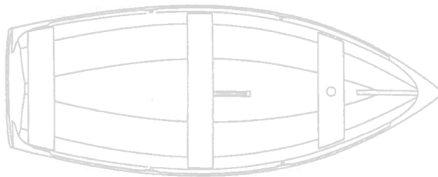
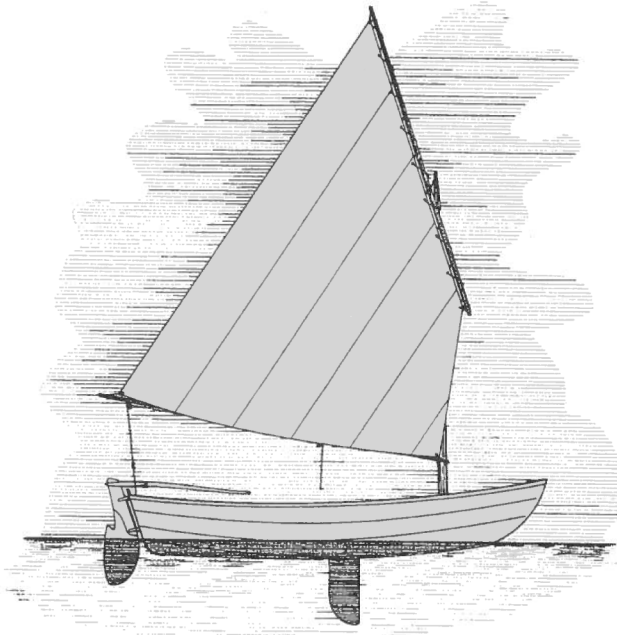


# The Shellback Dinghy

A Scale-Model Construction Kit by WoodenBoat



Designed by Joel White

LOA: 11' 2"

Beam: 4' 5"

Model Scale: 1 1/2" = 1'

## Shellback Model Kit Parts List

### Plans and Instructions plus Carbon Paper and Pushpins for Transferring Patterns

2 pieces 2.5 mm 3-ply Aircraft Plywood approx. 4 x 24"

Bottom, Transom, Rudder, Daggerboard, Daggerboard Truck Sides (2), Daggerboard Insert, Station Molds (3), Center Frame, Display Stand Supports (2)

3 pieces 1.5 mm 3-ply Aircraft Plywood approx. 4 x 18"

Planks (6), Rudder Cheeks (2), Tiller Cheeks (2)

1 piece Basswood 1/8 x 2 x 24"

Keel, Seats (3), Knees (4), Breasthook (2), Seat Supports (6), Daggerboard Posts (2), Daggerboard Trunk Cap, Daggerboard Trunk Bedlogs (2), Tiller

1 piece Basswood 3/16 x 1 x 6": Inner Stem, Maststep

1 piece Basswood 1/16 x 3/16 x 6": Outer Stem

2 pieces Basswood 1/4 x 1/4 x 8": Display Stand Longitudinals

4 pieces Basswood 1/16 x 3/16 x 24"

Gunwales, In wales and Blocks

1 piece Spruce 3/8 x 3/8 x 18"

Mast

2 pieces Spruce or Balsa 1/4 x 1/4 x 18" or 3/8 x 3/8 x 18"

Boom and Yard

2 pieces Pine (3/4) x (7/8) x 18 or 2 pieces Basswood (1/2 x 1/2 x 18

Ladderback Sides (2 x 15"), Transom Supports (2 x 2") (1 each from each 18" piece)

2 pieces Basswood 1/2 x 1/2 x 8.5 or 3 pieces Basswood 1/2 x 1/2 x 5.5

Ladderback Cross Pieces (3 x 2"), Stem Brace (1 x 5")

Note: these parts are indicated on plans page 2 as 2 x 4's, except for the two transom supports which are indicated as 1 x 4 uprights on the plans. With the exception of the two transom supports, these parts are all flush on top and bottom when the ladderback is assembled.

3 pieces Basswood - this kit may contain either 3/8 x 3/8 x 10.5 OR 4 1/2 x 1/2 x 8.5

Ladderback Cross pieces (3 x 2.25"), Mold/Centerframe Supports (3 x 5", 6.5", 5.5")

(3 Cross pieces from one, the 6.5" Centerframe Cross Spall from the second, and the 5.5" and 5" Mold Supports from the 3<sup>rd</sup>).

Note: these parts are indicated on the plans page 2 as 1 x 2's. In some places on the plans they are called cross pieces and other time called cross spalls. These pieces all fit on top of the ladderback sides and are used to support the molds, centerframe, and transom.

Dacron Sail and Leechline for Rigging

1/16" Brass Rod for Rudder Hanger

Small Brads for Tiller Pin and Temporary Fasteners

# **The Shellback Dinghy Model Kit**

## **Instructions**

### **The Concept**

The mission of The WoodenBoat Store is to provide access to the experience of wooden boats. This kit is the epitome of that mission. It is designed to be very close to the actual boatbuilding experience--to be a skills builder for your future endeavors. There are no pre-punched planks with this kit, but instead materials much like you would bring home after your trip to the lumber yard. The Shellback design has proven to be great fun under sail, a dinghy that tows exceptionally well, and a boat that provides easy, comfortable rowing. And it is all wrapped-up in a shapely design, created by naval architect and boatbuilder, Joel White.

A word about the plans. These aren't simple sketch plans like those that come with many models, but are actual scale plans, reduced to the scale of the model from the designer's original plans drawn for the full-sized boat. Of course, those plans include additional sheets of drawings and details not needed for this model, and a "table of offsets" from which a builder would "loft" his boat (draw it out at full size on a loft floor) before starting the actual construction. The plans in this model kit, being reduced to the actual scale-model size, will be used as patterns to cut out the parts from the wood supplied, just as you would do in building many big plywood boats (the "loftings" the boatbuilder draws become, in effect, his patterns). You will use glue throughout to fasten your boat together, whereas a big boat would be fastened with "mechanical" fasteners (screws, nails, bolts) in any places. And anyway, the real Shellback is constructed using the "glued lapstrake plywood" method, in which most of the planking is glued with epoxy, and screws are used only in a few critical areas.

### **Materials and Tools**

You will need to supply some yellow carpenter's glue or epoxy (if you want to sail your model you should use the epoxy). You'll also need a few simple tools, and some paint and/or varnish to finish it. Everything else is included in the kit. When you receive your kit, check each piece of wood against the materials list to make sure everything is there. This will also make you familiar with the various dimensions of wood you will work with. Don't cut any piece until you have checked and double-checked that you are cutting from the right piece of stock. When cutting out the parts from sheetwood, lay out the patterns in such a way as to use the wood in the most economical manner. In a number of instances, you will need to get several parts out of one piece of wood and will be making small pieces out of scrap. We have included a sample layout of these pieces to show an arrangement that will allow you to cut all of the parts from the wood provided. When cutting parts, it is best to cut slightly outside the line, then carefully trim exactly to the line with a fine rasp, or sandpaper.

For tools, you will need a ruler that measures in 32nds of an inch, a sharp X-acto knife or other modeling knife, a flexible straight edge, a small square or drawing triangle, a fine jigsaw or coping saw (helpful), a fine file or rasp, a sharp chisel, sandpaper, several spring-type clothespins to use as clamps, and some thread to sew the sail if you choose.

Now, before doing anything else, read the instructions through carefully, study the plans, and become thoroughly familiar with what you will be doing.

### **The Model Plans and Scale**

Cutting patterns will be taken from the plans, but rather than actually cutting the shapes from the plan sheets themselves, we suggest you use carbon paper to transfer the shapes either directly on the wood or onto another piece of paper or thin cardboard that you can carefully cut out as a pattern. You can also lay the plans over the wood, then use a push pin to punch tiny holes along the pattern to press tiny holes into the wood. Then remove the plans and draw lines between the points. It will be easier in the long run to keep your plans intact. Whatever method you use be *precise*.

Note that the dimensions marked on the plan are the dimensions for building the full-sized Shellback. Also, the scale we'll be using for building this model is actually  $1\frac{1}{2}'' = 1'$  ( $3'' = 1'$  as is indicated on the plans is the scale of the plans used for building the real boat.) So while the patterns are full sized for the model you are building, the measurements noted on the plans are not accurate for the model. In cases where measurements are required, use your ruler to determine dimensions from the plans. Please also note that the attached photos show construction of a full sized Shellback, but we think you will find them helpful.

### **Building the Ladder Frame**

The first step is to construct the building jig. Like the foundation of a house, it is important to have this be square. The hull of the model is built upside-down on this frame. Details for the ladder are shown on Sheet 2 of the plan set. Cut the two side rails from the two pieces of  $\frac{3}{4} \times \frac{7}{8} \times 18''$  Pine, (each side should be  $14\frac{3}{4}''$  long, leaving two pieces to cut the transom supports from.) Cut the two transom supports. These should be approximately  $1\frac{3}{4}''$  long. The length and thickness of the supports is not important but the angle in which they are attached to the frame is.

Next cut the three cross pieces from the  $\frac{1}{2} \times \frac{1}{2} \times 8''$  Basswood, they should be approximately  $1\frac{3}{8}''$  long. Note that the size of the basswood used is larger than shown on the plans. What is important is that the finished ladder frame is the correct length and *outside* width, that it's square ( not skewed) and that the molds are placed in the correct positions. Cut the stem brace from the remaining piece. It should be approximately  $4\frac{1}{2}''$  long. Before assembling the frame, cut a notch for the stem brace in one of the cross pieces so that it will fit flush with the top of the cross piece.

Assemble the frame as shown on Sheet 2 of the plans. Use a square to position the cross piece and verify that they are perpendicular to the side rails before gluing. Mark the angle for the transom supports and glue them in place. Check that the upper surface of the frame is perfectly flat. The upper surface should be marked with a centerline, spaced exactly at intervals taken from your plans.

### **Attaching the Molds and Center Frame**

Cut the 3 station molds and the center frame from one of the pieces of 2.5 mm  $4 \times 24''$  plywood ( be sure to mark out all parts needed from this piece before cutting any). Be sure to transfer the centerline C and sheer point S marks to the molds and the center frame. The notch in Mold #1/2 needs to snugly fit the stem ( cut from  $\frac{3}{8}''$  basswood), so you may want to cut that last. Because the final shape of your boat depends upon the shape and positioning of the molds and frames, be extra careful in drawing the station lines, in cutting the molds and frame, in gluing the cross spalls in the exact position shown on the plans. This is one of the most critical steps in the construction process.

The molds and the center frame can now be set up. Refer to the plans to be sure you're positioning them on the correct side of each station line. The cross spall of the center frame is glued directly to the base and the molds should have cross pieces (also cut from the 1/4 x 1/4 x 12" Basswood) also glued to the base for added support. Each mold/frame should be held square and plumb to the ladder surface while the glue sets. If necessary, attach diagonal braces made from scrap to hold the molds steady in a perpendicular position to the ladder frame.

### **Attaching the Transom and Stem**

Cut to the outside lines of the transom as shown on the Sheet 2, and mark the inner bevel lines on the piece. The bevels are cut from the outside edge to the marked bevel lines with a sharp chisel, a rasp, file or sandpaper. It is useful to glue a small, narrow strip of sandpaper to a flat piece of wood to avoid rounding the surface you are sanding. You want a good, flat surface at your bevel to make a "landing" for the bottom and planking. The bevel changes slightly on each surface. The transom must be marked with sheer points, a centerline, and mounting height on the inside surface for line-up on the jig and when planking. Attach the transom to the ladder frame using two temporary brads. Don't drive these brads home, flush with the face of the transom; you will pull them out later when you remove the boat from the jig. You may also want to use an elastic band around the transom and the transom supports to hold them snug until the planks are attached.

The stem, with its shape taken from plans Sheet 2, must be cut to shape from the piece of 3/16 x 1 x 6" basswood. Be sure to mark the lines for the forward station mold (#1/2 on your plans), the sheer point and the ladderback junction point (noted as 15' ' mark on the plans). If the setup is correct, lines transferred from the full-sized patterns to the stem will fall at the top of the ladderback and the forward face of Station Mold # 1/2. If this doesn't happen, check all your measurements in this area to determine what's wrong. Before installation, plane a rough bevel on the stem's sides, using the cross-sectional view on the General Arrangement Plan as a guide, Sheet 3 of your plans. The stem sits in the notches in Station #1/2 and the stem brace of the ladder frame. The stem should not be permanently attached to the forward mold or the ladderback, but rather held temporarily in place. If it seems loose, use clamps or pushpins to hold it in place until the bottom is attached. [Fig.1]

### **Attaching the Bottom**

Cut the bottom from the 2.5 mm 4 x 24" plywood using the patterns on Sheet 4 of the plans set. Again, cut to the outside lines. After cutting the bottom, trim it to shape, mark it with a centerline (when boatbuilders refer to a centerline, it is always a fore-and-aft centerline), station lines, and the outside stern transom line. Line up the centerline and transom mark on the bottom panel with the ladderback centerline and the transom and glue in place starting with the transom. Spread glue on the landing surfaces of the center frame and stem, and spring the bottom into place. DO NOT spread glue on the molds. Be particularly careful not to put too much strain on the center frame, or you may break it. Pins or small brads may be driven through the bottom and into the Station 1 and Station 3 molds to hold them in place while the glue sets, or small clamps or spring clothespins may be used. These brads will be removed later. Any overhang at the stern will be trimmed off later. A small clamp or clothespin is helpful to hold the forward end of the bottom panel to the stem while the glue sets. The edges of the bottom panel must now be beveled to give a landing for the garboard planks. The object here is to work down a bevel that matches the line of the molds, frames, and transom. This may be done with a sharp chisel, file, fine rasp or sanding block. An easy way to produce an accurate bevel is to hold a straight edge along the adjacent edge section of each mold

and frame in turn, and cut a bevel at those areas on the edge of the bottom panel until the straightedge lies flat and true against each and the bottom edge. Then “fair,” or join, these beveled sections to each other (the bevels will be at a different angle at each section, remember) in one long, smooth, changing bevel from end to end. This is the method to use for all plank beveling. [Fig. 2 & 3] This bevel must also carry up either side of the stem, meeting at it’s centerline. The stem bevel should join the bottom bevel in a smooth transition. [Fig. 4] When this step is finished you should have a landing surface for the garboard planks that will allow them to sit tightly against all contact surfaces. The final test for this fit comes with a dry-fitting of the garboards after you have cut them.

### Planking

Cut the shape of each plank from the 1/8” 4 x 18” plywood, following the plank patterns on Sheet 4 of the plans. It might be wise to allow for an extra 1/8” length on each end, which can be trimmed away after installation if not needed. Be sure to transfer the registration marks for the center frame (R.M.). These marks will be used to align the plank on the center frame.

The garboard planks are first. Position one so that the top edge of the plank (top and bottom defined as if the boat were right-side up) is lined up along the “knuckle” of the center frame. The knuckle is the point where the angle of the shape changes. Use the center frame marks to determine the fore-and-aft placement of the plank and clamp it in place or drive a small brad through the plank to temporarily hold it in place. Repeat the process at the transom. This will, in most cases, leave an overlap on the bottom edge of each plank. This should not be trimmed away, but left, and the V-shaped notch it creates will be filled later (see ‘Midship Section Detail on Sheet 3 of the plans). Bring the plank edge to the stem and tack or clamp it in place there. When fitting, the planks may require a bit of trimming where they meet at the forward centerline to obtain the proper fit on the beveled stem. Once the plank is aligned with the center frame, transom and stem, it should lie against the station molds also but this is not crucial.

When you are happy with the fit of the first plank (the garboard plank), spread glue on all contact surfaces and press the plank in place. An extra pair of hands may be required to hold the plank firmly at all points while the glue sets (or pins, small brads or clamps may be used temporarily). Small pieces of waxed paper placed over the edges of the three station molds will keep glue off them and prevent your boat from sticking to the building jig. (Remember, the station-molds should not inadvertently become part of your boat! They are not frames.)

Repeat the above process for the other garboard plank. After the glue has dried, remove the clamps and any temporary pins and plane the garboards flush with the bottom panel. This is the *only* plank overlap that is planed off in building the Shellback. The line where the garboard plank meets the bottom should be a nice, “fair” (smooth and even with no dips) line.

With the garboards installed, the process of beveling, checking, and gluing is repeated for the mid- and sheer planks. Be sure to dry-fit each plank in its proper position before spreading any glue. For the side planks near the bow, you’ll need to make a transition from overlapping edges to a flush, smooth appearance at the stem. See the top, right side of Sheet 3 of the plans for a series of drawings showing the change in plank overlap as you move toward the bow. Bevel the top edge of the garboard plank as far forward as Station #1/2 to form a landing (as you did in the previous step with the bottom to allow the garboard plank to be fitted). Clamp the mid-plank in place. The top edge of each of plank should be lined up with the marks on the center frame and transom. The plank will overlap the top of the garboard plank. Mark a pencil line on the garboard plank along the bottom edge of the mid-plank from the stem back as far as Station #1/2. [Fig. 5]

Then remove the mid-plank. Continue the bevel on the top edge of the garboard plank being sure not to go beyond your pencil line.

For the planks to appear flush at the stem, we must now cut a "gain" or groove along the top edge of the garboard plank for the mid-plank to fit down into. When building the full-sized Shellback, we'd use a rabbet plane, but for the thin model plywood, use an X-acto knife to score a line along your pencil mark, then shave away the wood up to your score. Work slowly so that you don't shave off too much at once. [Fig. 6] The overlapping plank is now clamped back in place. The fit is checked along the gain and back as far as Station #1/2. Any additional bevel or gain needed can be planed into the back of this overlapping plank. To do this, before removing the plank, reach inside the boat and draw a line along the overlapping edge. Then remove the plank and bevel the inside edge so that it will fit nicely on the gain of the other plank. Do not bevel beyond your pencil line. Be sure that you're working on the *inside* this time! [Fig. 7] Clamp the plank on again and check the fit. Once you're happy with the fit, the plank can be glued on. Again, start with the centerframe then glue the bow and transom. If your planks are not quite flush at the stem, you can run some sandpaper over them when you've finished planking to get that final smoothness near the stem.

Follow the same process for the second mid-plank and also for the two sheer planks. The top edge of the sheer planks must be lined up on the sheer points you marked on the center frame, transom and stem. Be sure that the planks are evenly placed on both sides, so that when you look toward the stern from the bow, the planks on either side meet nicely at the stem.

The planking and cutting the gains are the trickiest part of building a Shellback. If you get nothing else from this project, understanding how to cut the gains, and practicing that procedure with this kit, is worth the price of admission.

After all the planking is complete, the plank ends and bottom end may be trimmed flush with the transom. The plank ends are also planed flush with the inner stem. The surface created here should be about 3/16" wide. This would be a good time to sand the outside of the hull and fill the plank lap grooves with a bead of glue.

The outer stem (from 1/16 x 3/16 x 6" basswood) should now be glued in place. The extra length can be left for now. Mark a center line down the face of the outer stem and bevel the corners of the outer stem so they are smoothed and flush with the plank surface using a sanding block.

Next, the outer keel is installed. Its shape comes from the Construction Profile Drawing on Sheet 3. Cut it from the 1/8 x 2 x 24" basswood (be sure to transfer lines for all parts that will be cut from this piece before cutting any). Using a flexible straightedge, draw a fore-and-aft centerline on the bottom panel and glue the keel in place. [Fig. 8] Now the forward end of the keel should be planed to fair into the stem face.

Remove all temporary brads or pins (from the transom too) and cut off the center frame above the sheer (the cross spall is cut off in the process, too) and remove your model from the building jig.

### **Finishing Off the Shellback**

The first step in finishing off the Shellback is installation of the stern quarter knees and the breast hook. Their shape comes from the General Arrangement Plan on Sheet #3 of the plans. They should be cut from the 1/8 x 2 x 24" basswood. Adjust the bevel on each knee until it fits tightly against the inner faces of the transom and sheer planks. The Sheet & Traveler Arrangement drawing on Sheet 5 of the plans will also help with placement.

The breasthook is cut in two halves, as shown on the General Arrangement Plan on Sheet 3. The breasthook halves are tipped upward slightly where they meet, giving a crowned effect to

the finished unit. Bevel the edges where they meet and also the edges that attach to the sheer planks. Note that there may need to be a gap cut where the inner stem comes up. After it's glued in place, sand the top of the breasthook to give a nice curve to the top face.

Guardrails (1/16 x 3/16") are simply cut to length and glued along the top edge of the sheer plank. Lots of spring-type clothespins help here as clamps. When set, round the forward and aft ends with sandpaper.

If desired, inwales with spacer blocks are also cut from 1/16 x 3/16 x 24" basswood strips. If you decide to include them, you'll need to cut notches in the aft knees, the breasthook, and the center frame prior to installing them.

The seats may now be cut out from the 1/8 x 2 x 24" basswood and positioned, with shapes, heights, and fore-and-aft locations determined from the construction drawings. When they fit properly, mark their bottom edges on the hull and use these marks to locate the seat support blocks, which should be cut from 1/8" scrap basswood. These blocks, after being glued in place, will require some careful beveling of their top surfaces so the seats will lay on them properly. Do not install the seats yet.

### **Installing the Daggerboard Case**

As with the full-sized boat, one of the more meticulous parts of your project will be assembly and installation of the daggerboard case. Cut all pieces to shape (2 sides, 2 bedlogs and 2 end posts from 1/8 x 2 x 24" basswood). Leave the trunk sides about 1/8" higher than shown on the plan for later trimming, and the endposts should also be slightly longer.

Glue a bedlog along the outside bottom of each case side. Be sure to make a set, not two exactly alike, as they are not quite square and therefore not reversible. Glue the endposts to the inside of the forward edge and aft edge of one case side, leaving about 3/16" sticking down below the bedlogs. If building a sailing version of the model, coat the case sides with epoxy inside and out before assembly. Glue the two case sides together.

With the aft end of the case held against the forward edge of the center frame of the boat (middle seat removed), mark on the bottom panel where the posts touch. Note that the case must be offset from the centerline so that the daggerboard slot falls just beside the keel and *not* on top of it. Cut a slot through the bottom panel to match the slot in the trunk and allow the endposts to drop through without striking the keel. With the case fitted tightly in its slot, you can mark and cut the top to its proper height, even with the *underside* of the middle seat. The aft end of the case should be up against the forward edge of the seat. To find the proper final height of the case, with the middle seat resting on its support blocks and the forward edge of the seat behind the center frame, hold a small straight edge against the bottom of the seat and mark along its top edge across the case side. Cutting to this line will allow the daggerboard trunk cap to sit flush with the top of the seat. Now you may glue the daggerboard case in position.

The cutting, positioning, and fitting of the maststep (from 3/16" scrap), the mast hole in the step and through the forward seat, the daggerboard (from 2.5 mm plywood), and the case cap (from 1/8" scrap), are all detailed on the plans, and should present no problems. Sand the daggerboard so that it will be thin enough to fit snugly in the case but not so tight that you have to force it through. Don't forget to allow for the thickness of the paint or varnish you use to finish your boat. A small, narrow strip of wood is glued lengthwise to the bottom of the case cap so that it fits securely in the case slot and holds the cap in place when the board itself is not inserted. The seats should now be glued in place.



### **Display Stand**

Cut out the cradle's forward and aft support pieces from 2.5 mm plywood. Each support piece should be approximately 3 x 6". Use the profile drawing in the center of Sheet 1 to determine the shape of the top of each piece. The forward support piece should be cut to fit the lines shown for Mold 1 on the right side of the drawing, and the aft piece should fit the lines for Mold 3 as shown on the left. Note that only half of each pattern is shown on the plans. Draw a centerline down the support pieces and cut the notch for the boat's keel in each piece. Cut the two longitudinal pieces to length, then glue them end onto the two supports to make a rigid, boxlike structure. Make sure it is square, without a wobble. The hull of your boat will rest in the cradle high enough to allow the rudder to be mounted. The daggerboard may be inserted through the daggerboard case and part way below the bottom of the hull, but it will not go all the way down (that would require a cradle so high it would look awkward on display).

### **The Sail and Rigging**

Cut the sailcloth to the proper shape using the sail plan on Sheet 5 as a pattern. Leave some extra material on each side so you can stitch a hem around the very edge of the sail. This is especially important if you plan to sail your model. If you really want to get fancy, you could put three or four evenly spaced vertical lines of very fine stitching (a very narrow zigzag stitch would look even better) with white thread from the top of the sail to the foot to indicate "panels" of sailcloth used to make a sail. Some additional stitching at each corner would add to the authenticity as reinforcement stitching. For rigging, use the white leechline for the halyard, sheet, and lacing at the top of the sail around the yard. Note that the sail is "loose-footed," held only at the tack and clew to the boom and not laced around the boom all along its length.

[Fig. 11, 12, 13]

### **Finish**

How you finish your Shellback model is your choice. A nice, traditional scheme is to varnish the seats, tiller, and spars, and paint the inside bottom a buff color and the rest of the inside white, and the exterior white, with the sheer plank painted in a brighter color of your choice.

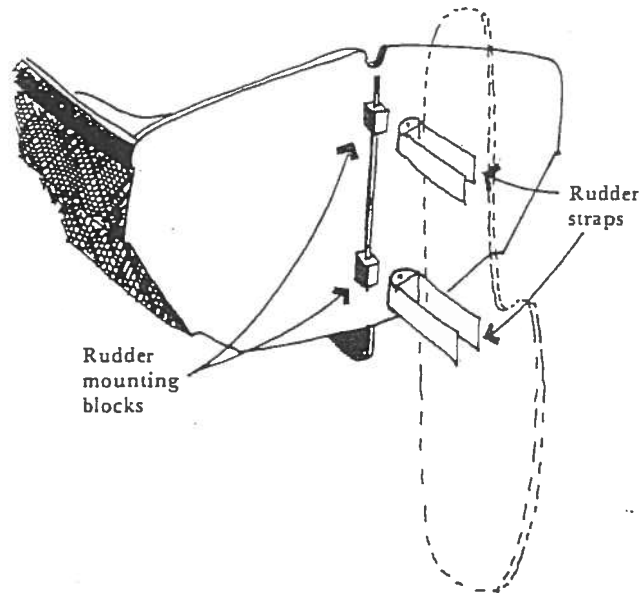
### **What's Next?**

With the completed model and all that new-found knowledge fresh in your mind, it's time to think about your *next* project. Be it another model or building a full-sized boat, we have a variety of ways to help. We offer full-sized plans for over one hundred boat designs, we have full-sized pre-cut kits for the Shellback, and you can even spend a week at our WoodenBoat School, building the Shellback in a class setting that will be like no other "classroom" you have experienced.

## The Rudder and Tiller

Follow the plans for the rudder and tiller. Cut the tiller cheeks from 1.5 mm scrap plywood. The tiller is cut from 1/8" basswood. The end of the tiller should be trimmed to the same thickness as the rudder so that when the tiller cheeks are glued on, they will sandwich the rudder in a press fit (don't glue them to the rudder). A small brad is provided to fit through the end of the tiller where it attaches to the rudder. It's helpful if you predrill holes for this in the tiller cheeks before gluing them to the tiller. Glue the brad in place then snip the ends off.

Small straps made from scrap wood are glued to each side of the rudder, where bronze fittings would be on a full-sized boat. Drill 1/16" holes in each fitting before gluing to the rudder. Glue two small blocks (cut from 1/8" or 3/16" scrap) to the transom. Predrill holes for the brass rod before gluing to the transom. The rudder straps should rest on top of the rudder mounting blocks. A piece of 1/16" brass rod serves as the rudder rod. This rod should feed through the top rudder strap, then through the top transom block, and then the same for the bottom half. For a permanently placed rudder, glue the rod in place at each mounting block. Do not allow any glue on the rudder straps so the rudder can freely pivot on the rod. If you'd like the rudder to be removable, as in the full-sized boat, simply bend the rod at the top and the bottom instead of gluing it. When you want to remove it, unbend one end and pull the pin. If you plan to sail your model, Sheet 5 of the plans shows details for a self-steering tiller assembly.



## Spars

Cut the spars to length and taking the shape from Sheet 5 of the plans, draw the taper on all four sides of the mast. Start with a centerline down the length of each side to ensure that you don't put in a lopsided taper. Note that the mast tapers two ways; a short, quick taper in the base to the heel, and a long taper to the head. Cut to the taper lines, then trim the edges of the four-sided wood with a file, rasp, or sandpaper block, to form an eight-sided piece. [Fig. 9 & 10] Now sand the sharp edges until the spar is round. Use increasingly fine sheets of sandpaper held in the palm of your hand to form a curve until you arrive at the proper shape and smoothness. Work slowly and don't try to take off too much at once, or you might take too much off. Form the other two spars using the same method. These two spars are thinner, with less marked tapers, and you may be able to work them simply by eye.

## Glossary of Terms

### **Aft**

Toward the stern.

### **After**

Closer to the stern.

### **Baseline**

A line, usually parallel to the waterline, drawn on boat plans and used as a reference for all vertical measurements and when lofting the lines of a hull.

### **Bevel**

An angle cut along the edge of a timber or across its end to produce an exact fit between parts.

### **Breasthook**

A type of knee, triangular in shape, that fits in the bow behind the stem and extends from side to side.

### **Butt**

To join end-to-end or edge-to-edge. As a noun, a strap or block fastened across a joint to hold the two elements together. Also the lower end of a mast.

### **Centerline**

On boat plans, a line dividing a hull into two identical longitudinal halves (always fore-and-aft in boatbuilding). It is used as a base for establishing 'thwartship measurements.

### **Chine**

A lower longitudinal joint where two edges meet in a hull. Most commonly, the joint between the sides and the bottom in a flat- or V-bottomed boat.

### **Cleat**

A fitting to which a line can be made fast. Any short length of small dimensional lumber used for miscellaneous framing needs.

### **Face**

The flat, broad surface of a board or timber.

### **Fair**

Descriptive of a line that changes gradually without quick humps, hollows, or flat places, and is pleasing to the eye.

### **False Stem**

External fairing piece that overlays the planking joint at the stem and protects the end of the planking.

### **Flare**

The outward angle of a boat's sides between the waterline and the sheer when viewed in cross section.

### **Flush**

Even or level with; not protruding.

### **Forefoot**

The area of the hull where the bottom of the stem meets the forward end of the keel.

### **Frame**

A 'thwartship member to which planking is fastened.

### **Freeboard**

The height of the sheer above the waterline at any given point along a hull.

### **Gain**

A rabbet planed along the top edge of a plank near the bow. A gain allows the overlap of the next plank to shift from the full plank thickness (a full lap) along the length of the hull to a smooth appearance at the bow.

### **Garboard**

The lowest plank on the hull. On a dory, the plank next to the bottom.

**Gunwale**

A longitudinal strengthening strip that runs along the sheer of a hull.

**Inboard**

Inside of the hull, toward the centerline.

**Inwale**

Longitudinal member at the inboard edge of the sheer.

**Knee**

A strengthening member that is fastened to two angled members and distributes stress to both.

**Lapstrake**

A method of planking in which each strake slightly overlaps the one below it, giving the appearance of clapboarding on a house.

**Limber holes**

Openings in bulkheads or frames that allow water to move from one section of the hull to another.

**Molded and sided**

Terms for describing the shape of a member. For example, the sided dimension is an indication of its thickness; its molded dimension is its width when viewed in profile.

**Outboard**

Outside the limits of the hull, in a direction away from the centerline.

**Painter**

A length of rope used to tie a boat to keep it from going adrift.

**Pre-bore**

To bore a hole in wood for a nail or other fastening to be driven into. Pre-boring reduces the danger of breaking out or splitting.

**Riser**

A longitudinal member inside the hull that serves as a support for the thwarts.

**Seam**

The joint between two planks or strakes, made watertight by caulking.

**Seize**

To bind together, or to put a stopper on a line. To wrap the loom of an oar with light line for protection from wearing.

**Sheer**

The uppermost line of a hull when viewed in profile.

**Sheerstrake**

The top plank, or strake, on a hull.

**Stock**

The unfinished material something is to be made from. Stock is usually wood or lumber in woodworking, but in metalworking it is metal.

**Stem**

The foremost vertical or nearly vertical structural member of a boat's hull, at the point where the two sides meet at the bow.

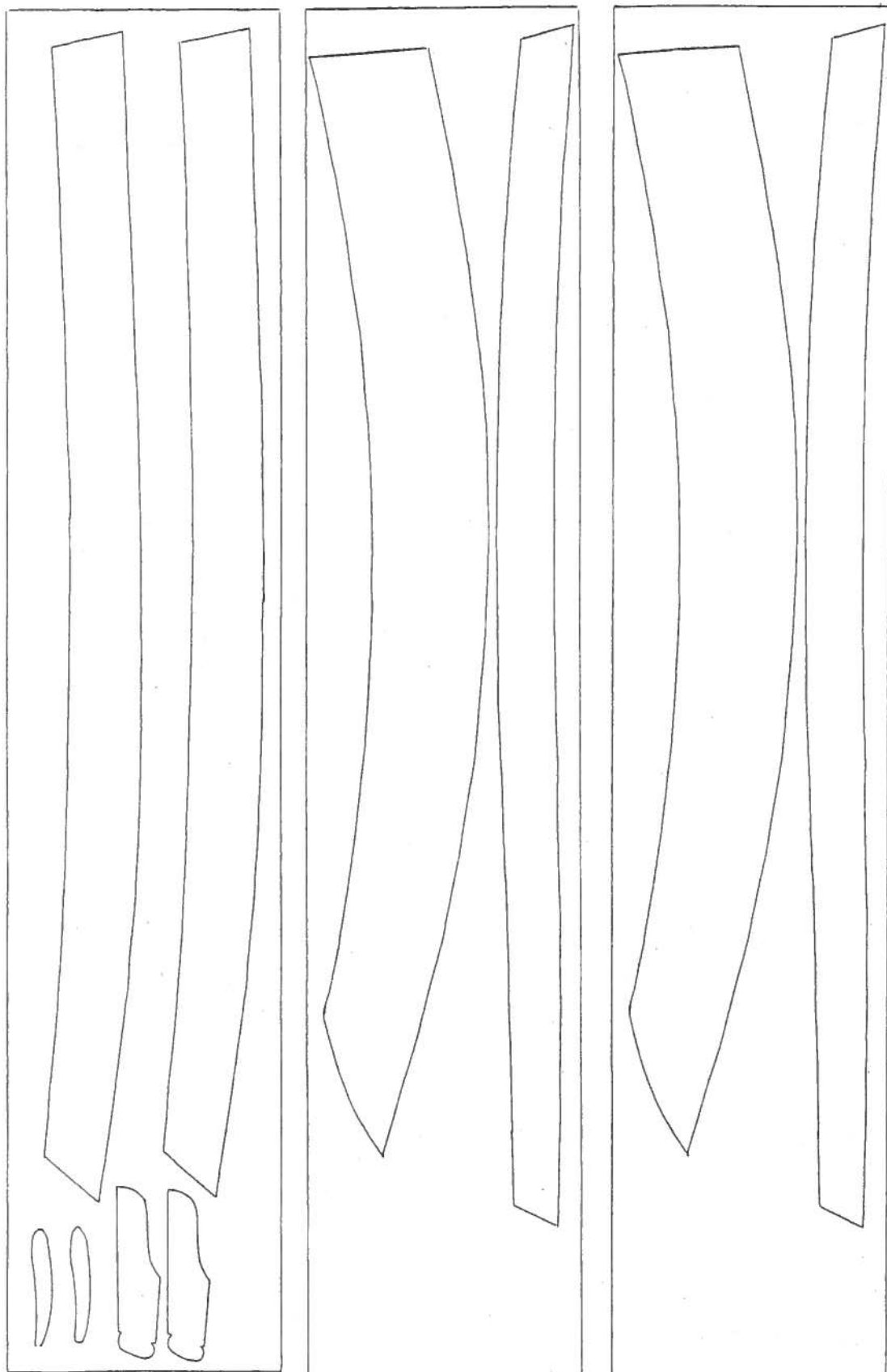
**Strake**

A single unit of planking that runs from the bow to the stern. A strake can be made of several pieces joined end to end.

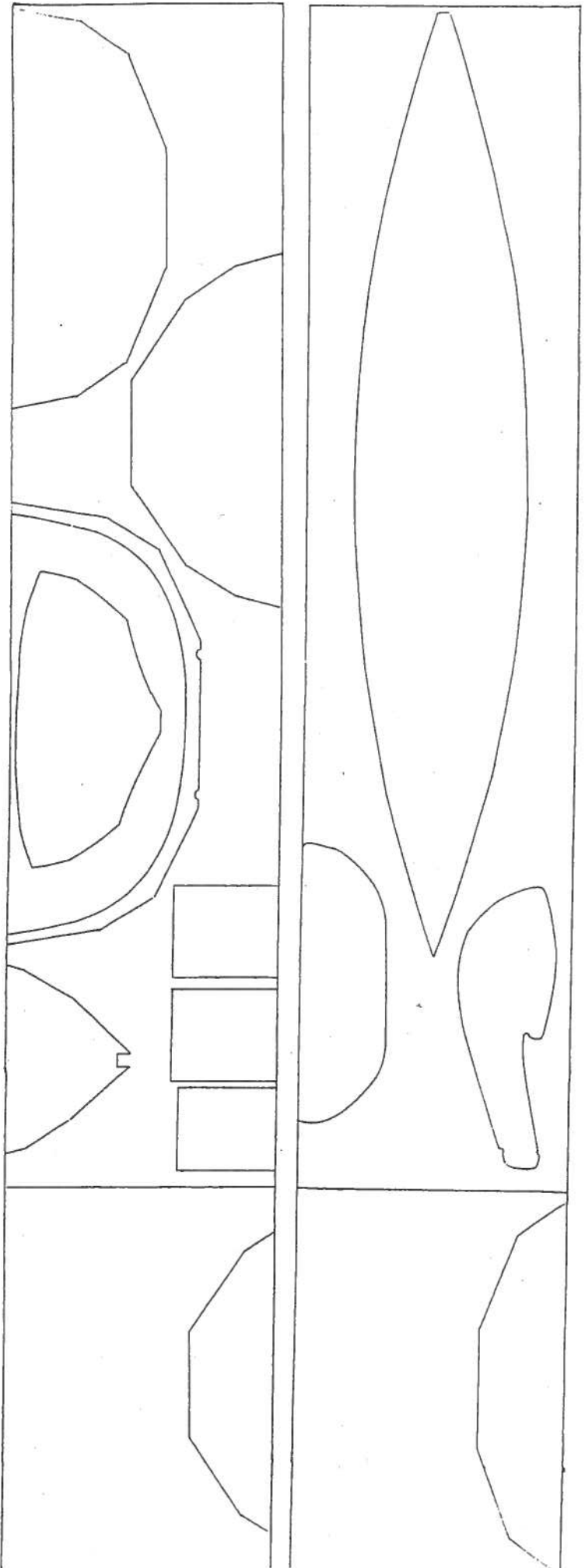
**Waterline**

Any horizontal line on a boat's profile generated by a plane parallel to the surface of the water. The load waterline is the upper limit of a boat's draft, under normal conditions with the designed load.

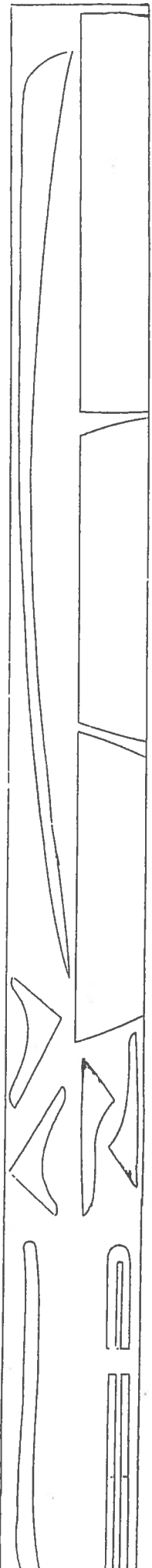
3 Pieces 1.5 MM 3-ply Aircraft Plywood approx. 4 x 18"



2 Pieces 2.5 MM 3-ply Aircraft Plywood approx. 4 x 24"



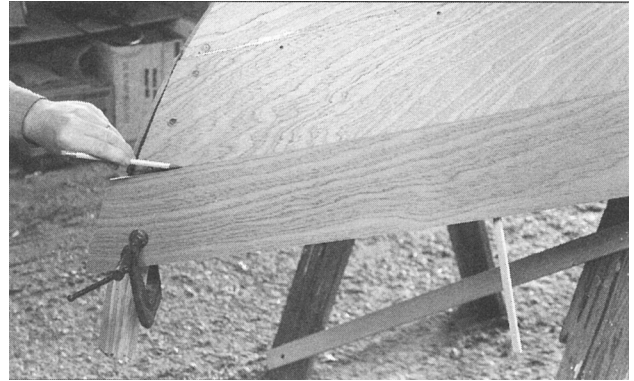
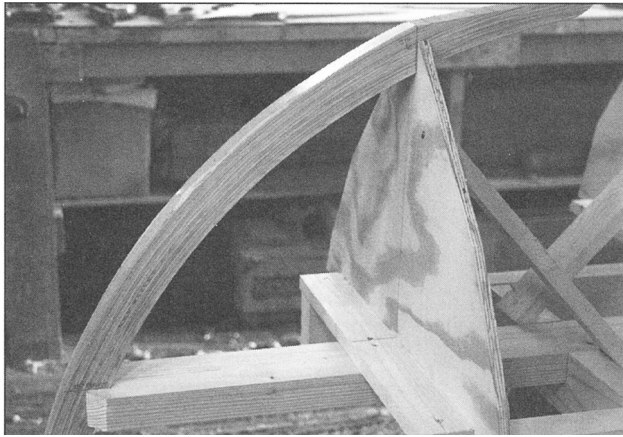
1 Piece Basswood 1/8 x 2 x 24"





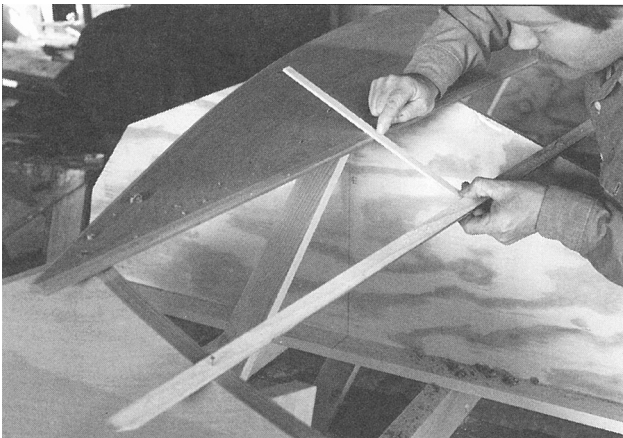
# Stem, Planking, and Keel

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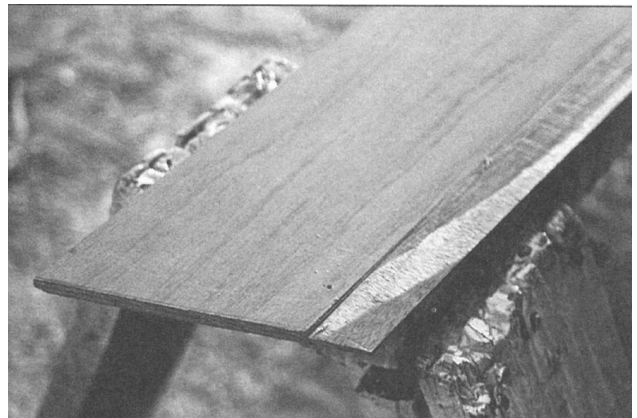
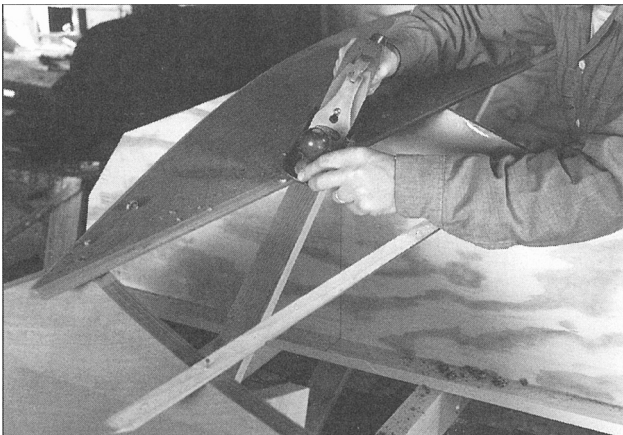
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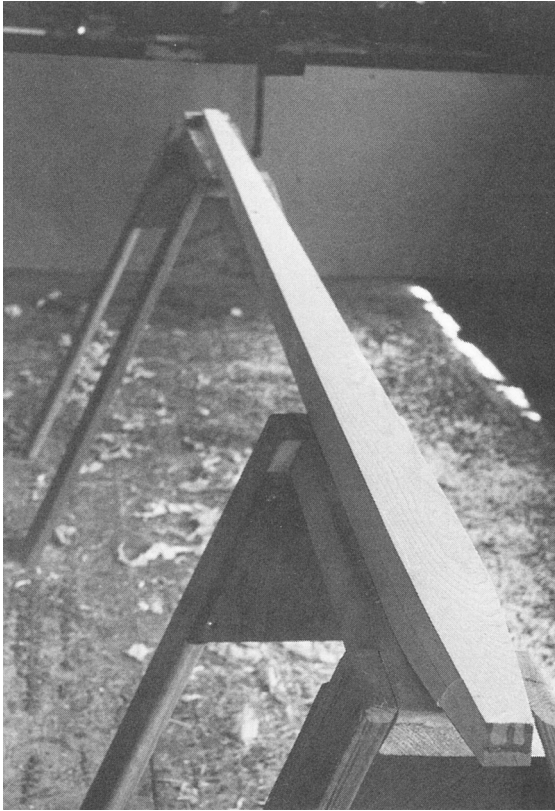


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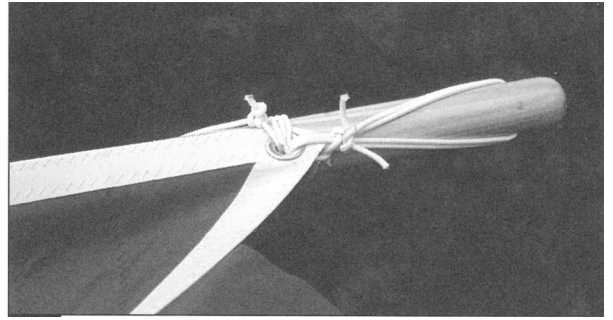


# Spars and Rigging

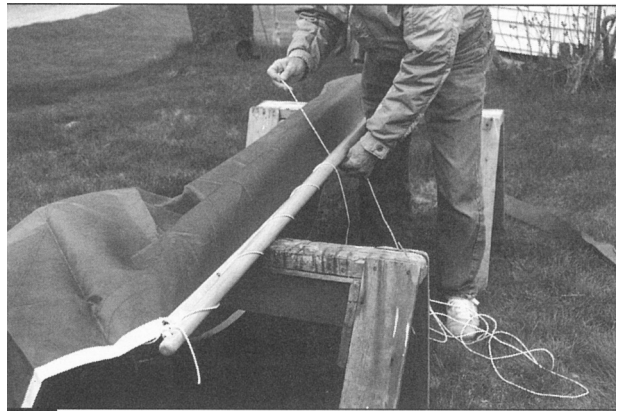
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