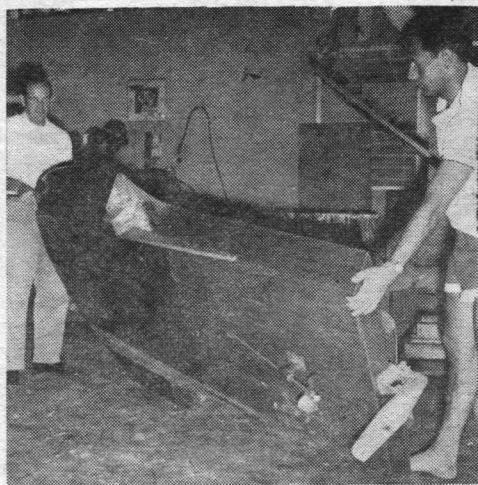


Fig. 8: Bottom of the finished boat. Air traps are in place, as well as the strut, shaft, propeller and rudder assembly. Note sponson fin on back of the left sponson only—necessary for tight turns.

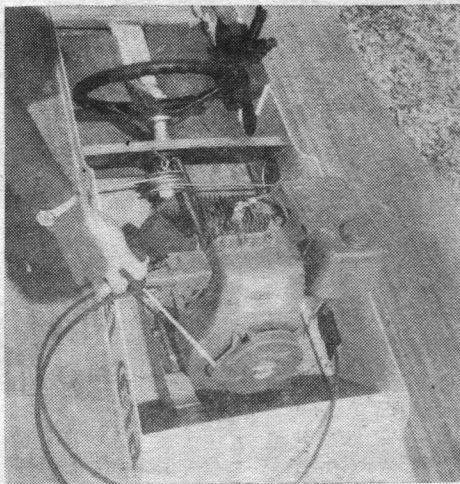


Fig. 9: Steering, dead man's throttle and engine installations of El Cid are seen in this photo. A gentle curve in throttle cabin allows it to operate without binding. Engine is a 4-horse model.

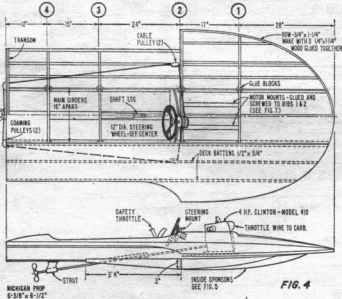


FIG. 4