大元

BIG ONE

By LEON KRISILOFF

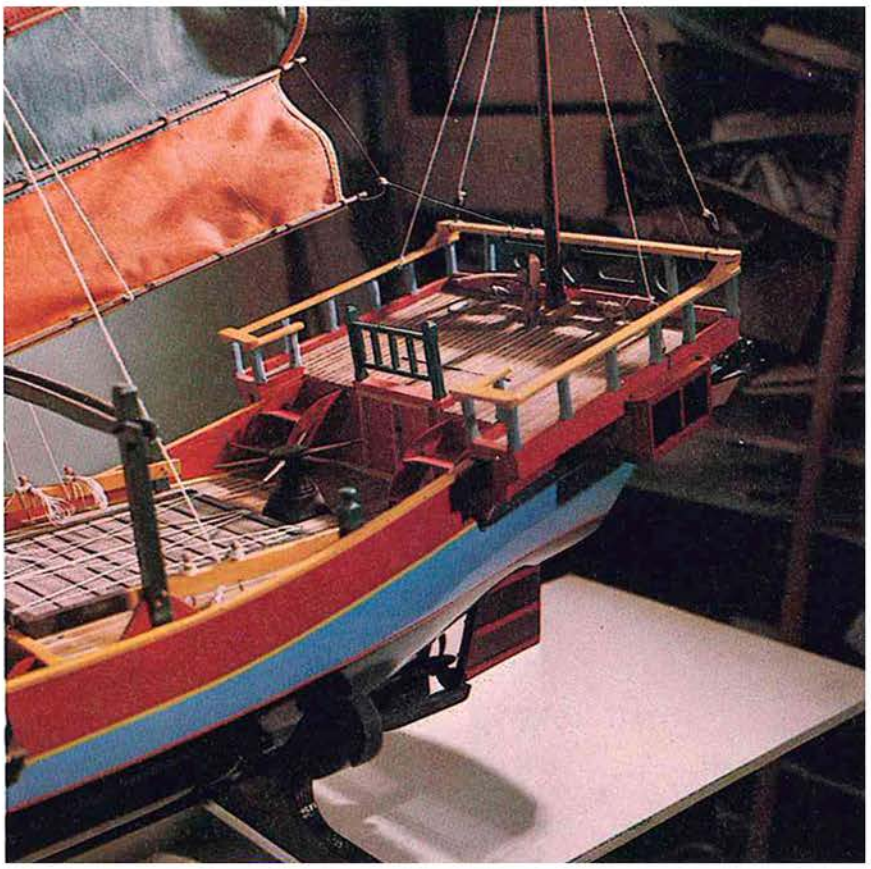
FROM KRISS HOBBY HAVEN AND FIBO CRAFT MODELS COMES THIS BEAUTIFUL, SEMI-SCALE ½" TO 1'-0" CHINESE JUNK FOR R/C AND ELECTRIC DRIVE.

The 'Big One' came about because I saw some beautifully colored embroidery in a friend's house. The photos are the results of my efforts. After seeing the 'Big One' in the water and operating, I thought that others would like to build this model. In addition, I thought that building a junk would be an easy job, but as I looked for information I found very little. The final lines for the 'Big One' were lofted from the scant information found, and a plastic model, with the help of a Chinese friend who supplied most of the detail.

Their history is interesting, what there is of it. There is no record of junks until Marco Polo wrote about them in 1298. Neither did I find any mention of them in reference to Chinese history. Polo described a junk that was flat bottomed, pontoon shaped, with several heavy wooden transverse sections, the deck being built above the pontoon with high bulwarks covering it. They retained their pontoon shape for many centuries. They had five masts fitted with lugsails made from woven bamboo mats, and the junks used on the rivers of China, today, still maintain this basic shape. About the middle of the 1800's, under the influence of European merchantmen, the ocean-going junk hull shape began to change. There finally emerged the basic shape of our 'Big One'. The basic lugsail retained the shape they had centuries ago, although today they are made of cloth. Engines were finally installed in the middle 1930's and were used to go up-stream. There are still thousands of these junks in use in China and the Far East.

Finally, I had the plans completed and I built the 'Big One'. (Building instructions follow later on in the article.) The 'Big One' was placed in a child's wading pool and trimmed for operation. Two 6 volt wet cells were used for motor (Pittman 12 volt) power. By shifting them in the hull, I obtained the proper floating trim, which is with the decks level. The batteries were secured by building a 1/4" balsa frame within which rubber bands were used to hold the batteries in place. To get the model down to the proper waterline requires five pounds of lead! The ballast is glued as low in the hull as possible.

I installed a single channel R/C unit under the front hatch with switches in the side deck. The rudder linkage was kept to a minimum length by placing the rudder servo on a platform between frames No. 8 and No. 9. The R/C equipment was placed so that the trim was not upset. Finally, I was ready for the actual operating test.

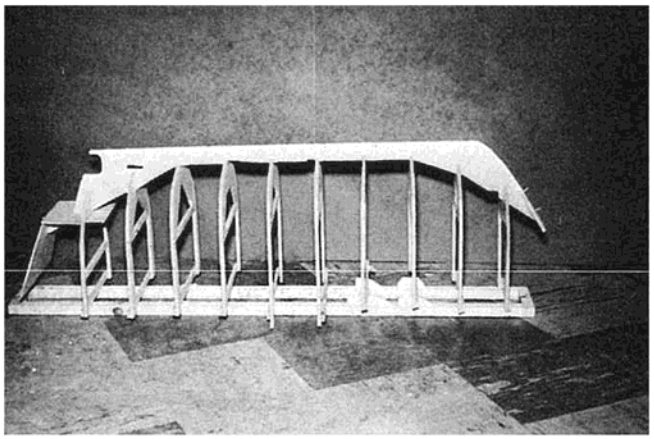


At the lake, I took the 'Big One' out of the car, and after answering a million questions from the people around the lake, I finally got her into the water. I flicked on the switches, and instant disaster was upon my 'Big One'! A stiff breeze came up, filled the sails, and she almost turned over! This was a hair-raising experience to say the least! The reason for this action did not occur to me. I tried again when the breeze let up. The same thing happened, and then it struck me - too much sail and not enough hull in the water. Back to the drawing board I went. How do you add more bottom area or weight to a finished model? More lead in the hull would bring the waterline down, but this would not solve the problem. A sailing keel could be added, and that was the answer.

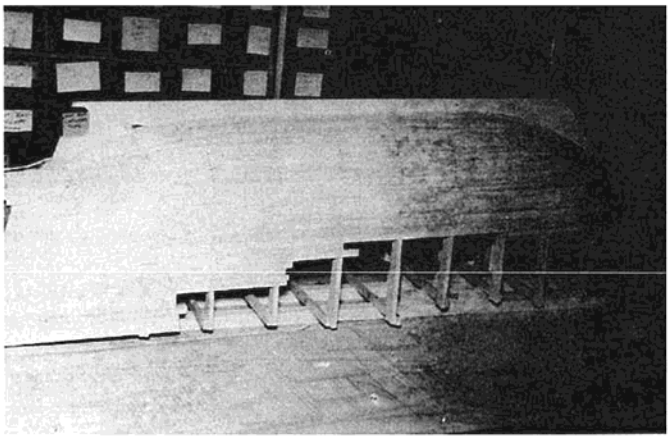
I went back to the lake on the week-end, took the 'Big One' out of the car, answered the same questions from the people around the lake, flicked on the switches, and put her into the water. This time I held on. She seemed more stable so I got up enough nerve and let go. The keel worked, and she heeled over only slightly when the breeze filled the sails. Now, I had it made, if she answered to the rudder. I hit the transmitter button and she came around to the right with the sails following. So far so good, and now for left, and again that beautiful junk came about with the sails following. The batteries lasted about 45 minutes and gave out. I tried sailing the 'Big One' without the motor, and that turned out to be quite a job. I have to say that the 'Big One' requires the motor for really good operation. It has been run several times since then, at times in a really stiff breeze, with great success. With the sails lowered and the keel out, she handles like any other power boat. She really turned out to be a beautiful model and well worth the trouble to build. I am sure that multi-channel equipment can be installed for rudder, motor and sails. I have not tried it because my multi set is tied up in another model. The following deals with the construction of the 'Big One'.

Hull Construction

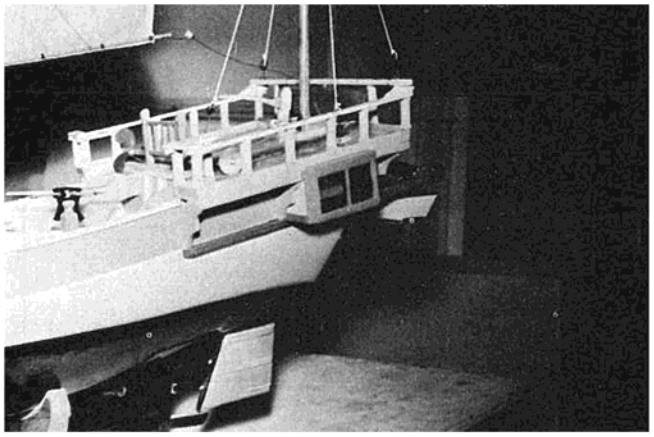
The hull is built upside down on a jig of pine 3/4" x 4" x 37". Get a piece of sugar pine and it can be used to make the masts after the hull is finished. The centerline and frame positions are marked off on the jig, measured from the plans. A small 'x' will help you remember on which side the frames are placed.



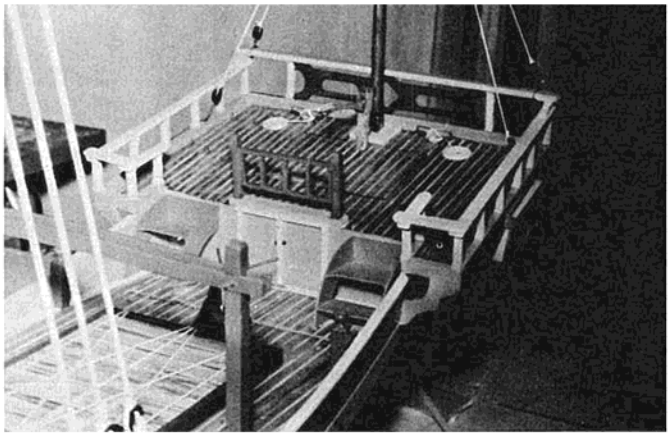
Hull framing on the 'Big One'.



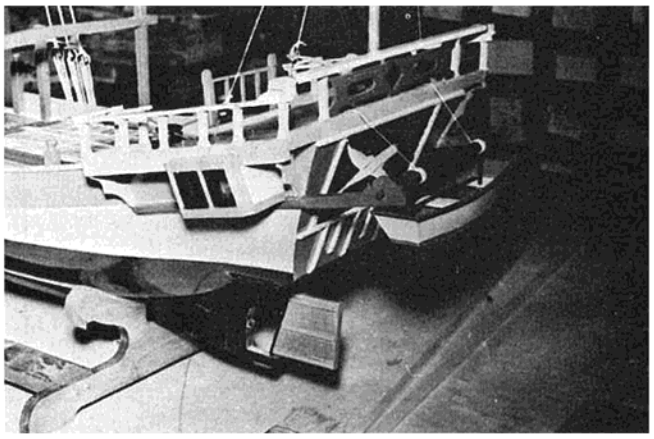
Hull planking partially completed.



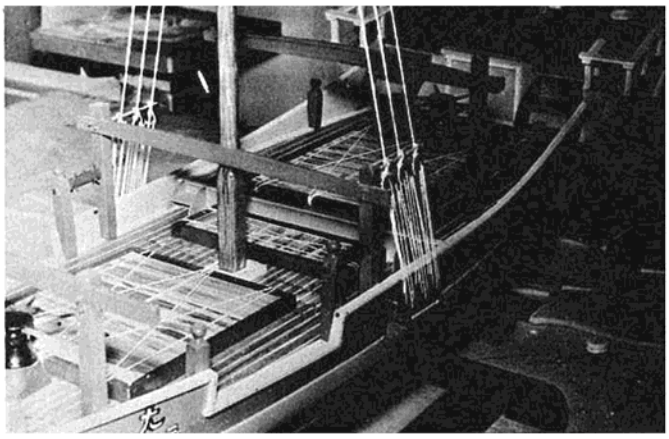
Stern view showing railing and windows.



A view of the stern deck detail.



Stern view showing stern design and dinghy.



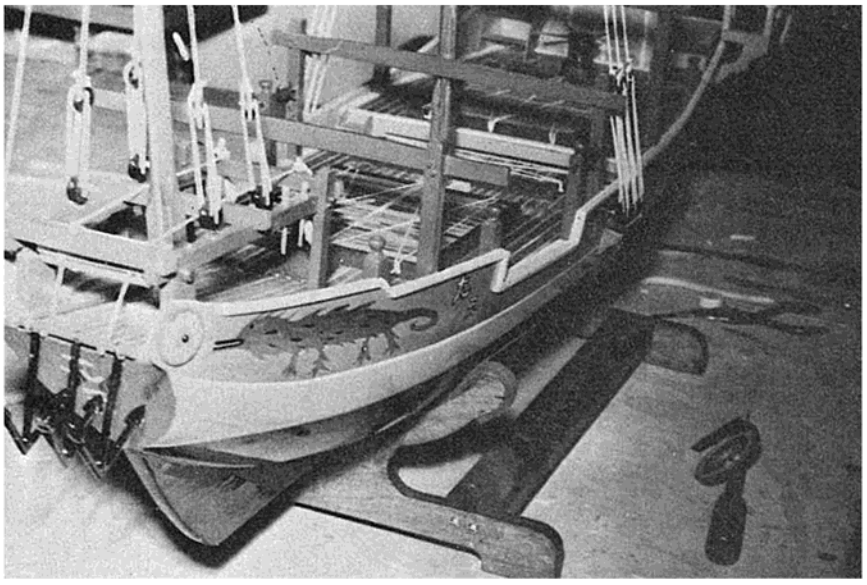
Midship view of gantries and main mast rigging.

With the jig prepared, the hull frames can be cut from 1/4" hard balsa sheet. There are ten frames, with the plan showing frame No. 1 as a typical section. The 1/4" x 1/2" balsa deck braces are glued into the frames. The 1/4" x 1/2" crossbraces are glued and pinned to the tops of the frames. The frames are made in halves, and glued together along the centerline. A 1/8" balsa gusset can be glued over the joint for additional strength.

Erect the frames in place on the jig. Use pins and glue to hold in place on the jig. Cut the keel from 3/8" hard balsa sheet (two pieces glued together to make the required width). Slip the keel into notches in the frames. This should pull the frames into alignment. Check one frame to be sure that it is perpendicular to the jig, and the rest should follow. Cut the bow and stern from 1/4" hard sheet balsa and glue in place on the keel. Cut the stern floor from 1/8" sheet balsa and glue in place to the stern and frame No. 10. Re-glue all joints.

Hold a strip of balsa along the frames and bevel them so that the strip lays flat on each frame. The bevel will be the sharpest at the bow and least at the stern and mid-ships.

Planking is accomplished with



Bow view showing bow mast, gantry, and rigging. Note bow design.

1/8" x 3/8" x 36" medium balsa strips. Start at the keel and work around the hull. Bevel the edge of the strips to insure that they fit tight together. Work the planking uniformly on both sides of the hull to lessen any distortion. If you wish to do a really professional job, there should be the same number of planks on each frame. To do this, divide frame No. 7 into 3/8" spaces, count the number of spaces, and divide the other frames into the same number of spaces. The width of the spacing will vary on each frame, and the planking strips are tapered to cover these spaces. This is really not required because the hull is painted, and this beautiful planking job will be covered. I random planked the hull until it was completely covered. Be sure that you plank up to the line shown on the typical section.

With the planking complete, cut the hull from the jig at the top of the planking. The frames are cut down to the top of the planking line. Use a strip of balsa to flare a smooth line between these points and trim off the excess wood. Cut this line with care because it becomes the top of the hull. Cut the frames down to the deck braces, being careful not to break off the free standing planking. Sand the inside smooth.

The bow deck brace is glued in place 1¼" behind frame No. 2 and extends across the hull, constructed from 1/4" x 1/2" balsa with the 1/2" side up. The brace is at the same level as frame No. 3. The mid-ships step is cut from 1/8" balsa sheet and is glued across the hull. Position 1/2" behind frame No. 6, 1/8" above frame No. 6 and even with top of frame No. 7. The stern step is cut from 1/8" sheet, glued across the hull 1-3/8" behind frame No. 9. The bottom is 1/8" above frame No. 9 and the top is flush with the strip layed across frame No. 10 and the stern.

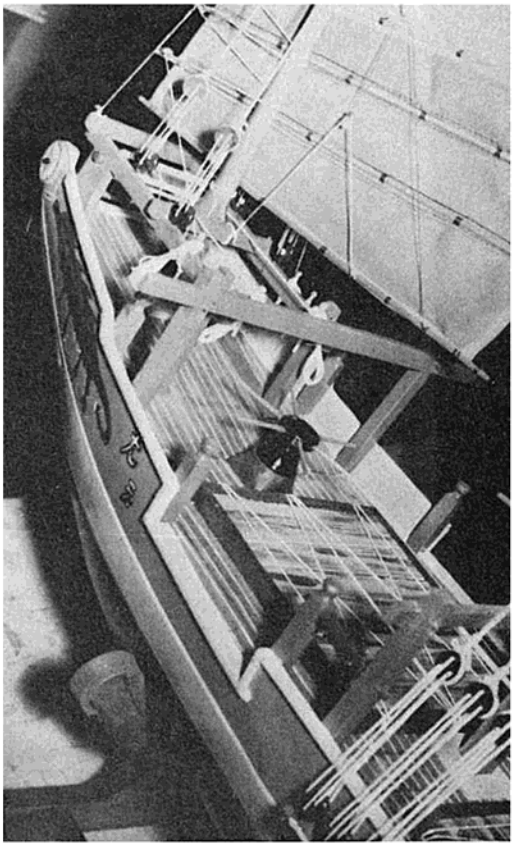
The mast bracing should be set into the hull at this time. The bow mast is located at frame No. 1. Use a 1/4" x 1/2" strip glued between frames No. 1 and No. 2, leaving a 1/2" space between the two braces. A small crosspiece is glued between the braces to form a 1/2" square box. The main mast is located 1/8" behind frame No. 5. Again, using 1/4" x 1/2" strip, glue between frames No. 6 and No. 7 with 1/2" spacing between them. Glue in the crosspiece. The stern mast requires a 1/4" sheet balsa box glued to the stern. Make a box to accept a 3/8" square mast and glue to the stern on the centerline flush with the deck.

There are two hatches in the deck that allow easy access to the equipment installed in the hull. The front hatch extends from the bow brace to frame No. 5. Notch the deck braces for 1/4" square balsa located 2-3/8" each side of centerline. Glue in a 1/4" strip. The stern hatch extends from the mid-ships step to frame No. 9. Notch the deck brace for a 1/4" square balsa strip 3-1/8" both sides of center. Glue in the 1/4" square strip. Also glue a 1/4" square strip across the mid-ship's step top.

The troublesome sailing keel is installed at this point. The keel, itself, is made from a 6" x 8" piece of 18 gauge sheet metal or a piece of 1/32" brass. Cut a piece of bar solder in half and bolt it to the 6" side of the keel with two 4-40 bolts. Place the writing on the solder toward the keel. Place the solder on something solid and tap the ends closed. File the ends round. The keel sits in the hull in a box much like a centerboard. The box is made from two pieces of 1/8" x 2½" x 5" plywood. Paint one side of the plywood with two coats of varnish. Sandwich the brass between the plywood and cut the brass to fit the plywood. Drill holes for 4-40 bolts 3/4" from the side and top. Glue a 1/4" square spruce strip around the top and sides. The ends of the box are 1/8" plywood glued to the 1/4" square strips around the box. The latter is set into the hull on top of the keel behind the main mast. Cut out frame No. 6 to accept the box, then glue the box in place, using plenty of adhesive. Cut a slot in the bottom of the balsa keel so that the metal keel can be slipped into the keel box. (I installed the keel only when I intended sailing the model.)

The deck can be cut from 1/8" sheet balsa and glued in place. The bow deck was made in two pieces and joined along the centerline. Lay a 1/8" sheet parallel to the centerline and mark off the curve of the side planking. Trim off the excess, and glue in

Top side view of stern and midships.



place. The side decks are made in the same manner, and slipped under the mid-ship's step. Fill in the deck between the side pieces and cut out the mast hole. The stern deck has a 1½" overhang on the sides. Flare deck frame No. 10 and stern so that deck lays flat, then glue in place. If you wish to have a hatch for access to the rudder arm, cut the stern deck out between frame No. 10 about 2" toward the stern, and approximately 4" wide. This will be a sheet hatch with no bracing, therefore be sure that it fits tightly. Glue 1/4" x 1/2" strip half under the deck around the opening. This will keep the hatch from falling into the hull.

Hatches are made slightly differently in order to insure a good fit. Cut two pieces of 1/8" x 2" balsa sheet to fit into the hatch opening and glue to the center deck frames along the centerline. At the edge of the opening (next to the deck hatch frames) notch the deck frames for 1/4" square balsa strip. Glue the strip into the notch along the length of the hatch. Do not glue to the brace on the deck. Cut the hatch out between the two 1/4" strips. Cover the rest of the hatch with 1/8" sheet. Hatches are held in place in the hull with four small wood screws placed in the corners. The deck is scored with a sharp awl, starting at the centerline and working out at 3/8" spacing. Stain the deck with walnut oil stain, wiping off to prevent the stain from penetrating and becoming dark. Apply three coats of clear varnish. Pre-paint three pieces of 1/16" x 1/4" x 36" spruce strips, (yellow) and glue to the deck along the edge at the side planking.

If you wish to power the model, install a Pittman 12 volt motor. The motor sits over frame No. 7. The shaft hole is made with a sharpened piece of 1/4" brass tubing, twisted through the keel. The shaft I used was made from 1/8" piano wire sheathed in a 1/4" tube with ends bushed with brass tubing to form bearings. Slip the tube into the hull and glue in place. Align the motor with scrap balsa. The propeller used was a 1-3/8" diameter nylon manufactured by Sterling Models.

The rudder tube is set into the stern floor. Make the hole in the floor and keel in the same manner as the propeller shaft hole was made. Glue in a 1/4" tube, and brace with 1/4" scrap balsa. The rudder is made from 1/4" x 3" x 3¼" mahogany. Screw the rudder to a piece of 3/16" brass tube and slip into 1/4" tube in the stern floor. The bottom of the rudder shaft is secured to the keel in a 3/8" x 3/8" x 4" piece of spruce set into the keel.

In preparation for painting, I strongly recommend that you fiberglass the entire outer surface of the hull. This will take care of sealing the wood and give you a hard, strong surface for the paint. If you do not fiberglass the hull, apply at least 12 coats of sanding sealer and sand smooth. I used Testors' spray paint on the entire model. The hull bottom is black to the waterline, light blue from the waterline to the deck line, and red above to the top of the hull. The colors were separated with 1/8" orange striping tape. (Apply two coats of clear varnish to prevent peeling.) The stern design was made from white decal paper and the dragon on the bow from gold decal paper with the 'dragon fire' painted on. You can use your own colors.

The masts are made from sugar pine (the jig). The ball was carved on the masts and not added on. All carving is done with a sharp knife and sandpaper. The bow mast dimensions are 1/2" x 1/2" x 18½" with a square bottom. The rounding of the mast starts 5½" from the bottom. The main mast is 1/2" x 1/2" x 28", with rounding starting 7" from the bottom. The stern mast is 3/8" x 3/8" x 14", with rounding starting 3½" from the bottom. The mast trees and braces are shown on the plan. Cut from 1/8" plywood and glue to the balls on the mast. The masts are stained walnut, as was the deck. Apply three coats of clear varnish. The trees are painted red. The flagstaffs on the masts are made from 1/8" dowel.

DECK DETAILS: The bow gantry was made from 1/4" x 3/8" spruce uprights and crosspieces. The bottom mount is 1/8" x 5/8" spruce. The bow roller is made from 3/4" dowel with the ends cut down to 3/8" diameter. The roller cleats are 1/8" square spruce. The gantry is painted green with brown roller and yellow cleats. Locate as shown on plan. The main mast gantry is 3/8" x 1/4" x 4" (uprights) and 3/16" x 3/8" x 10" spruce (crossbraces). The joints are glued and pegged with 1/16" dowel. The roller was made from 1/4" dowel with ends cut down to 1/8" diameter. The adjoining bitt is made from 3/8" square spruce. Drill a 1/8" hole in the bitt and upright to take the roller. The bitt and gantry are green, the roller brown. Locate from plans and glue to deck and bulwarks. All bitts are made from 3/8" square spruce with tops shaped as shown. Paint green and glue to hull and bulwarks as shown on plan. The stern gantry and bitt are made from 3/8" square spruce uprights and 1/8" x 3/8" crosspieces. The lower belaying pin rack is made from 1/4" x 1/2" x 5½" spruce. The gantry and bitt are green, the rack yellow. Belaying pins are carved from 3/16" dowel as shown. These were left natural. Drill holes in the rack and bow gantry and insert the belaying pins.

The steps are made from 1/16" sheet balsa. Paint red and glue in place. Around the edge of the stern deck glue a piece of 1/4" x 3/8" spruce, with 1/4" on deck. Glue a 1/4" square piece to the underside of the edge. Paint this coaming orange. Paint two pieces of 1/4" x 3/8" x 10" spruce, blue and glue to the outside of the hull (measure from plan) for dinghy hangers. Make the dinghy roller from 3/8" dowel, cutting the ends down to 1/4" diameter. The roller keepers are made from 1/4" scrap spruce. The roller is painted brown. Slip the dinghy hangers on the roller and mount the roller in the brace with keepers.

The stern windows are made from 1/8" balsa. The sides are cut to fit the hull. Cut the top and bottom so that they overhang the deck by 3/8". Assemble a piece of celluloid for the window with 1/16" strip frame. Paint the frames red, the window body yellow, and glue to the hull. The deck braces are made from 1/8" spruce, painted orange, and glued to the hull and deck overhang.

The stern rail is made from 1/4" square spruce stanchions, the corners cut on a small bevel. The cap rails are 1/8" x 3/8" spruce. The stanchions are glued to the stern deck coaming and the cap rails to the top of the stanchions. Stanchions are light blue and the cap rail is yellow. The stern part of this rail is made separately (see detail) and glued to the deck. The stern center deck rail is made and glued to the deck.

The mast coamings are made from 1/8" x 1/4" spruce, painted yellow and glued around the mast hole on the deck.

The dinghy was built on a backbone cut from 3/16" sheet balsa. Cut the bow and stern and a center section from 1/8" balsa and pin to the backbone. The sides are from 1/16" sheet balsa, glued to the bow and stern. Trim the sides to the shape of the bottom of the backbone and glue on 1/16" sheet balsa with the grain running across the hull. When the glue is dry, remove the backbone and mid-

section. The trim is 1/8" square balsa. The dinghy is brown, the seats yellow. The dinghy hanger is made from 1/8" brass tubing epoxied to the bottom. Solder a 1/4" brass ring to the top of the hanger and slip onto the roller at the stern. Mount the roller in keepers.

Anchors are made from 3/16" diameter brass tubing soldered together. Solder a 1/4" diameter brass ring on top of the anchor, then solder spade ends in place. Paint the anchors (3) flat black. Slip the rings onto a 1/4" dowel and paint brown. Glue the dowel between the side planking at the bow.

Cargo deck hatches are made from 1/2" x 1/2" balsa outside framing. Cover the center of the frame with 1/8" sheet, 1/8" below the top edge of the frame. Heavy white cord is used with ends cut down to 1/8" diameter. The adjoining bitt is made from 3/8" square spruce. Drill a 1/8" hole in the bitt and upright to take the roller. The bitt and gantry are green, the roller brown. Locate from plans and glue to deck and bulwarks. All bitts are made from 3/8" square spruce with tops shaped as shown. Paint green and glue to hull and bulwarks as shown on plan. The stern gantry and bitt are made from 3/8" square spruce uprights and 1/8" x 3/8" crosspieces. The lower belaying pin rack is made from 1/4" x 1/2" x 5½" spruce. The gantry and bitt are green, the rack yellow. Belaying pins are carved from 3/16" dowel as shown. These were left natural. Drill holes in the rack and bow gantry and insert the belaying pins.

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Cargo deck hatches are made from 1/2" x 1/2" balsa outside framing. Cover the center of the frame with 1/8" sheet, 1/8" below the top edge of the frame. Heavy white cord is used for lashing and is secured to the sides with large pins. The outer frame is painted bark brown, the center cover wood tan with brown streaks.

Capstans are carved from balsa block. The arms are 3/32" dowel pieces passed through holes drilled in the capstan. They are painted black. If you can find metal ones, use them, and consider yourself lucky!

The sails are made from cotton drip dry cloth. Sails shown are full size. Main and bow sails are made in the same way. Make a cardboard pattern and transfer to the cloth. Tape the edge with a bias tape. The sail braces are 1/8" dowel sewn to the sails at 1" intervals. Pass the thread around the brace at least three times. The sails shown on the model in the article were made from different colored cloth sewn together on the braces. This type of sail is a bit more trouble to make but sure looks good on the junk. Get your wife to sew them, if you can.

The rigging usually presents the most trouble. I have tried to be as specific as possible without getting too wordy. You will require 20 dead eyes made from 7/16" dowel cut into 1/8" thick slices. These pieces are drilled with three 1/16" holes in a triangle pattern. Cut a groove around the dead eye on the 1/8" edge. Also required are four bull's eyes. These are made from 1/4" dowel 5/8" long. Cut the dowel flat on the top and bottom to 3/16", and taper down the ends. Drill a 1/16" hole at one end, cut a groove around the bull's eye on the 5/8" sides. Paint dead eyes and bull's eyes black.

Slip the main mast into the hole in the deck and secure to the keel. On the edge of the dead eye (6) double wrap a piece of 26 gauge soft wire and twist off, leaving a 2" free end. On six other dead eyes, tie a heavy white fishing line in the grooves and tie off tightly. Use a lighter white fishing line and string the dead eyes together as shown on the plan. Allow about 3-5/8" between the dead eyes. Tie a loose knot around the stay line. The wire ends of the dead eyes are spaced along the spreader (3 each side) and secured to a large pin placed 1" below the spreader. Push the pin into the hull and glue from the inside. The stay lines are passed through the holes in the mast tree and pulled tight. They are tied off with a good knot. Check the mast position. The line ends that string the dead eyes are untied and pulled tight, evening out the dead eye spacing. Tie this line off around the stay lines. Make an additional loop and pass a piece of 1/16" dowel through the loop and tie off tightly. This is repeated at the mast tree using a 3/32" dowel.

The bow mast is slipped into the hole in the deck and secured to the keel. The dead eyes are strung (4 each) in the same way as the ones for the main mast were done. They are secured to the mast tree in the same manner. The lower ends of the dead eyes (wire) are secured around the bow gantry.

The stern mast is slipped into the deck box. Around the bull's eyes wrap (twice) 26 gauge soft wire and twist tightly, leaving a 2" free end. In the

hole in the bull's eye, tie a piece of heavy white cord. Drill a 1/16" hole in the stern coaming 2½" from the stern. Push the wire through and twist off. The other wires are twisted around the stern rail. Secure the stay lines to the mast tree.

Sail working rigging are the lines that raise and lower the sails. This is accomplished with working metal blocks. Two blocks are used on each mast (5/16" diameter). Tie one block to the top brace on the sail. The other block is secured to the mast tree brace with 26 gauge soft wire. String the block with heavy white cord. The bow sail line is tied off at the belaying pin on the bow gantry. The main sail line is tied off on the belaying pin rack at the side. The lower brace of the sails are tied off directly to the mast with heavy white cord, passed around the mast several times.

Tacking rigging (lines at front, back and center of the sails) are used to set the sails. 1/4" wooden blocks (single) were used on this rigging (19 are required). The bow sail front rigging blocks are tied to the sail braces. White cord is tied to the brace and passed around the mast and through the blocks. This line is tied off on a belaying pin at the bow gantry. The center rigging is shown on the plan. This line is secured to the center brace on the bow gantry. Read the sail lines - the blocks are tied to the bracing ends with the blocks in the center of the line and free to slide. The lines tied to the blocks are tied off on the midships gantry.

The main mast tacking rigging is accomplished in the same manner as the bow lines. The front lines that are wrapped around the mast and brought through the blocks are tied off on the side belaying pin rack. The center rigging is shown on the plan. The rear rigging lines are passed through blocks that are tied to the stern mast and tied off at the stern rail.

The anchor rigging uses heavy white cord. Tie the cord to the dowel at the bow, looping the cord around the bow roller, and tie off on the belaying pins at the rear of the bow gantry.

The dinghy rigging is accomplished by wrapping heavy white cord around the roller six times and then tying it off. These lines are passed over the stern coaming and tied to cleats on stern deck. A few loops draped around the belaying pins also add a nice effect.

That's it – wasn't too bad, was it?