

# TO BUILD A WHALEBOAT

HISTORICAL NOTES AND A MODELMAKER'S GUIDE

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MODEL SHIPWAYS

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thickness between W.L.2 and W.L.1. See the Top View in Sheet 1-A. This bevel can also be clearly seen in Figures 3-8, 3-17, and 3-18 and was in fact cut into the mold at a much later point in the building of the pilot model illustrated in this book. If you bevel the molds at this early stage, it will be much easier.

The section molds are also scribed on one side at W.L.4, and this should be done by carefully superimposing each mold on the section views of the plan and marking the waterline on the edges, both sides. Pick up the mold and carry the edge marks carefully to one side, then connect them with a carefully scribed pencil line. At the center, measure the distance from the waterline to the flat surface which receives the keel; this should be the same as on the plan at that mold.

To assist the planking process, it is advised that you mark the approximate locations of plank laps and seam battens on the edges of the molds. This can be easily done before the mold parts are assembled. Take each section mold and lay its corresponding drawing on Sheet 1 ("Molds—Planked Over," lower right corner). Once a side is correctly superimposed, mark its edge wherever the seam battens or laps touch. Flip the mold over and mark the other side. When all molds are marked this way, shade the areas of the laps and battens as in Figure 3-9. The same should be done for the profile mold ends on at least one side. These marks can be made the same way by superimposing the mold on the inboard construction profile at the top of Sheet 2. The results should look like Figure 3-8. When the time comes to plank the hull, these marks and shaded areas will be helpful in gauging the accuracy of your work; however, they are only approximate guides and you should allow yourself some leeway in following them.

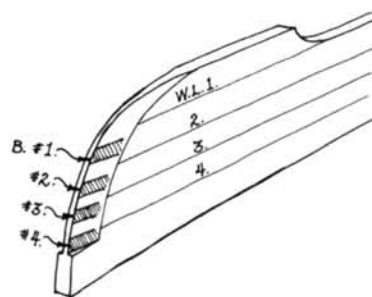


Figure 3-8. An end of the profile mold, showing the bevels for the seam battens. The shaded areas indicate the approximate positions of the battens as they approach the stem or stern.

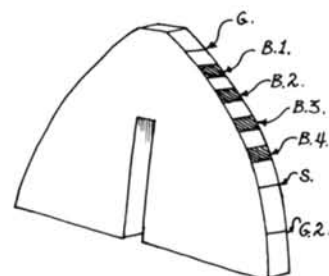


Figure 3-9. A section mold with lines marking the garboard, sheer strake, and gunwale strake laps (G, S, and G2); the shaded areas mark the locations of the seam battens.

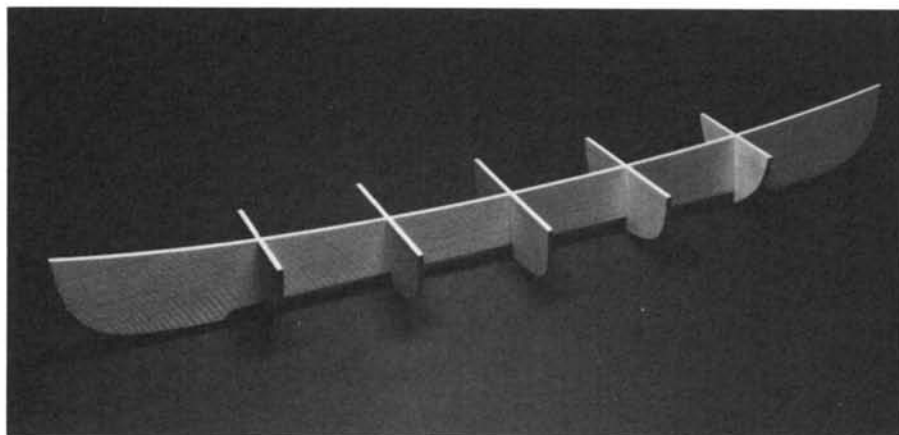


Figure 3-10. The profile and section molds assembled (prior to gluing).

The section molds should now be fitted to the profile mold (Figure 3-10), but not glued. See how the W.L.4 scribe lines match and if there is mismatching of the molds at their top surfaces (where the cap strips are to be fitted). The tops of the section molds, particularly 1,2,4, and 5, must be beveled to follow the sheer of the profile mold, so the top surface of each will align

\*In referring to "top" and "bottom," the hull in a *right-side-up* position is always meant. For example, "bottom" will refer to the area surrounding the keel, and "top" will refer to parts adjacent to the sheer, even when the hull is upside-down on the molds. The horses supporting the mold, on the other hand, are described in their present state; i.e., their tops are adjacent to the mold and their bottoms are fixed to the construction board.

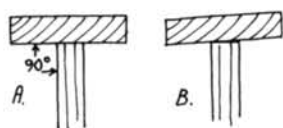


Figure 3-11. The cap strip must fit squarely atop the profile mold (A). If it does not (B), the section molds will not fit properly.

with the profile mold top\* (note that these bevels slope to the sides *opposite* those which were beveled for the hull planking; see Sheet 1-A). If this happens, your layout work has been accurate; if not, an error of  $\pm 1/32$ " is not serious, but anything more than that requires careful rechecking. As a last resort, measure the distances between the "flats" for the keel and W.L.1 (straight surface of profile mold cutaway) and transfer these to the section molds. Fit the section molds to the profile mold so the cutaway edge and these marks are aligned. This will assure that the keel and bottom planking will follow the correct contours.

With alignment work done to your satisfaction, take the mold apart and glue and pin the  $1/8" \times 1/2"$  cap strip to the top of the profile mold. If the molds are birch ply, pilot holes must be drilled before driving the lill pins. A #75 or 76 drill is recommended; bore the hole about  $2/3$  the depth of the pin shank. Note that the ends of this cap strip are slotted to receive the stem- and stern posts, and you may wish to cut these notches before fitting this piece. Be sure the cap strip sits squarely on the profile mold and does not lean to one side, thus throwing the section molds out of alignment (Figure 3-11). Let this assembly set up thoroughly before fitting the section molds.

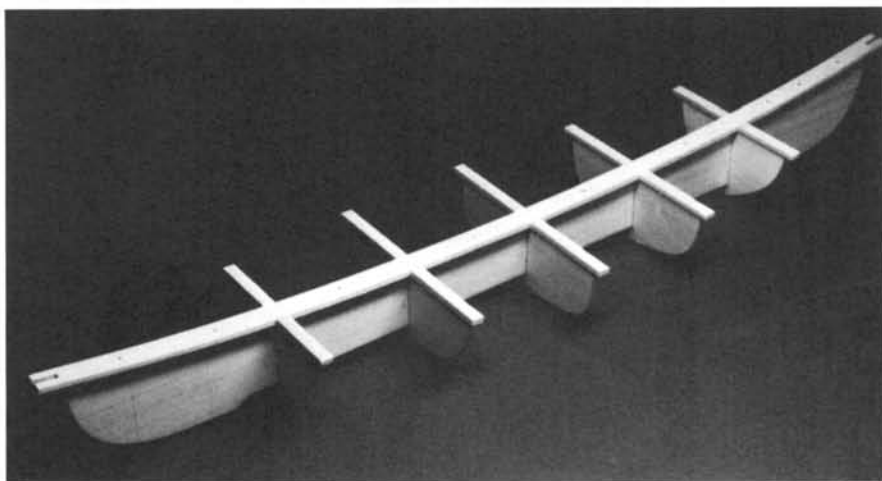
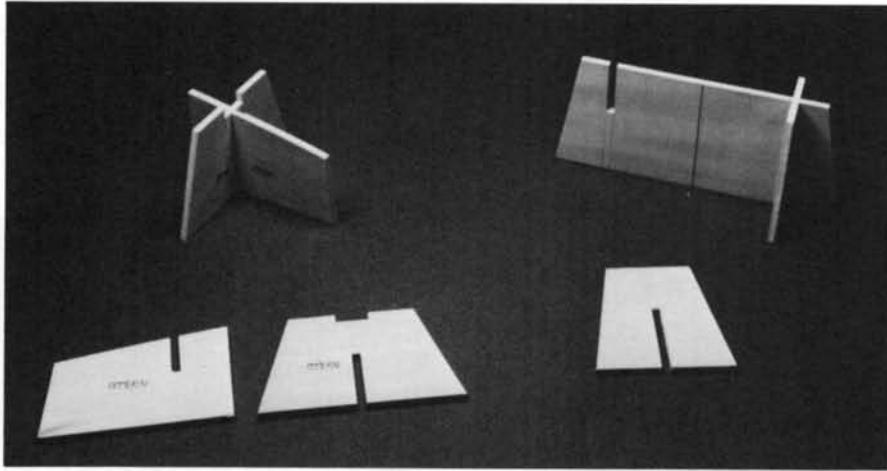


Figure 3-12. The hull mold (profile and section molds) assembled and glued.

When the section molds are fitted again, their top surfaces should drop down onto the cap strip without affecting previous alignment. Check this before gluing them; sometimes all that's necessary is sanding off the corners of the slots which got hung up on the glue fillet between profile mold and cap strip. The section molds are best glued by applying glue to the insides of the slots before sliding them onto the profile mild. Once in place, care should be taken that the molds are square (perpendicular to the section mold); this can be easily gauged by superimposing the mold assembly on the "Top View" of Sheet 1-A and looking directly down on it. A small machinist's square is also handy, but not essential, for this purpose. The  $1/8" \times 1/4"$  cap strips can be fitted to the tops of the section molds after they have firmly set.

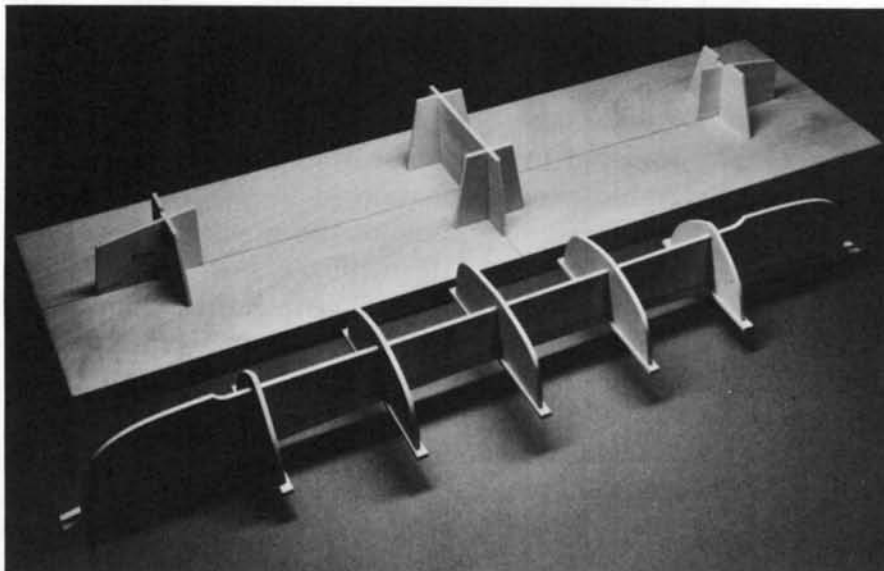


These should be glued and pinned like the profile mold cap, adjusted so their top surfaces follow the sheer, and left to set thoroughly. At this stage, the mold assembly should look like Figure 3-12.



*Figure 3-13. The horses for mounting the hull mold.*

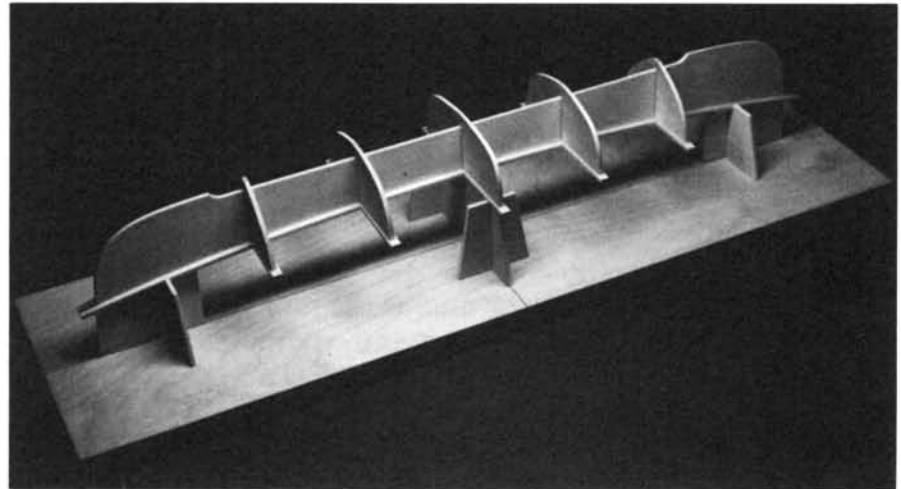
The three horses which support the molds on the construction board should be cleaned up and assembled (Figure 3-13). Fine joinerwork and finish are not necessary, but the results should not be sloppy either. It is advisable to mark the centerline on the cross-piece of the midship horse to insure accurate positioning. While the glue is drying, the construction board should be sandpapered smooth and marked with the centerline and midship section (Section 3). Glue the midship horse to the board first, aligning it on the centerline and Section 3 as carefully as you can. Let the glue set before you proceed further.



*Figure 3-14. The horses fitted to the construction board, ready to receive the hull mold.*

The bow and stern horses are positioned on the centerline by taking measurements from the plans, but they should not be glued yet (Figure 3-14). The assembled mold is then placed upside down on the horses, with the midship mold centered over the midship horse. The ends of the profile mold will be aligned

over the center line of the construction board. Drill and pin #3 mold to the midship horse so it cannot shift. The bow and stern horses should then be shifted fore or aft until their ends align with the ends of the profile mold. Study this situation carefully in the Side View in Sheet 1-A; if alignment is not precise, the shapes of the stem- and stern posts will be affected, usually for the worse. When molds and horses are aligned, mark the positions of the molds on the construction board, remove the hull mold, and glue the end horses to the board exactly where the marks indicate.



*Figure 3-15. The hull mold mounted on the horses and construction board.*

When the horses are securely glued, the hull mold can be joined and spot-glued to them (Figure 3-15). It is important not to glue the mold too securely to the horses, as it must be removed together with the hull planking when the hull is ready to frame. First, the tops of the horses should be filed down until the mold makes contact with all three. It is *not* necessary to have perfectly uniform contact with the entire top surfaces of the bow and stern molds, just enough to prevent the mold from “rocking.” The midship mold can be spot-glued directly to its horses; see suggested glue application in the Section Views of Sheet 1-A (shaded areas). The ends of the mold should not be glued directly to the bow and stern horses, but spot-glued via glue tabs, which when broken away will free the mold. These can be seen in the End View in Sheet 1-A and in the photographs (Figures 3-17 and 3-18). When spot-glued surfaces have set, the mold will be ready for hull construction.

**STEM POST, STERN POST, AND KEEL.** In building a real whaleboat, the stem- and stern posts—collectively termed “stems”—were steamed and bent to shape from single pieces of unseasoned oak. For model construction, it is easier to laminate these pieces, using easily bent hardwood like holly or maple. Once bent to shape and glued, they have great strength and resistance to straightening, two big advantages over one-piece construction. These members can also be laminated in stages which you will

find has great benefits in forming the stem and stern rabbets. The construction set provides  $\frac{1}{32}'' \times \frac{1}{8}''$  hardwood strips which should be soaked in water (hot water or steaming is not necessary) and carefully flexed between the fingers until they start to bend in a curve approaching that of the mold ends. Three layers should then be placed over the mold along the stem or stern profile and clamped in place, using the clips and wedges described in Sheet 1-A and illustrated in Figure 3-17. When this is done at both stem and stern, let the unglued layers dry in place; when removed for gluing, they will retain this shape and be much more docile when reclamped on the molds. Be careful not to allow glue to get between the laminations and the molds or you will have problems removing them later! If this problem seems likely, rub a little beeswax or paraffin on the mold edges before setting the glued layers back on them. Read the construction notes on Sheet 1-A carefully regarding clamping sequence, which should start at the keel scarf and progress upward.

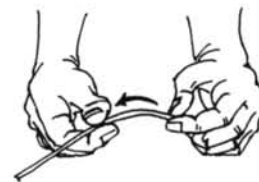
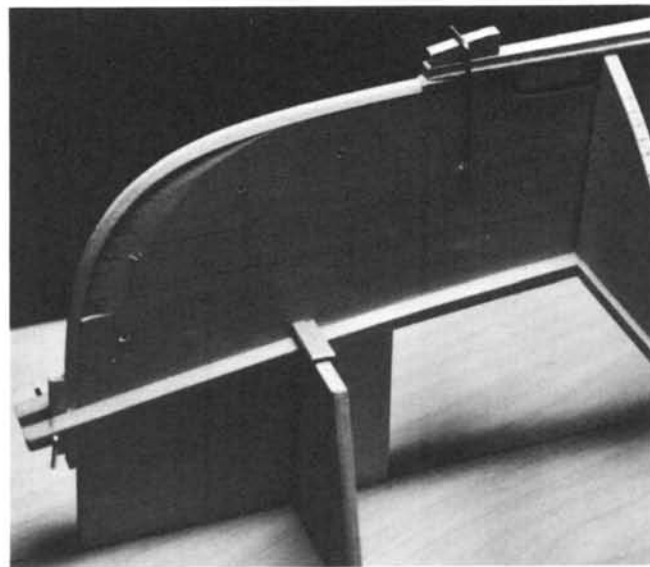
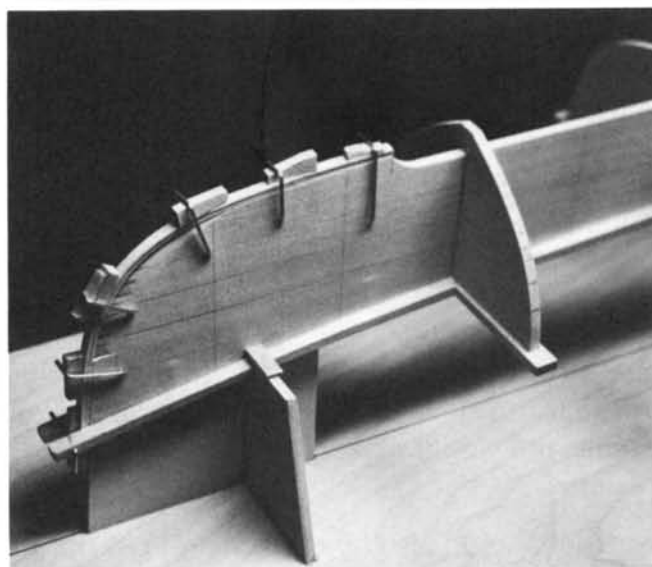


Figure 3-16. The hardwood strips can be partially preformed by soaking them in water and drawing them through your fingers with a twisting motion.



The first three laminations should be thoroughly set before removing the clips and wedges, so wait a day or two if you are using white resin or carpenter's glue. Upon removal, file the lower ends to form the scarfing surfaces with the keel, then bevel the sides as shown in the plans and Figures 3-18 and 3-19. This bevel should not lap the scarf joint and it should not extend through the cap-strip of the mold, particularly at the stern post. The angle of the bevel can be checked by springing a strip of wood over the molds and against the stem. When finished, reclamp the laminations in the molds; they need only be wedged down at the keel and at the cap-strip.

The two layers of the keel should now be made from provided basswood strips. The upper layer is  $\frac{3}{64}''$  thick by  $\frac{1}{2}''$  wide. Cut it a little longer than shown in the plan, then mark the sections and the width at each section as measured from the views at the

Figure 3-17 (left). The first three layers of the stem post clamped to the profile mold with wire clips and wedges.

Figure 3-18 (right). The clips and wedges are removed from the stem post, which is beveled for the rabbet. The two layers of the keel are assembled and joined to the stem- and stern posts.

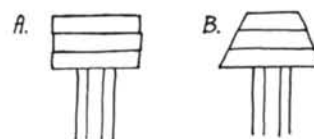


Figure 3-19. A, the first three layers of the stem post after gluing; B, beveled for the rabbet.



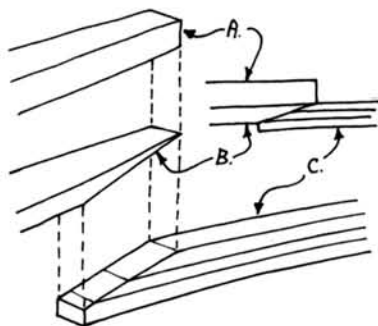


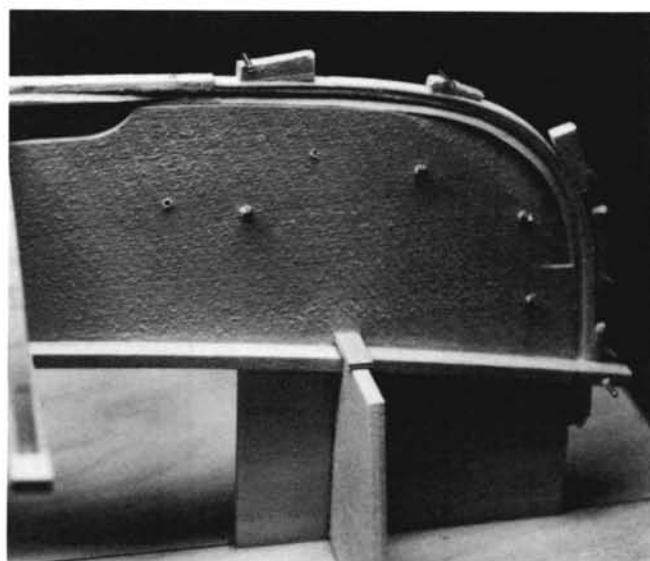
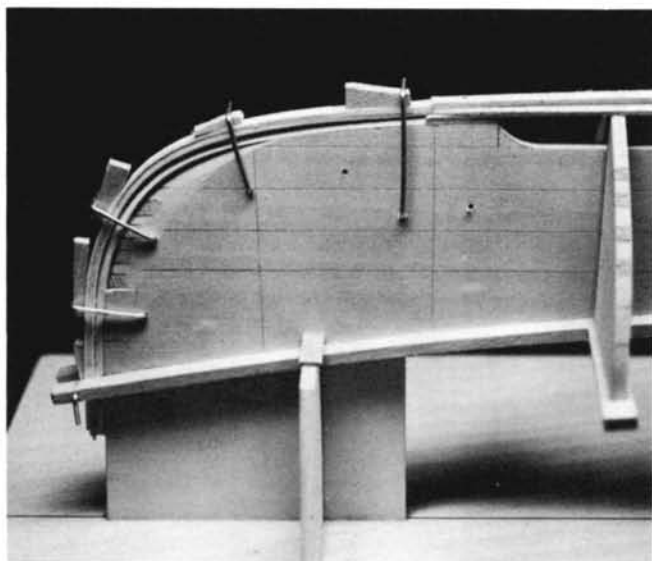
Figure 3-20. The upper layer of the keel (B) is scarfed to the stem post (C). The lower keel layer (A) is then joined to B.

bottom of Sheet 1-A. The easiest way to taper the ends to shape is with a small plane, holding the strip firmly at the edge of block of wood (approximately 12-20" long, any width and thickness) with the part to be planed extending beyond the side of the block. This will hold the wood strip steady and prevent its twisting and possible snapping. Be sure the plane blade is sharp and set to make only a shallow cut. The shaped piece can now be fitted to the mold, first trimming the ends to cover the scarf joints in the stem- and stern post laminations, then tapering them to join neatly to the slope of the scarfs. The taper will feather out just short of the far ends of each scarf, as seen in the Side View in the plans. This part of the keel should touch the flats of all the section molds and develop a subtle "rocker" when sighting along its edge from one end. If this does not happen, some of the flats may have to be filed down *slightly*, but care must be taken not to lose the rocker in the keel. Also be sure that the scarf in the stem- and stern post laminations has been filed down to the correct level; if too high, the keel will not sit properly on Molds 1 and 5.

The lower layer of the keel should now be shaped from a basswood strip  $\frac{5}{16}$ " wide by  $\frac{1}{16}$ " or  $\frac{5}{64}$ " thickness, depending on the thickness of the hull planking. True scale thickness of the planking is  $\frac{1}{32}$ "; therefore the lower keel layer must be  $\frac{1}{16}$ " thick if it is to project below the garboard at scale dimension. In the construction set, plank thickness was increased to  $\frac{3}{64}$ " to make these fragile parts easier to handle and less prone to breakage; but this would hide more of the side of the keel than it should, so a thicker lower piece for the keel is necessary. In making this departure, it was felt that the small sacrifice in scale dimension would not be noticeable and would make the amateur modeler's task significantly easier.

The centerboard slot should also be marked and cut out of the lower keel layer, to avoid the inconvenience of slotting the whole keel at a later date when such work becomes much trickier. Leave the upper layer uncut; the keel is stronger this way and you have a ready-made pattern and guide to follow at the time the centerboard case is to be fitted. The lower keel layer can now be fitted and glued to its upper part. Clamp it over the scarf joints with clips and wedges; then pin it to the section molds, driving the pins until their heads press against the keel bottom (drill pilot holes first, please). What you have done so far should look like Figure 3-18.

The final three layers of the stem- and stern posts can now be added. Follow the earlier procedures by prewetting and forming the strips, then clamping them unglued over the first layers. After setting, they can be removed, glued, and reclamped, taking care that the lower ends butt the keel ends tightly at the scarf joint (Figures 3-21 and 3-23). The effect of beveling the first



layers to form the stem and stern rabbets should now be quite apparent. It should also be plain that part of the strategy of the two-layered keel was to create an extension of that rabbet the whole length of the hull; however, the two are not matched at the scarf joint, so they must be blended by careful carving and maybe some filing, if you have a warding file in your needle file collection (a flat file which tapers). Begin by beveling the rabbet along the whole length of the keel. You can see this bevel in the section drawings on Sheet 1, marked "Molds—Planked Over." The bevel angle steepens as it approaches the ends, but you can gauge it quite accurately by laying a  $\frac{1}{2}$ " wide strip of wood against the rabbet while its other edge touches the mold (Figures 3-24 and 3-26A). An Xacto knife with a narrow chisel blade (#17) works well; cut with the beveled edge against the wood, as this reduces any tendency of the cutting edge to dig too deeply. Make shallow long cuts and repeat until the test piece sits neatly in the rabbet. As you approach the scarf joints, continue the bevel until you reach the bevel in the laminations, then carve gradually down until the keel rabbet joins the stem and stern rabbets in a gradual twisting sweep (Figures 3-22 and 3-24). File away any roughness with the small warding file. If you don't have one, glue 220-grit sandpaper to a small block of wood with sharp, square edges and sand gently along the whole length of the rabbet. Emery boards are also extremely useful for delicate sanding jobs. They can be cut to a variety of shapes to permit sanding in hard-to-get-at places on your model.

At this point, it is still necessary to anchor the stem- and stern post securely to the mold, but clips and wedges will interfere with the planking process. For this reason, you should drill and pin the posts to the mold, driving the pins to their heads as with the keel. Three pins in each post will suffice: one through the scarf and two equidistant between the scarf and the cap-strip. The wedges and pins in the cap-strip will not be in the way

Figure 3-21 (left). The second three layers of the stem post are glued atop the first three and wedged.

Figure 3-22 (right). The other side of the stem post, showing the blending of the rabbet from the keel to the stem.

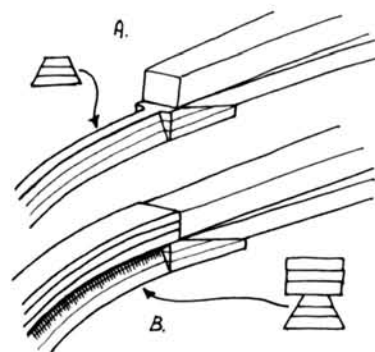


Figure 3-23. A, the first three layers of the stem post, beveled and ready to receive the next three layers (B).

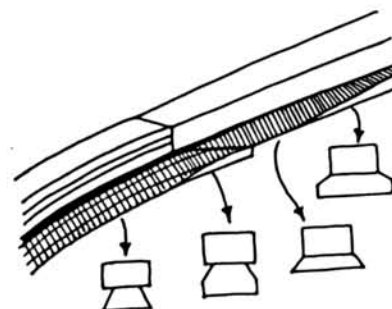


Figure 3-24. The blending of the keel rabbet with the stem rabbet. Note the sections at the different locations.

and should remain in place. Be sure the posts are right on the center line of the mold; otherwise the seam battens will have too much room at the ends on one side and not enough on the other.

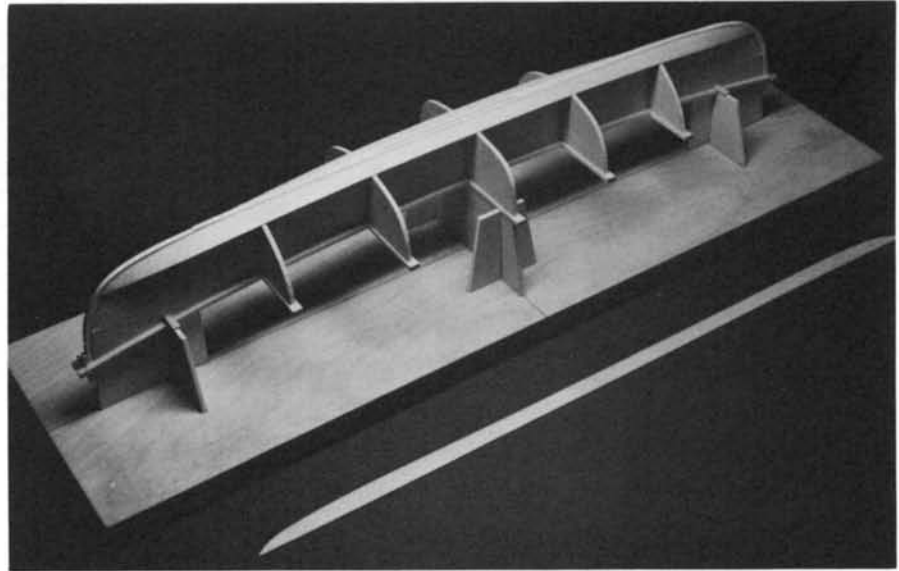


Figure 3-25. The garboards fitted and joined. Their pattern lies alongside the construction board.

**PLANKING THE GARBOARD.** Using Sheet 1-B for reference, remove the garboards (port and starboard) from the die-cut basswood sheet, lay them atop their corresponding patterns, being sure the bow and stern ends are *not reversed*. Carefully mark the location of the midship mold, also the letters p (for port) and s (for starboard), and an arrow pointing forward. Use a soft pencil so the marks can be easily erased and sanded away. The die-cut edges may tend to look a little fuzzy and splintered, so sand them carefully with a small sanding block, but do not round the edges. You will probably find after this is done that the plank edges match the plan patterns much better and won't look oversize due to fuzzy edges hiding the pattern lines. Only the outboard side of the garboard will be visible, so if that surface is rough or has planer marks (a minutely rippled surface), sand it lightly and very carefully with 220-grit paper followed by 320-grit. Make short sanding strokes; if too long strokes are made, the plank could buckle and snap, usually in three pieces. Leave the inboard side in its rough-sawn state, which is a better gluing surface for the frames and seams.

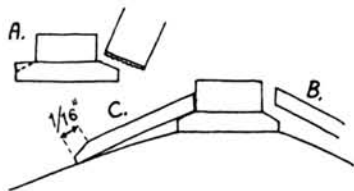


Figure 3-26. A, sanding the bevel into the keel rabbet; B, the lower edge of the garboard beveled to join the keel; C, the garboard fitted to the keel and section mold. Note the bevel to receive the second stroke.

In fitting the garboard to the keel, it's not the shape of the pattern on Sheet 1-B that counts, but whatever is needed in additional trimming to get that lower edge to nestle snugly into the rabbet. This should not amount to much, but plane and sand those parts which prevent a close fit at adjoining areas. Begin by fitting the garboard to the keel rabbet amidships with the lower edge of the plank in the rabbet and the upper edge resting on the mold. Be certain that you beveled the rabbet properly so it is not preventing a close joint. Follow the rabbet



3/14/2013

## NEW BEDFORD WHALEBOAT PARTS LIST MS2033

| PART #   | ITEM                 | QUANTITY      | DESCRIPTION/NOTES   |
|--|----------------------|---------------|---|
| <b>BRITANNIA CASTINGS</b>                            |                      |               |   |
| WP7401   | Whaling Gun          | 1             |   |
| WP7402   | Compass Bowl         | 1             |   |
| <b>BRASS AND MISCELLANEOUS FITTINGS AND MATERIAL</b> |                      |               |   |
| WP0993   | Nails                | 50            |   |
| WP2462   | Bow Roller           | 1             |   |
| WP0411   | 15/32" Belaying Pin  | 1             | Tub oar crotch  |
| WP0986   | Brass strip 6"       | 2             | for Gudgeon & Pintle Straps                               |
| WW9910   | Bulldog Clips        | 10            | Steel   |
| WP0446   | Photo Etched Plate   | 1 (100 parts) | Copper - Clench nails                                     |
| WP0447   | Photo Etched Plate   | 1 (29 parts)  | Copper - harpoon & lance heads,<br>Hatchet & knife blades |
| WP0448   | Photo Etched Plate   | 1 (100 parts) | Copper - Clench nail rooves (washers)                     |
| WP0449   | Photo Etched Plate   | 1 (8 parts)   | Brass - Rowlock horns, mast hinge &<br>mast straps        |
| WP40203SEC   | 0.036" Dia. Wire     | 2 ft          | Copper  |
| WP40223SEC   | 0.028" Dia Wire      | 2 ft          | Copper  |
| WP40246SEC   | 0.024" Dia. Wire     | 2 ft          | Copper  |
| WP100K-04  | 1/16" x 4" Tubing    | 1             | Aluminum  |
| WP127K-12  | 1/8" x 6" Tubing     | 1             | Pedestal material   |
| WP125K-12  | 1/16" x 6" Tubing    | 1             | Pedestal material   |
| WP163K-12  | 3/32" x 6" Rod       | 1             | Pedestal material   |
| WP0567   | 12" x 18" Sail Cloth | 1             | Cotton  |

### RIGGING LINE

Note: Rigging line is Cotton/Poly mix. Stain line for other desired coloring.

|        |                         |       |
|--------|-------------------------|-------|
| WP1241 | 0.008" Dia. Manila Hemp | 5 yds |
| WP1242 | 0.021" Dia. Manila Hemp | 5 yds |
| WP1244 | 0.040" Dia. Manila Hemp | 5 yds |

## WOOD DOWELS

Note: All dowels are Beech unless otherwise noted. Dowels are supplied in lengths as noted. Cut to length as required.

|           |             |   |   |
|-----------|-------------|---|---|
| WP5100-24 | 5/64" x 6"  | 1 | Boat hook pole                              |
| WP5101-12 | 1/8" x 18"  | 5 | Waif poles, paddle looms, Boat spade handle |
| WP5103-18 | 3/16" x 18" | 6 | Pulling oar looms, lance poles              |
| WP5104-24 | 1/4" x 18"  | 3 | Mast & sprit, Steering oar loom             |

## WOOD STRIPS, SHEETS, AND BLOCKS

Note: All wood is Basswood or Limewood (European Basswood) unless otherwise noted. Wood strips, sheets, and blocks are supplied in lengths as noted. Cut to length as required.

### STRIPS

|           |                     |    |   |
|-----------|---------------------|----|---|
| WP3602-24 | 1/32" x 1/16" x 22" | 20 | Frame laminations                         |
| WP3604-24 | 1/32" x 1/8" x 22"  | 12 | Seam battens, stem laminations            |
| WP3678-24 | 3/64" x 5/16" x 22" | 6  | Ceiling, cuddy boards                     |
| WP3679-24 | 3/64" x 1/2" x 22"  | 1  | Upper keel                                |
| WP4647-24 | 5/64" x 1/2" x 22"  | 1  | Lower keel                                |
| WP3619-24 | 1/16" x 3/32" x 22" | 2  | Gunwales                                  |
| WP3623-24 | 1/16" x 1/4" x 22"  | 3  | Outer thwart pads, risers                 |
| WP3624-24 | 1/16" x 1/2" x 22"  | 2  | Bow/stern sheets, cap strip, section mold |
| WP3634-24 | 1/8" x 1/4" x 22"   | 3  | Cap strip, section molds                  |
| WP3635-24 | 1/8" x 1/2" x 22"   | 1  | Cap strip, profile mold                   |
| WP3666-24 | 1/8" x 3/4" x 22"   | 1  | Thigh boards                              |
| WP3631-24 | 1/8" x 1/8" x 22"   | 2  | Ribbands                                  |
| WP3626-24 | 3/32" x 1/8" x 22"  | 2  | In wales                                  |

### SHEETS

|           |                  |   |                        |
|-----------|------------------|---|------------------------|
| WP4606-24 | 1/16" x 2" x 22" | 1 | Centerboard case sides |
|-----------|------------------|---|------------------------|

### BLOCKS

|           |                           |   |                                     |
|-----------|---------------------------|---|-------------------------------------|
| WP4646-24 | 5/8" x 5/8" x 12" Molding | 1 | Pine – Jig for steam curving planks |
| WP3695-24 | 3/8" x 1/2" x 6"          | 1 | Cheek pieces                        |
| WP3643-24 | 1/4" x 1/4" x 6"          | 1 | Mast step                           |
| WP3674-24 | 3/16" x 5/16" x 6"        | 1 | Bow chocks                          |
| WP3640-24 | 3/16" x 3/16" x 6"        | 1 | Preventer & standing cleats         |
| WP3681-24 | 1/8" x 5/16" x 6"         | 1 | Peak cleats                         |

## LASER-CUT WOOD PARTS

Note: All Laser-Cut wood is Basswood or Limewood (European Basswood) unless otherwise noted.

|          |                                      |   |         |
|----------|--------------------------------------|---|---------|
| WP4607-A | <u>1/16" Thick Set</u><br>Oar Blades | 1 | 6 parts |
| WP4607-B | <u>1/16" Thick Set</u>               | 1 |         |



|            |  |   |   |
|------------|--|---|---|
|            | Keg Parts  |   | 56 parts                                |
|            | Centerboard                                      |   | 1 part                                  |
|            | Paddle Blades                                    |   | 6 parts                                 |
|            | Lions Tongue                                     |   | 1 part                                  |
|            | Rudder   |   | 1 part                                  |
| WP4641-C-1 | <u>3/64" Thick Set</u><br>Hull Planking          | 2 | 9 parts                                 |
| WP4641-C-2 | <u>3/64" Thick Set</u><br>Hull Planking          | 2 | 9 parts                                 |
| WP4628-D   | <u>1/8" Thick Set</u><br>Building Forms (others) | 1 | 6 parts                                 |
| WP4628-E   | <u>1/8" Thick Set</u><br>stansion molds 1-5      | 1 | 6 parts (also includes 1 building form) |
| WP4628-F   | <u>1/8" Thick Set</u><br>Keel                    | 1 | 1 part                                  |

#### PLANS AND INSTRUCTIONS

|            |                |   |                             |
|------------|----------------|---|-----------------------------|
| WPPL2033-A | Plan, Sheet 1  | 1 | 1. Lines                    |
| WPPL2033-B | Plan, Sheet 1A | 1 | 1A. Mold construction       |
| WPPL2033-C | Plan, Sheet 1B | 1 | 1B. Patterns                |
| WPPL2033-D | Plan, Sheet 2  | 1 | 2. Hull                     |
| WPPL2033-E | Plan, Sheet 3  | 1 | 3. Whaling/boat gear        |
| WPPL2033-F | Plan, Sheet 4  | 1 | 4. Davits, sail plan        |
| WPPL2033   | Parts List     | 1 |                             |
| WP2033MB   | Whaleboat Book | 1 | By Erik A. R. Ronnberg, Jr. |

#### PLEASE NOTE:

To construct the row locks, as shown on page # 104 of the Whaleboat instruction booklet simply slide a brass nail through the photo- etched plate (A) and then through a 3mm brass sheave which will serve as the spacer on part (D). The entire assembly is then fastened to the hull as shown.

Instruction book; page 76 paragraph below fig 3-6, line 3, 1/32 should read 1/16

FORM WPPL2033