

INSTRUCTION MANUAL

Charles W. Morgan

NEW BEDFORD WHALING BARK 1841

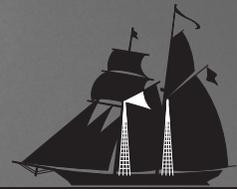
Technical Characteristics

SCALE: 3/16" = 1'0" (1:64)

Overall length: 30-3/4" (781 MM)

Overall height (including baseboard): 27-7/8" (708 MM)

Overall width (main yard): 10-1/8" (257 MM)



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HISTORY

Charles W. Morgan was built in 1841 at the Hillman Brothers' Shipyard on the Acushnet River in New Bedford, Massachusetts. She cost \$52,000 and was registered at 351 tons, 106' 6" x 27'2-1/2" x 13' 7-1/2".

Her primary owner was *Charles Waln Morgan*, a Philadelphia-born Quaker. The first of *Morgan's* 37 successful worldwide expeditions began on September 6, 1841. During her 80 years of service, she caught and processed more whales than any other whaler in history. Her active days ended in 1921 with the decline of whale oil prices. From 1925 to 1941, she was on display and struggling to survive at Round Hill, Massachusetts. *Morgan* was purchased for Mystic Seaport Museum (Mystic, Connecticut) in 1941, restored, and is berthed there as a monument to the men who built and sailed her.

Morgan was originally ship rigged. However, shortly after the Civil War, her rig was reduced to a double topsail bark.

Refer to the bibliography for an in-depth history of the whaling industry and more details on *Charles W. Morgan*.



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Instruction Manual

New Bedford Whaling Bark **CHARLES W. MORGAN** 1841

Plans and Instructions
By Ben Lankford

Model by Bob Bruetsch

Model Shipways' *Charles W. Morgan* kit was developed in 1994-'97. Plans are based on drawings and other information provided by Mystic Seaport, and from photographs taken by the author in 1994. The Model Shipways plans and instructions were reviewed by Mystic Seaport for accuracy.

In 1983, Mystic restored *Morgan* as a double topsail bark. The museum relied on photographs and other documentation to depict the whaler as she appeared between 1892 and 1908. Those wishing to build the model in another configuration should consult the bibliography and the numerous photographs showing changes made throughout *Morgan's* career.

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Hollywood, FL 33020

Before You Begin

Charles W. Morgan is an interesting ship and makes a splendid model. Assembling the plank-on-bulkhead hull develops an understanding of how real ships are built, while laser-cut parts assure an accurate shape. Although *Britannia*, brass, and wood fittings facilitate construction, many require final finishing prior to installation. This is especially true for the *Britannia* castings and is discussed later.

Various scratch-building techniques appear throughout the manual to encourage less experience modelers to acquire these skills. As the model progresses, don't be afraid to substitute kit fittings with your own creations. We encourage you to try it. The experience gained will prove valuable for future projects.

If you are a beginner, take your time. *Morgan*, with her davits and whaleboats, has a fair amount of detail and small parts. Always complete one stage before going on to the next. When something goes awry, consider doing it over. A second attempt usually surpasses the first, since practice makes perfect.

Tools Needed to Start Construction

The following items are recommended for building the model. Those who have modeled before may have their favorites.

A. Knives

1. Hobby knife
2. No. 11 blades

B. Files

Set of standard or diamond needle files

C. Clamps

1. A few small C-clamps
2. Wooden clothespins
3. #16 and #33 rubber bands

D. Carving Set

Buy gouges and chisels for carving center keel rabbets, counter block, stern and bow filler blocks, tapering the stem, and carving the whale boats.

E. Sharpening Stone

Keeps tools razor sharp

F. Boring Tools

1. Set of #60 to #80 miniature bits
2. 1/16", 3/32", and 1/8" bits
3. Pin vise

G. Miscellaneous

1. Tack hammer
2. Tweezers (a few)
3. Small, fine pointed scissors
4. Miniature pliers
 - a. round nose
 - b. flat nose
5. Small bench vise

6. Soldering iron or torch
 - a. solder
 - b. flux
7. Sewing thread for seizing (other rigging in kit)
 - a. black
 - b. tan
8. Beeswax block (for treating rigging lines)
9. Masking tape
10. Wire cutters (for cutting fine wire and strip metal)

H. Sandpaper

Fine and medium grit garnet or #100 to #220 aluminum oxide

I. Sailcloth

Light weave cotton or linen cloth for making sails. Model Expo sells a suitable cotton cloth

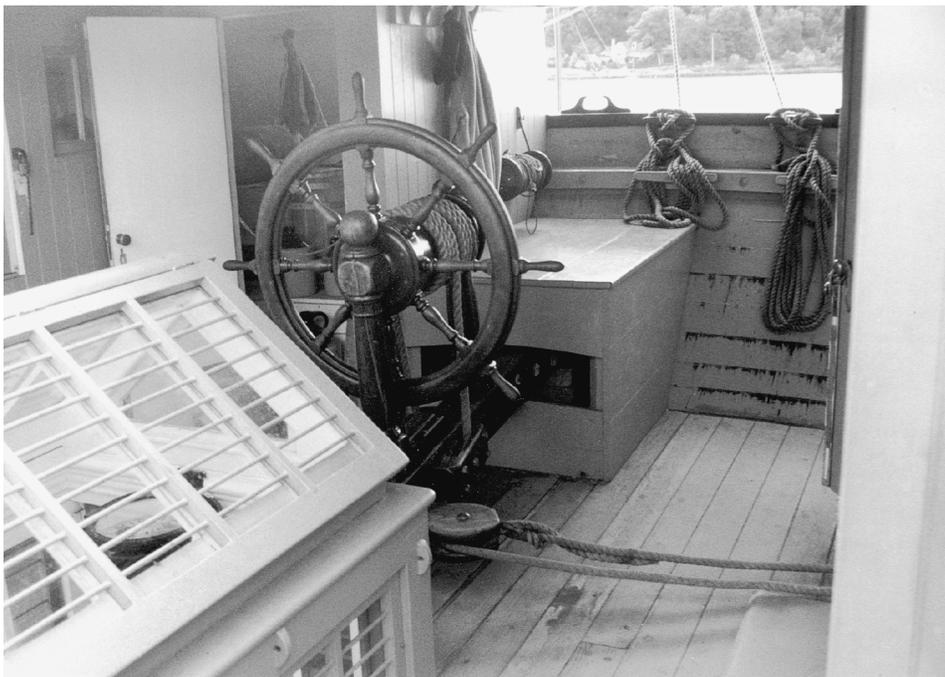
J. Finishing

1. Paintbrushes
 - a. Fine point for details
 - b. 1/4" to 1/2" flat square for hull

K. Supplies

1. Paints
2. Primer
3. Stains and varnish
4. White (polyvinyl acetate or PVA) or yellow woodworker's glue (aliphatic resin)
5. Cyanoacrylates (generic name is Super glue)
6. Five-minute epoxy
7. Wood filler

Note: White or woodworker's glue in yellow or tan will suffice for most of the model. Five-minute epoxy provides extra strength for affixing fittings. Cyanoacrylates, such as Jet, Flash, or Zap, produce quick adhesion. For most applications, the medium viscosity, gap-filling variety is best. The watery type is recommended for filling a narrow crack or tacking hull planking to the bulkheads.



How to Work With the Plans & Parts

Before starting the model, carefully examine the kit and study the plans. First, determine if all the listed parts are present. Handling them will quickly give you a better understanding of the kit's requirements. Try to visualize how every piece will look on the completed model. Also, determine ahead of time what must be done first. The instructions will help, but a thorough knowledge of the plans at the outset is essential.

To avoid losing small fittings and hardware, sort them into labeled boxes or compartments. These should have lids to keep out dirt.

1. The Plans

Six plan sheets are provided:

1. Laser-Cut Wood Patterns
2. Plank-on-Bulkhead Hull Construction
3. Hull Plan and Profiles
4. Hull and Spar Details
5. Rigging and Sails
6. Rigging Sections and Details

Sketches appear throughout the manual to illustrate various construction techniques.

The *Charles W. Morgan* kit is manufactured to a scale of $3/16" = 1' 0"$ (1:64). Each plan sheet is drawn to that scale, except areas enlarged to show detail. Most dimensions can be lifted directly off the plans by using draftsman dividers or a "tick" strip (piece of paper such as an adding machine roll). Lay the paper strip over the plan, carefully mark the item's length with a sharp pencil, then transfer the marks to the wood.

A $3/16"$ architect's scale or metric ruler is a handy tool. Measuring and cutting parts using the scale gives a better feel for real sizes. Because these are model-building plans, actual measurements have been converted to the nearest $1/64"$ (0.4mm) or $1"$ full scale. Sheet 5 contains a table for converting imperial numbers to metric.

2. Making Allowances Along the Way

Try to be exact when following the plans, but use common sense. Adjustments may be necessary to compensate for small differences in how

your model is shaping up; perhaps one mast has too much rake (the angle at which it sits). Lines should not drape over fittings or conflict with other lines when belayed (secured). If necessary, move a belaying point or fairlead. Put yourself on the ship, imagine performing the task, and use logic.

3. Understanding Hull Lines

Beginners may not be familiar with the following hull lines. *Buttock* lines are vertical longitudinal planes that cut through the hull. *Waterlines* are horizontal planes, *diagonals* are diagonal planes, and *sections* are transverse vertical planes. These lines define the hull's shape and are used by the draftsman to fair it (create even curves).

A complete set of hull lines is not needed for this model, because laser-cut bulkheads and the center keel define the hull's shape. Sheet 2 shows the bulkhead lines. They are similar to a ship's body plan or sections, and illustrate how the hull curves from top to bottom. Consult these lines when installing the bulwarks, since the bulwark stanchions are built separately from the lower bulkheads.

4. Using Basswood

Basswood comes in $1/32"$, $3/64"$, $1/16"$, $3/32"$, $1/8"$, $5/32"$, $3/16"$, $1/4"$, and $1/2"$ thick sheets and strips. Strip widths are in the same increments, while sheets may be $1"$, $2"$, $3"$, or $4"$ wide.

Note: Model Shipways occasionally substitutes lime (*Tilia vulgaris*), a European wood, for basswood (*Tilia americana*) in its kits. Both have a fine, uniform texture and straight grain. Lime, however, has superior steam-bending qualities. It is often called basswood in Europe.

Based on *Morgan's* $3/16" = 1' 0"$ scale, $1/64"$ equals $1"$ on the real ship, $1/32"$ equals $2"$, and so on. Generally, basswood strips or sheets can be used as is. Occasionally, a strip must be thinner than the supplied size. To maintain scale, sand the strip to the required thickness before making the part. One way is with a sanding block. Another is with a hobby sanding thickness planer (sold commercially). If you don't own one, chuck a sanding drum into your drill press, then clamp a block alongside the drum to act as a fence. This makeshift tool works quite well. Sorting the wood in the kit by

thickness will save time. After selecting and cutting what you need, return the remaining stock to the proper thickness pile. Don't worry about using a piece for one item intended for another. Model Shipways supplies enough extra wood to complete the model.

5. Britannia Metal Fittings

Britannia metal is a great improvement over the white metal castings found in older kits. Unlike white metal and pewter, Britannia doesn't contain lead (it's a tin, copper, and antimony alloy) and won't corrode. These fittings will require final finishing before mounting on the model. First, remove mold joint flash with a No. 11 hobby blade, then file or sand with fine sandpaper. Second, wash fittings in dishwashing liquid and warm water to remove traces of mold release agent and the body oils your fingers have deposited. Allow to dry thoroughly before applying primer and painting.

6. Soldering and Working with Brass

Charles W. Morgan sailed during a time when iron fittings were used. To accurately portray this, some soldering is necessary. Although paper or brass strips could be glued together as a substitute, soldering will maintain the model's integrity. Here are a few tips on soldering brass strips and wires, or scratch building with them:

Cut brass sheets and strips with a small pair of tin snips or heavy scissors. Thicker brass will require a jeweler's saw. After cutting, smooth the edges with needle files followed by wet-or-dry fine sandpaper used dry. Cutting slivers from brass sheet curls and bends it sideways. To straighten, grip the ends with a pair of small pliers and pull in opposite directions. Thin brass sheets can be scored with a utility knife and metal straight-edge, then snapped off. Use two or three light passes, cutting against a maple chopping block, birch board, or glass backing.

Drilling holes in brass with a pin vise is a slow process. The solution is to mount a handpiece for flex-shaft machines in a hobby drill press. Several companies manufacture this tool and it is worth the cost. When working with brass, use a $1/4"$ or thicker piece of maple or birch

Painting and Staining the Model

for backing. (Avoid softwoods, as these flare the exit hole.) To prevent the bit from wandering, mark the spot with a small center punch. Lubricate the bit with light oil and drill slowly to avoid breakage. The brass will become hot, so clamp the pieces to the drill press table or hold them down with a wooden stick. Do not touch the brass! If possible, keep the speed of the drill under 2000 RPM. Any higher speed causes excessive heat and small bits will easily break.

Until recently, modelers used pure silver solder to avoid the corrosive qualities of lead in soft solder. Today, many solders are lead free. They're composed of tin and antimony, are strong, and melt at less than 450° F. Some brands are mixed with 3% or 4% silver, but still melt easily. Consequently, no reason exists to use pure silver solder (melts at 1300° F). The key to soldering is keeping the brass clean. Use a solvent, lightly sand, or both. Once the parts are cleaned, don't touch them. Your fingers will leave greasy spots. Soldering is easy if your work is set up properly. First, immobilize the parts in a fixture or other holding device, then add just enough flux to the joint to do the job. Solder flows where flux is applied. Next, heat the joint with a small torch or pencil soldering iron. This sequence is important. The larger the parts, the longer it takes to heat the brass and melt the solder. Remove excess solder with needle files. The joint should look like the real thing, not a big glob of fillets.

Beginning this manual with directions on applying finishes may seem strange. Not so! Much time and effort can be saved and more professional results obtained if the finishing process is carried out during construction. Proper timing in applying finishes and using masking tape to define painted edges should eliminate unsightly glue marks and splotchy stained surfaces. Take advantage of these general suggestions:

Paint

Use flat finish model paints manufactured by Floquil, Polly-S, Testors, Humbrol, or Model Masters. Jo Sonja artists' paints (used by bird carvers) or Holbein Acryla Gouache are also acceptable. They are a combination acrylic-gouache. Sometimes the required color is available only in gloss. To subdue the shine, spray on a clear, flat finish. Do not apply a lacquer finish over acrylics. It will blister the paint. If you intend to airbrush the paint, always use the manufacturer's recommended thinner. Floquil makes railroad, military, and marine colors, and each has its own thinner. Note: The latest thinners and paints are compatible with plastics. Floquil's Dio-Sol thinner, however, was formulated for lacquers and attacks plastic.

Paint Scheme

The plans show *Charles W. Morgan's* color scheme currently used at Mystic Seaport. It consists primarily of black, white, and light ochre.

To obtain light ochre, mix three parts Floquil yellow ochre with seven parts white.

Primer

Floquil's gray primer will highlight scratches and other defects. Gray works better than white for this. Prime all metal fittings and woodwork to be painted. Do not prime parts to be stained or varnished. Lightly sand the primed items. Use a hobby spackling compound, such as Pic-n-Patch, or DAP, to fill any scratches and defects, then re-prime.

Stains and Finishes

Tone wood with Floquil or Minwax stains. After staining, protect natural finished wood with a low sheen polyurethane varnish or Floquil finishes. An oil-resin mix such as natural Minwax is also acceptable.

Brushes and Procedures

Use quality soft sable or synthetic hair artist brushes. A small pointed brush is good for details. For the hull, use a 1/4" to 1/2" flat brush.

Before painting, clean the model with a tack rag. Thin paint to a consistency that eliminates brush strokes, but doesn't run. Apply in smooth, even, overlapping strokes. Light colors will cover the primer in four or five coats, and dark colors in maybe two. Check the finish between applications, and sand or add spackle to eliminate blemishes.

Use masking tape wherever two colors meet. Electricians' black plastic tape is ideal. It leaves a crisp edge and is not overly sticky. Do not use drafting tape. Its edge is wrinkled and paint may run underneath. Office and art supply stores sell Scotch Magic Plus Removable Transparent Tape 811. It, too, is excellent for masking, removes easily, and doesn't chip off paint when peeled. However, don't reuse it, for it doesn't adhere well the second time around.

Airbrushing

Airbrushing with any of Floquil's or Model Masters' solvent-based paints is easy, but the fumes are toxic. Spray only in a ventilated booth or do it outdoors.

While Floquil's Polly S and Model Masters' acrylics are not toxic, they are difficult to airbrush. Always use the recommended thinner. Thinning with water causes surface tension problems. Even when the recommended thinner is employed, acrylics do not cover well, are spitty, and clog the airbrush. Experiment on your own. Some modelers are successful spraying acrylics, others have poor results.

STAGE 1

Framing the Plank-on-Bulkhead Hull

1. Bending Wood

Building a P-O-B hull requires bending some wood without distorting its desired position (doing so stresses glue joints and fasteners). Although the term "steam-bent" is used to identify the process, there are three ways to do it.

Steam bending: Hold the piece over a kettle of boiling water and bend. Hold the wood in position until it cools. It should remain in that position, but may spring back slightly.

Soaking: Submerge the piece in warm water for several hours. Try adding a little household or pure ammonia. This speeds up the soaking process and makes the fibers slippery so the wood bends easier. After soaking, hold the piece in position with a fixture and let it dry completely.

Soldering iron: Large soldering irons with a tubular end are ideal. Clamp the iron upright in a vise. While the iron heats, soak the strip of wood in tap water. Some modelers prefer bending around the tube near the handle (it's not as hot), while others use the shank. Move the strip back and forth against the iron. Its heat turns water into steam and drives it into the wood. The trick is to wait until you feel the wood wanting to yield before starting the bend. Begin too soon or apply too much pressure and the strip will break.

The wood dries rapidly, so care must be taken to avoid scorching. Resoak and reapply it to the iron until the desired shape is achieved. Once the piece is formed, it can go directly on the model. Because the wood's memory has been permanently altered, it will never spring back to its former shape, meaning no stress on any timber or fasteners. Spend some time acquainting yourself with this method and you'll never bother with fixtures again.

Fig. 1-1 Center Keel Assembly

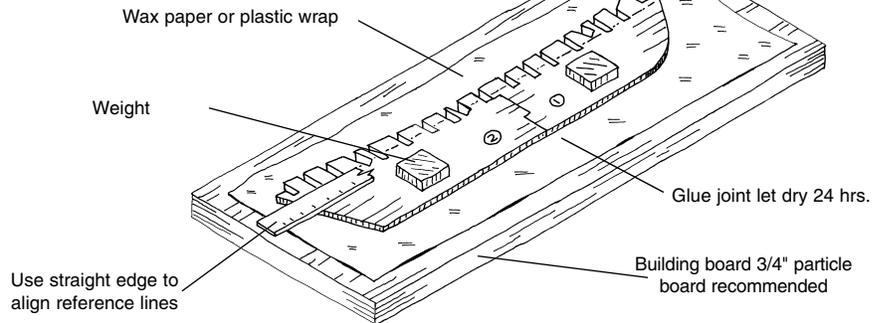


Fig. 1-2 Installing the Keel, Stem & Sternpost

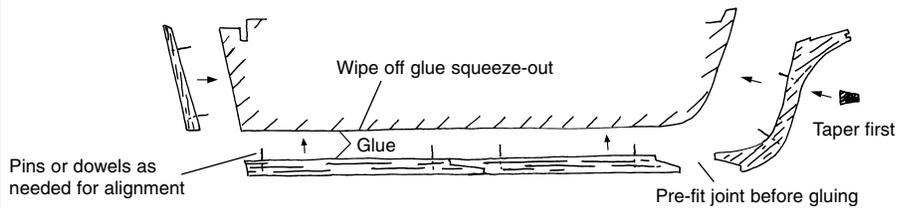


Fig. 1-3 Cutting the Rabbet into each side of Center Keel

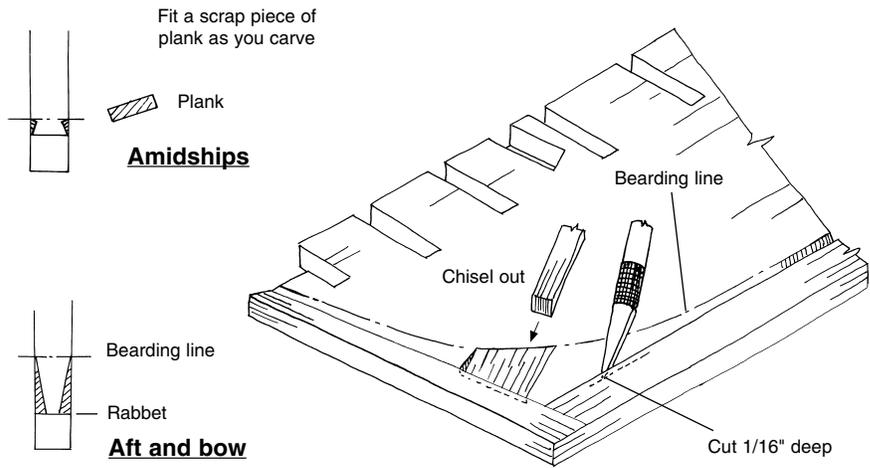
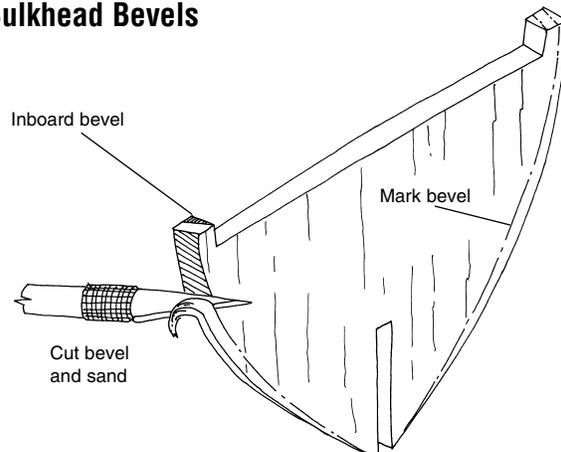


Fig. 1-4 Cutting Bulkhead Bevels



2. Center Keel Assembly

The first step in constructing the hull is to assemble the two laser-cut center keel pieces. First, use a sharp pencil and mark the bulkhead locations below the slots and reference line (used to locate Bulkheads A through O). Mark both sides of the center keel piece. Be especially critical in locating the reference line, for it is a key to proper alignment. Take measurements from several points on the plans to double check its position.

Cover a flat building board or table with a sheet of wax paper or plastic wrap, then place Parts 1 and 2 over it. Apply white or woodworker's glue to the joint. Align the reference line with a steel or aluminum straightedge. Place a weight on each piece to hold it down while the glue dries for 24 hours (Figure 1-1).

3. Installing the Keel, Stem, and Sternpost

Add the keel, stem, and sternpost. Taper the stem as shown on the plans before installing. Use dowels to align and hold the pieces (Figure 1-2).

Option: Some modelers prefer to cut the rabbet before adding the keel. The choice is yours.

4. Cutting the Rabbet

If the keel is in place, the rabbet is the glue line between it and the center keel. The bearding line is the intersection of the center keel and the inside surface of hull planks. Measure its position from the plans, then mark the bearding line on both sides of the sternpost, keel, and stem. With a hobby knife, cut a 1/16" deep rabbet on both sides of the center keel and at the bow. This is so the 1/16" thick hull planking will fit flush. Cut on or slightly above the glue joint and take your time. For the long slope at the stern, switch to a straight chisel. Cut with the grain to remove the wood between the bearding line and rabbet. The rabbet changes to follow the hull's shape as it moves forward to the mid-ships area (Figure 1-3). Lastly, check-fit the rabbet with a short length of 1/16" thick plank. Its outer edge should lie flush with the sides of the keel, stem, and sternpost.

Fig. 1-5 Gluing Bulkheads to Center Keel

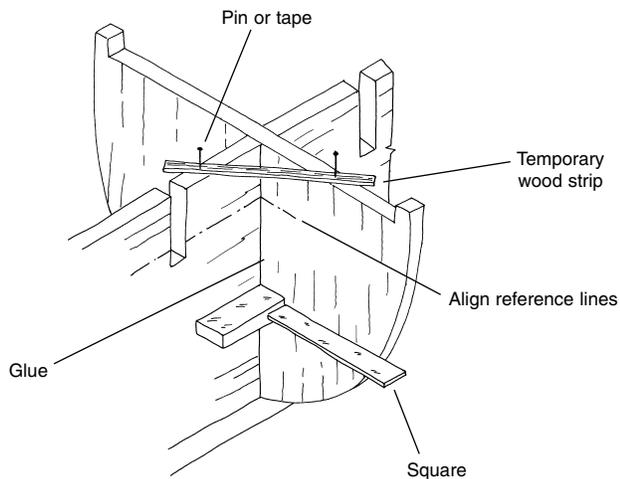


Fig. 1-6 Temporary Battens for Hull Alignment

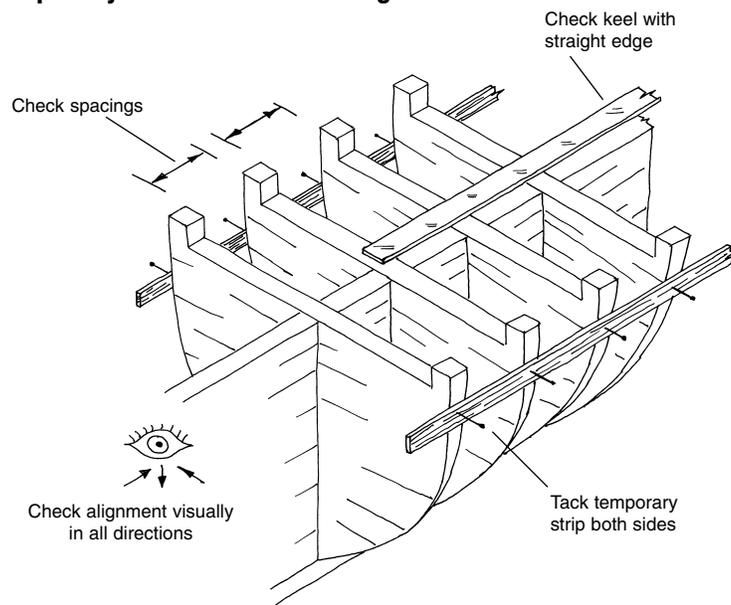
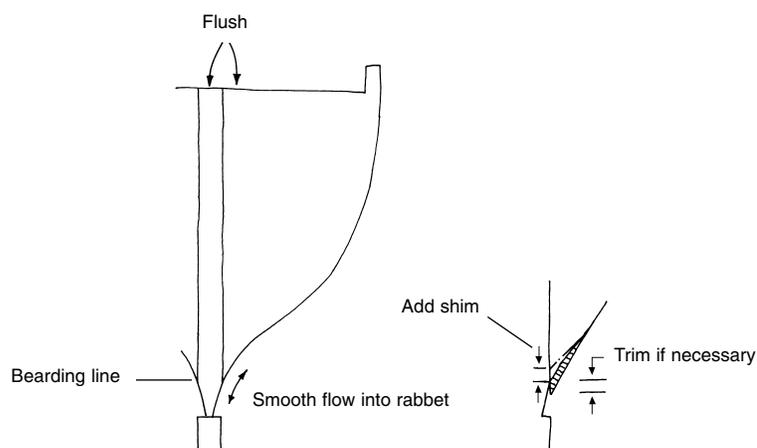


Fig. 1-7 Correcting Bulkheads at Bearding Line



5. Installing the Bulkheads

Compare the laser-cut bulkheads with the pattern plan, determine which is which, and label them A through O. Test each to make sure it will slide into the center keel slots. If the fit is too tight, sand the slots until the bulkhead slips on. It should be a snug fit with a little tolerance for glue.

Using a pencil, mark the location of the reference line on each bulkhead. It must align with the reference line mark on the center keel. This assures an accurate hull, because each bulkhead is correctly related to the others.

Next, mark the bevels on the bulkheads. Use a tick strip to transfer the lines from the plans, or lay the pattern over the bulkhead and prick with a pin to locate the bevel. Cut the bevels with a #11 hobby blade as shown in Figure 1-4. Deck bevels and the side bevels amidships are not drawn, because they are hardly measurable. Sand these in after the bulkheads are installed.

Glue the bulkheads in place. Make sure each bulkhead's reference line matches the center keel's line. Use a small machinist square to set each bulkhead perpendicular to the center keel, then tack or tape a temporary strip to the top of the bulkhead to hold it in place while the glue dries (Figure 1-5).

Once the bulkheads are installed, tack or tape a temporary batten to each side of the hull just below the deck (Figure 1-6). This is a critical step. Measure the spacing between each port and starboard bulkhead and retack the battens until the hull is aligned. Although the center keel was assembled flat, it could warp and produce a banana-shaped hull. When it looks correct, check it again.

Now examine the bottom of each bulkhead. It should feather out and lie precisely on the bearding line. If not, trim until it does. Also check that the top of each bulkhead at the centerline is flush with the top of the center keel. Since alignment is based on the reference marks, slight errors can occur. Sand or add shims until the bulkheads and center keel surfaces are flush (Figure 1-7).

Next, sand in the bevels that were not pre-cut. Check the hull's fairness by laying a 1/8" square basswood batten against the bulkhead edges (Figure 1-8). Correct bumps and dips by sanding or adding shims. This is an important check. Hull planks must lie flat against the bulkheads. With *Morgan's* numerous bulkheads, it's possible for manufacturing or assembly errors to occur.

Fig. 1-8 Checking Hull Fairness with a Batten

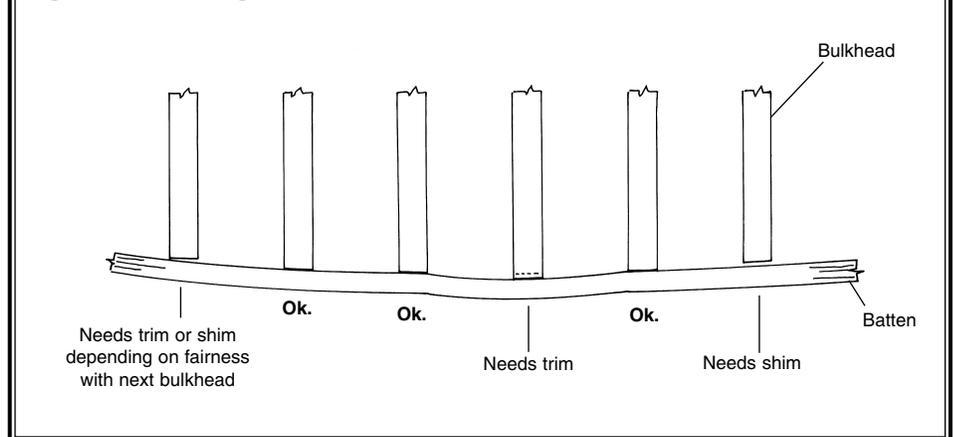


Fig. 1-9 Installing Stern Frames

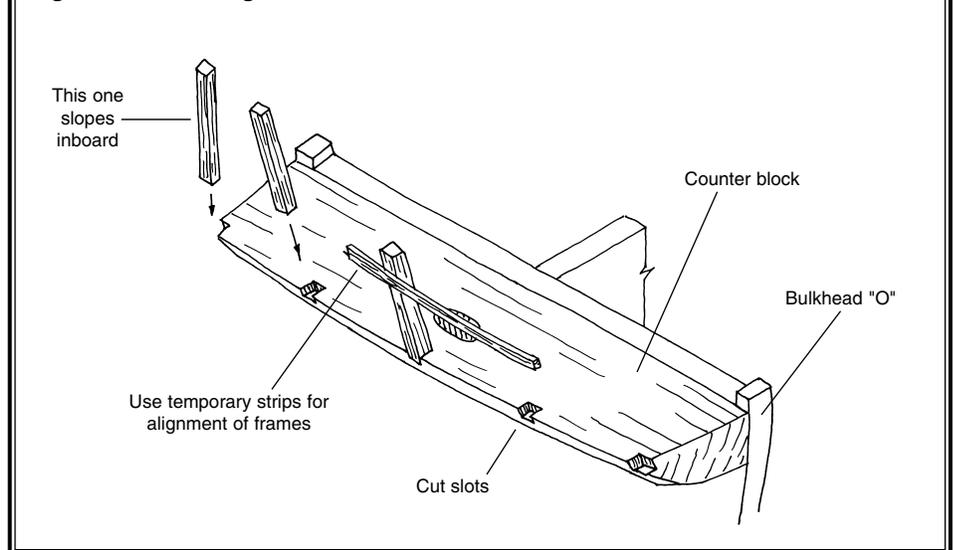
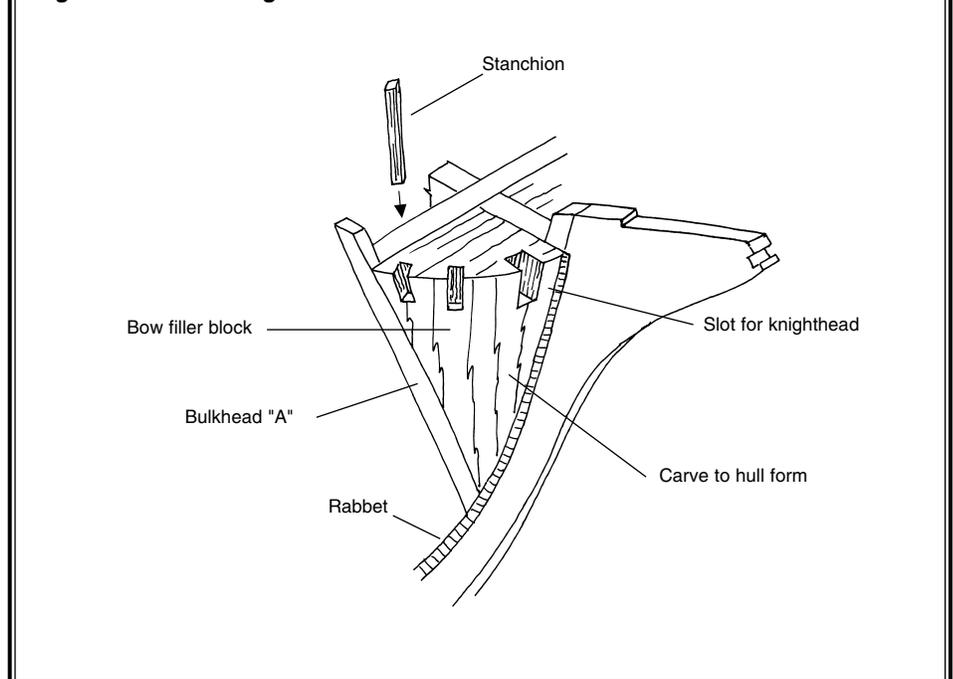


Fig. 1-10 Installing the Bow Filler Block



6. Installing the Transom Framing

Follow the plans when carving the counter block. Its bottom reflects the counter curve, while its forward side matches **Bulkhead O**. The aft side indicates the slope and curvature of the transom. At the center is a hole for the rudder stock. Glue the counter block to the center keel and aft side of **Bulkhead O**.

Notch the counter block and add the transom frame pieces. Later, the transom will be planked on both sides. Figure 1-9 illustrates the transom framing.

7. Installing the Bow and Stern Filler Blocks

Carve the blocks to the shape of the hull, then mount them forward of **Bulkhead A** and aft of **Bulkhead O**. Their purpose is to add support where the planks make a severe curve. Although the planks still need steam bending, they are not as likely to break with the blocks in place. In addition, the bow block provides a solid base for inserting timberheads and knightheads (Figure 1-10).

8. Covering the Mast Slots

Add the pieces shown on Sheet 2 to both sides of the three mast slots in the center keel. Cut them from scrap wood. Glue securely, because access is impossible once the deck is planked. Since the slots are larger than the actual timbers, masts can be wedged in the hole when stepped.

9. Installing the Waterway, Planksheer, and Bulwark Stanchions

Add the waterway along the deck edge. Note that the waterway varies in thickness and shape from bow to stern. At the bow, it also goes from a thick piece into a heavy ceiling. Follow the plans.

The planksheer goes on top of the waterway. These laser-cut pieces have square holes for the bulwark stanchions. Make sure the planksheer is properly located. At this point, it extends past the bulkheads. After the hull planking is installed, the planksheer will protrude slightly beyond that as well.

Next, add the bulwark stanchions. Get their correct angle from the hull planking layout on Sheet 2. Prior to gluing, clamp a strip on top of the stanchions for alignment. When they are fair, secure the stanchions with a touch of cyano (Figure 1-11).

Fig. 1-11 Using Batten to Align Bulwark Stanchions

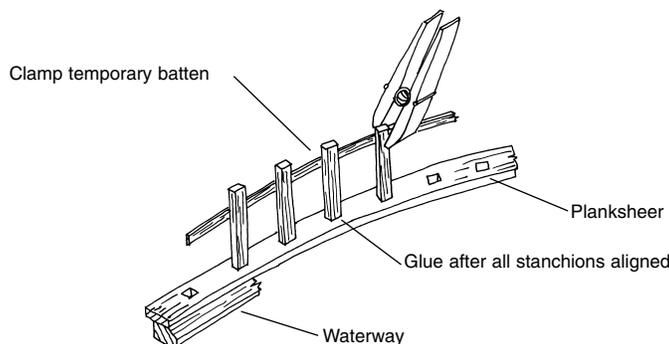


Fig. 1-12 Installing the Main Rail & Lashing Rail

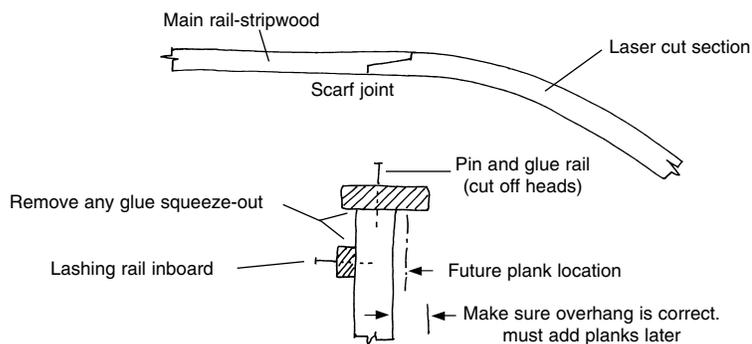
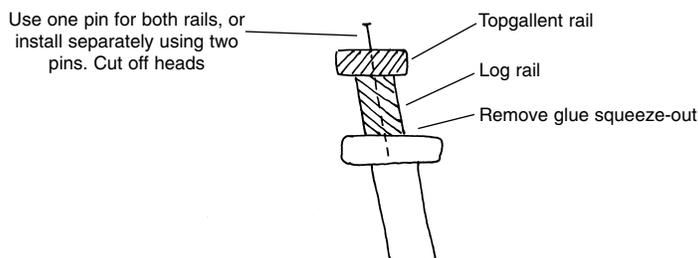


Fig. 1-13 Installing the Topgallent & Log Rail



10. Installing the Knightheads and Forward Timberheads

Make the knightheads and forward timberheads. Install the timberheads in the planksheer notches and the knightheads in the forward filler block notches.

11. Installing the Main Rail and Lashing Rail

Heavily curved main rail sections are laser cut. Cut the other sections and inboard lashing rail from stripwood. Use pins or dowels to align and hold them in place (Figure 1-12).

12. Installing the Topgallent Rail

The topgallent rail rests upon a log rail that sits on top of the main rail. The topgallent rail's curved sections are laser cut. Make the remaining sections from stripwood. Use some pins or dowels to locate and secure the rails (Figure 1-13).

Note: Knees at the stern connect the main and topgallent side rails to the rails across the transom. Since these knees will eventually be inside the hurricane house, they can be omitted.

STAGE 2

Planking the Hull

Before starting, it's a good idea to know some common shipbuilding terms that apply to the planking process.

Plank: A single length of wood used to plank a hull or deck. A *strake* is a continuous line of planks from wherever it begins to where it ends.

Garboard strake: Planking adjacent to the keel.

Sheer strake: Upper line of planking on a hull.

Wale: A heavy layer of strakes below the sheer strake. On *Charles W. Morgan*, the wale's top edge protrudes beyond the hull planking. However, no lower wale edge exists. The thicker wale planks gradually taper into the lower planking, so the hull is flush from the top edge of the wale down to the keel rabbet.

Belts: A group of planks along the hull. Belts are laid out using *battens* (temporary strips of flexible wood). A *ribband* is also a batten. It holds frames in position during planking. Ribbands are removed as planking is completed.

Spiling: Process for marking and cutting a plank to a given shape.

Edge-bending or springing: To bend a plank edgewise.

Fair: Refers to smooth, gradual curves when planking.

Nib or nibbing: To avoid a feather edge when a plank runs into another at a sharp angle, the plank is often cut off and inserted into a cut (nib) in the other plank. Nibbing generally applies to decks, but sometimes hull planks are nibbed.

Stealer: A plank inserted into another plank or between two adjacent planks to reduce their width. Or, when two planks taper toward a narrow end, it may be necessary to cut off both planks and substitute a wider plank, thereby leaving enough wood for fastening.

Counter: Underside of the portion overhanging the stern.



1. Getting Started

Mount the hull upside down in a vise or cradle. Whatever it is secured in should rotate. Planking is tedious and time-consuming. Think of each plank as a project unto itself. Since hull sides are identical, simultaneously cut one pair of port and starboard planks to the shape. Fit the plank on one side, then the other. Don't rush. Speed results in frustration and a poor job.

2. Planking Battens and Belts

Hulls are easier to plank when divided into belts. Each is designed to lay the planks against the bulkheads without excessive edge bending. They sweep up at the ends like the deck sheer. Planks within a belt are usually evenly spaced, tapered, and fitted. Belts prevent errors from accumulating.

When selecting a belt width and the number of planks it contains, consider how the planks taper and lay against the bulkheads. Taper too much and not enough stock is left for fastening. Then a larger plank must be substituted for two planks to increase the width. Planks too wide won't lay flat. In some areas, the distance between planks widens rather than tapers. If it becomes too wide, a stealer must be added. While these alterations are acceptable and employed on many ships, the best run of planking limits their number. (Figure 2-1 illustrates some inserts.)

Sheet 2 shows the planking layout. Fore and aft views along with a profile view provide a complete picture.

3. Planking Butts

Planking butts are another thing to consider before starting. Few trees grow as tall as ships are long. Consequently, real planks were generally 20 or 30 feet long. Some builders think a plank as long as the model is easier to use. They scribe in fake butts or omit them. Although this can be done, working with shorter planks has its advantages. For example, tapers mark quicker and only one hand is needed to hold and fasten the plank. Should a mistake happen, just a small piece is affected. So, the following is based on scale-length planks.

Because this is a plank-on-bulkhead model, butts must occur on bulkheads and won't simulate shipwright practice. Use plank length to cover four bulkhead spaces. However, to avoid stubby pieces at the bow and stern, a longer or shorter plank may be necessary to complete the run.

To emulate shipwright practice, stagger the butts (Figure 2-2's pattern is similar to a real ship). This also applies to deck planking. Covering four bulkhead spaces follows the rule; i.e., three full plank widths between butts on a single frame. One plank covering three bulkhead spaces won't work, because that leaves only two full planks between butts.

4. Spiling

Edge-bending planks on real ships is done on a limited basis. Wood is rigid, so many planks must be cut to shape. Spiling (Figure 2-3) is simply a matter of transferring curves to a straight plank, then sawing them out. The planking layout shows the required stealers. In most cases, the basswood strips are flexible enough to edge-bend in place.

5. Fastening the Planks

Some fancy, commercial plank clamps are more trouble than they are worth. Those that screw into the edge of bulkheads leave a big hole to contend with when installing subsequent planks. It's best to hold or pin short planks in place. Be careful not to split the plank with the pins. If necessary, drill a pilot hole first. Smear a light film of white or woodworker's glue along the edge of the plank with your finger, then touch each bulkhead with thin cyano to quickly affix the plank. Be careful not to glue your fingers to the model.

While glue alone will secure the planks, small brass brads or wooden treenails provide additional holding power and duplicate shipwright practice. If using brads, cut off and discard the heads, then hammer in. Treenails are commercially available, but making your own is easy. Buy a package of long bamboo skewers, strip off short lengths, and pull through a drawplate to the desired diameter. Drill holes through the plank into the bulkhead, dip the treenail in white or yellow glue, and drive in place. Another alternative is to whittle flat toothpicks (round ones don't work as well) to a point. Place the entire toothpick in the hole, rap sharply with a 10-inch bastard file, and break off the remaining portion. A file works better than a hammer, because its serrated surface catches and firmly holds the head of the toothpick, permitting it to be driven in tightly. Exterior stubble is dressed and sanded smooth when treenailing is completed.

6. Planking the Outer Hull

Belt Layout: Now the fun begins! The hull, bow to stern, is divided into even spaces from the main rail down to the top of the wale. Rails and wale line are preset lines that cannot be modified. Notice on the plans that planks are narrower forward than they are amidships and aft. Although this is how they appear on the real ship, wider planks could be used forward on the model.

Fig. 2-1 Planking Shown Using Stealer Inserts

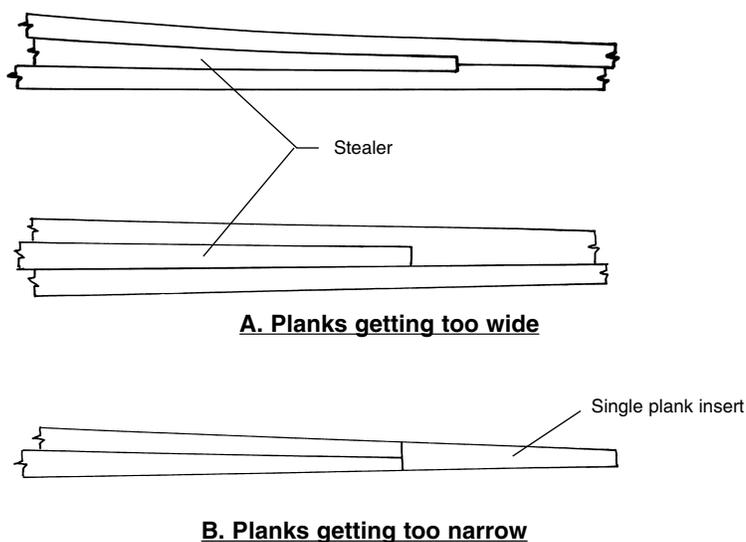


Fig. 2-2 Staggering the Planking Butts

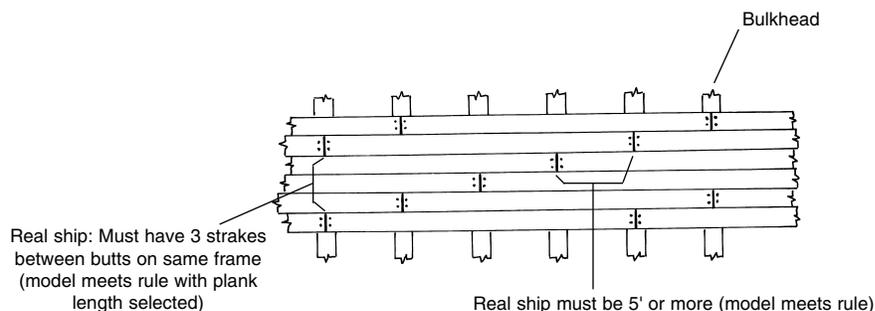
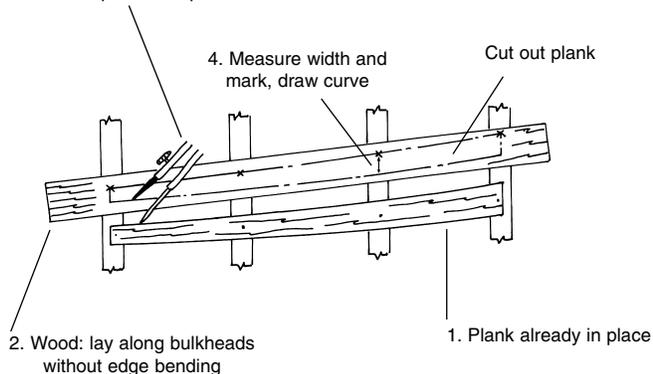


Fig. 2-3 Spiling the Planks When Edge Bending Cannot be Accomplished

3. Use compass-run steel point along plank in place and mark parallel line on new plank with pencil end



Planking will require tapering fore and aft from the top of the wale down to the keel. Consequently, the hull below the wale is divided into **Belts A** through **D**.

Morgan had no lower edge to her wales. They gradually tapered into the planks, eliminating the step along the hull found on other ships.

On Sheet 2, use a tick strip to mark the top-of-wale location and belt seams on each bulkhead. Transfer these points with pencil to the model. Now, temporarily tack 1/16" x 3/32" basswood battens along the marks with lil pins. Battens assure an accurate run of planks by correcting any errors in drafting, tick strip marking, or transferring. However, remember that the wale line is a given and must follow the plans.

When the battens are in place, visually check their flow. Look at the model from the side and from the bow and stern. Do the battens have a pleasing, smooth curve? Are they symmetrical? Adjust the lower battens if necessary. The plans show what they should look like from the side and ends. When everything seems fair, make sure the belt seams are clearly visible. Remark those that aren't. Now, either remove the temporary battens or leave them in place until they interfere with installing a plank.

Tapering Plank Edges: As planking proceeds, the edges of a particular plank may require tapering to butt flush against the adjacent plank.

Properly machined planks have square edges. Butting them together on a hull may produce a small gap. Most are sealed with glue or wood filler, or caulked on a real ship. Plank edges are often deliberately sloped to ensure they butt against each other, while providing a sufficient gap for caulking. How the plank runs determines whether its top or bottom edge is tapered. Sometimes both are. To create a perfectly smooth hull without gaps, trim each plank edge as it is fit. The decision to taper or rely on filler is yours.

Planking the Counter and Transom: Cover the counter with 1/16" planks and transom with 1/32" planks. How the counter planks intersect with the hull planks can be done several ways. On the real ship, the joint is mitered (Figure 2-4). Add the mouldings to the transom after the planking is completed.

Fig. 2-4 Transom-Hull Plank Intersection Options

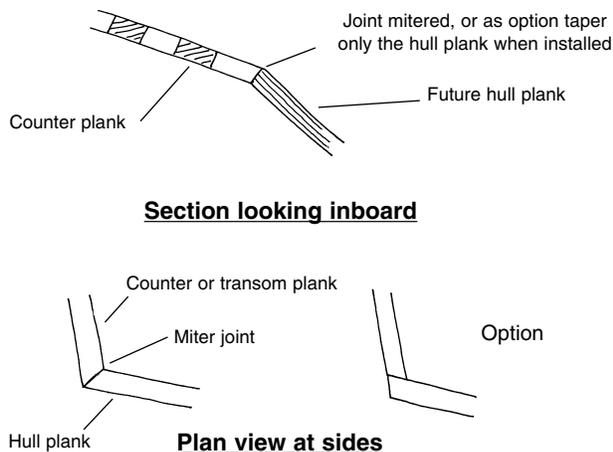


Fig. 2-5 Installing First 2 Strakes in Belt A

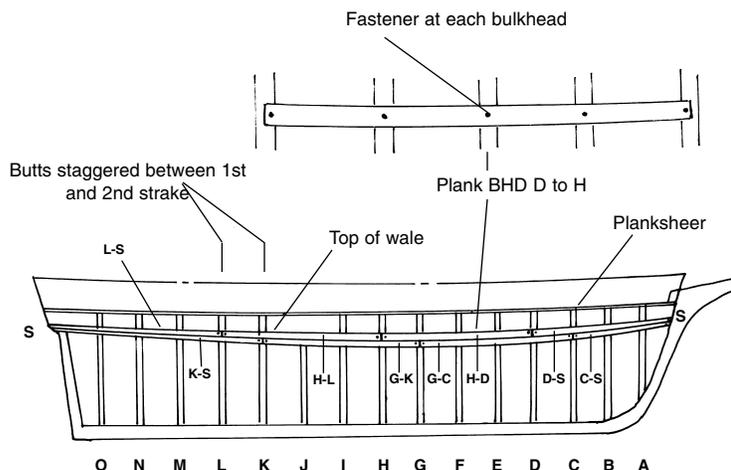
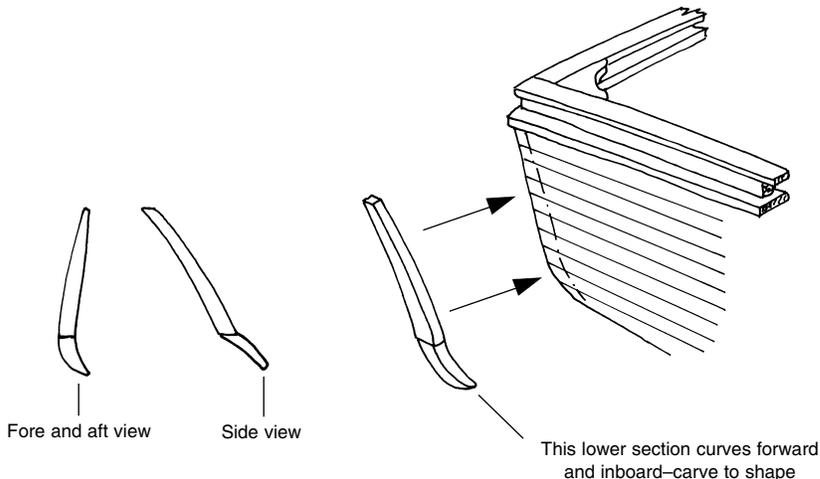


Fig. 2-6 Installing the Fashion Piece at Stern



Side Planking Above the Wale: Planking is $3/64$ " thick from the top of the wale to the planksheer. From planksheer to main rail, it is $1/32$ " thick. These planks are fairly uniform in width from bow to stern and can be easily fitted.

Laying the Planks in Belt A: Planks below the wale are $1/16$ " thick. **Belt A** has ten strakes below the wale. The maximum plank width is at **Bulkhead H** (roughly 9" on the real ship or $1/8$ " on the model). Planks taper forward to about $3/32$ " and widen going aft. Use $1/8$ " wide strips for the midships area, $3/32$ " forward, and $3/16$ " aft.

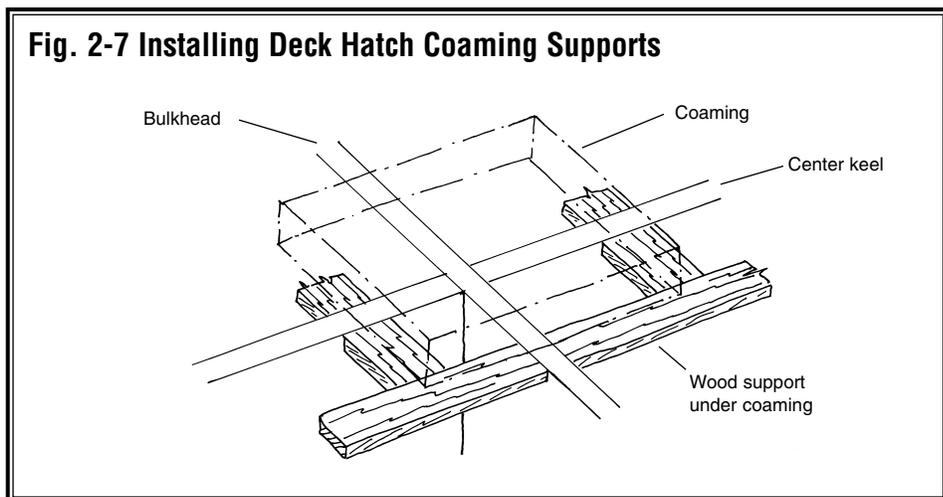
Lift the plank widths from the hull planking layout with a tick strip. If you changed the locations of the battens, divide the space on each bulkhead into ten equal plank widths. Set the slide on your proportional dividers to the number of planks in **Belt A**. Span the width of **Belt A** with the long legs. The distance between the points on the short legs is the width of each plank in the belt. Mark these lines on the bulkheads with a pencil.

The next step is to cut planks to fit between the marks. **Belt A** doesn't require spiling, so make straight tapered planks. Start at **Bulkhead H**. Use four planks; one from **Bulkhead H** to **Bulkhead L**, another from **Bulkhead L** to the stern, **Bulkhead H** to **Bulkhead D**, and **Bulkhead D** to the stem. First, lay a piece of planking stock over **Bulkheads H** through **L**. In pencil, mark their overall length on the plank, then the position of each bulkhead. Next, using a set of dividers or tick strip, lift the plank widths from the marks on the bulkheads and transfer to the stock. Draw a line through the points and cut the plank. Trace this tapered plank to obtain another for the other side of the hull. Repeat for the remaining planks in **Belt A**.

Install these planks on the hull. Follow the same procedure for the next strake, but stagger the butts. Install a plank from **Bulkhead G** to **Bulkhead C**, **Bulkhead C** to the stem, **Bulkhead G** to **Bulkhead K**, and **Bulkhead K** to the stern. The hull now has four planks comprising each strake from bow to stern (Figure 2-5).

Move down to the next planking strake. Stagger the butts starting at **Bulkhead F**. Continue until this strake is finished, then complete the others in **Belt A**. Most planks have a severe bend at the stern and must be steam bent.

Fig. 2-7 Installing Deck Hatch Coaming Supports



Laying the Planking in Belt B and Belt C: These belts have 10 strakes about the same width as those in **Belt A**. If the temporary batten is still in place, remove it. Lay the planks for **Belt B** and **Belt C**, but remember to stagger the butts.

Laying the Planking in Belt D: This belt contains the garboard strake (next to the keel) and has only eight strakes. Near the stern are two stealers fitted per the plans.

Sheet 2 shows a complete planking profile. Follow it to determine the plank widths in **Belt D** aft. The hull planking layout doesn't show all the planks aft, so the profile view is necessary.

Plank Variations within a Belt: Suppose a belt has nine planks the same width, but the tenth plank must be wider to complete the belt. Cause for worry? Certainly not. No planking job, even on real ships, is that precise. After all, these are hand-cut planks and slight variances will occur. The important thing is to keep their flow smooth.

Fashion Piece: When planking is completed, add the fashion piece at the stern (Figure 2-6).





7. Planking Inboard (Ceiling Planks)

The inboard transom is covered with 1/32" ceiling planks, as is the forward area under the anchor deck above the waterway.

8. Deck Planking

Hatch and Companionway Coamings: Before planking the deck, decide how to treat the hatch and companionway coamings. We recommend shipwright practice. Glue all coamings on top of the appropriate bulkheads, then plank around them to save work and materials. Be sure to glue and pin scrap wood underneath the coaming's three free sides prior to installation. This takes the place of deck beams and provides a permanent landing for the planks (Figure 2-7). The alternative approach is to glue completed hatches and companionways on top of the deck, but that affects their scale height.

Deck Planks: Main deck planks are 1/16" thick. Anchor deck planks are 1/32" thick. Planking runs parallel to the centerline.

Prepare the strips by painting one edge black or dark brown to simulate deck caulking. Or, attach the planks with brown woodworker's glue. It's dark enough to pass for caulking.

Thick Pads: Laser-cut thick pads go under the windlass knees and around the mainmast. Fit these before planking, then plank around them.

Procedure: Start deck planking at the centerline and work outboard. Scrape off any glue that squeezes out before adding the next plank. Butts can be included or omitted. On the real ship, they don't show up as readily as the seams. Butts can also be scribed in after the plank is laid. Since deck planking doesn't curve like hull planking, using strips the length of the deck is okay. If desired, fasten planks with brads or trenails. See hull plank discussion.

Anchor Deck: Before planking the anchor deck, paint the areas underneath it, then add the bowsprit bitts and edge beams. After planking the anchor deck, mount the forward breasthook.

Caution: Read the segment on Standing Rigging - Fore and Aft Stays -Mainstay. Decide whether to temporarily omit some anchor deck planking and the breasthook to facilitate rigging the mainstay. Also, the exact location for the mainstay holes in the anchor deck may not be known at this point.

STAGE 3

Completing the Basic Hull Structure

1. Correcting and Sanding

Once all the planks are installed, examine the hull. Rub wood glue in cracks or add filler. When seams are filled, smooth hull and deck planks with sandpaper.

2. Coppering the Bottom

During the 1983 restoration, *Morgan's* copper line was lowered to permit work on her topside planking. Model Shipways' plans show the original, higher line and as it appears now.

It's time to decide whether to paint or copper the underwater hull. While it may seem a difficult task, coppering is fairly easy. It just takes patience.

The kit includes plain or adhesive-backed copper strips. Secure plain strips with contact cement. Either apply a long strip and scribe in overlapping butts, or cut the strips into plates and overlap them following shipwright practice. The latter looks best.

The first step is to lay out the seams in pencil. No plan exists showing *Morgan's* exact layout, so design your own or follow the author's. It's based on photos of *Morgan* and other whalers.

With the model upside down, start laying the copper plates at the keel and stern. Forward plates overlap aft plates, and upper plates overlap lower ones (Figure 3-1). To keep seams straight, line up the plates precisely on the layout lines. If they are wavy, the effect is awful. Add the basic side plating first, then the plates capping the stem, sternpost, keel, and rudder.

Gore Ends: On the plans are belts with gore ends; i.e., where plates go under others (Figure 3-2). If the plates are left square on the ends, their outline may show through the upper belt plates.

Nailing: Some modelers like to simulate the nails in plating by indenting the copper with a sharp point. This is easily overdone, especially when too big a nail is used. If it doesn't look scalelike, forget it.

Fig. 3-1 Installing Copper Sheathing

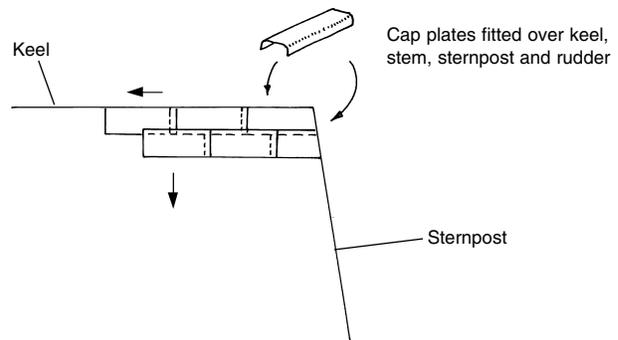
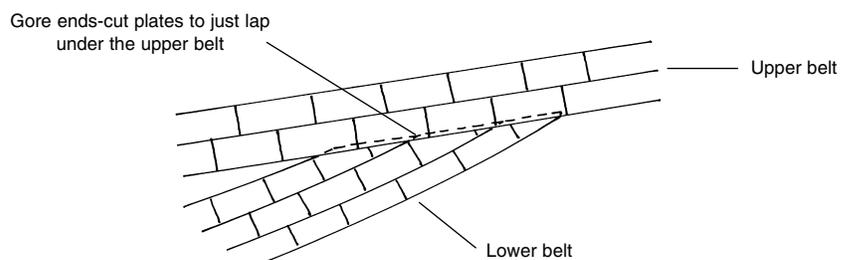


Fig. 3-2 Gore Ends of Copper Belts



Coloring: Copper plates will tarnish naturally or can be chemically treated with *Patina-It*. This turns them a blue-green. A solution of sal-ammoniac (available from a drugstore) and vinegar will do the same, or simply use a wash coat of paint over the copper. There are different schools of thought regarding plate coloring. Copper weathers only when exposed to air, such as when a ship is in drydock for an extended period. Some say the patina wears away once the ship is back in water. The choice is yours, but weathered copper does give the model a salty look.

3. Natural Wood, Double Plank Option

Most wooden ships had one layer of external planking. However, many builders are familiar with double-planked European kits or want a natural wood finish typical of Navy Board models. Even though *Morgan* should be painted, its hull can be double planked. Purchase 80 strips of 0.5mm x 5mm x 20" mahogany, walnut, or some other hardwood from Model Expo for the task.

Double planking will cover the existing basswood, but leave the rails exposed. Solve this by substituting your wood of choice when adding the rails, capping them with the new strips, or staining them a similar color.

Follow the basswood planking process. You may want to work with longer strips, since the basswood already defines the plank shapes. Simply lift dimensions from the hull and cut the wood. When completed, sand and finish the hull with Floquil oil or glaze, or tung oil. Finally, add a coat of wax and polish.

STAGE 4

Mounting the Hull

Before proceeding farther, mount the hull to prevent damaging fittings when handling the model. Proper mounting is important, because future alignments will require a true waterline. This kit contains two brass pedestals and a baseboard for displaying the model. A second option, called the launching ways, can be made by hand or purchased. Feel free to devise your own approach. To avoid damaging the base, mount the model to a flat, true work board until finished. The method of mounting remains the same.

Models should be cased to protect them from dirt and damage. Furthermore, most competitions require entries to be cased. A case is a cheap insurance policy. However, the kit's baseboard may be too small to serve as the base for the case. A case's outside diameter should be 4" longer than the model (2" fore and aft), 4" wider (2" port and starboard) and 2" higher. If the baseboard doesn't measure 34-3/4" long by 14-1/8" wide, make a new one to accept a case.

1. Baseboard with 2 Pedestals

Round the top edges of the baseboard or cut a simple chamfer. Those with access to a router can cut mouldings along the edges. Paint or stain the baseboard. Alternatives: Prefinished baseboards are available or make your own from cherry, walnut, bubinga, or rosewood.

Mount the model so the copper line is parallel to the baseboard. Drill pilot holes in the keel and baseboard for the pedestal screws. If something goes awry and the balance is off, add a brass shim under one pedestal to correct it.

2. Launching Ways

Launching or building ways, available as a kit from Model Expo, is another method of mounting. It is most suitable for models without sails. Drill the keel to accept the rods anchoring the model to the ways. Launching ways are easily adapted to mounting on the baseboard and permit the builder to create a mini-diorama based on a shipyard activity. Follow directions in the launching ways kit to achieve the proper waterline level.

Note: Stain or paint the baseboard or launching ways before mounting the hull.



STAGE 5

Adding Hull Details

1. Locating Deck Furniture

If hatch and companionway coamings were not installed when planking the deck, it's time to locate them along with the hurricane house, deckhouse, vegetable bin, skylight, amidships shelter (boat bearer), crew's head, bilge pumps, bitts, catheads, windlass, chocks, cleats, eyebolts and ringbolts, chain pipes, hawse pipes, stern eagle, tryworks, workbench, scrap hopper, cooling tank, boat davits, and fife rail.

To locate items, measure from a known benchmark such as the centerline or center of a mast. Mark positions lightly in pencil. While eyebolts, cleats, and other fittings associated with rigging can wait, installing them while working on the deck is a good idea. Once they're mounted, varnish the deck. Then, when rigging commences, the fittings are ready and waiting.

2. Deck Structures

The crew's head, aft hurricane house, amidships shelter, deckhouse, and berth duplicate planked structures. Tick off dimensions from the plans (Figure 5-1 gives some ideas). The amidships shelter comes with laser-cut knees. After 1906,

Morgan had a tryworks shelter, but it wasn't included during the 1983 restoration.

Notice the tool racks hanging under the amidships shelter. For added detail, place harpoons or other gear in the racks.

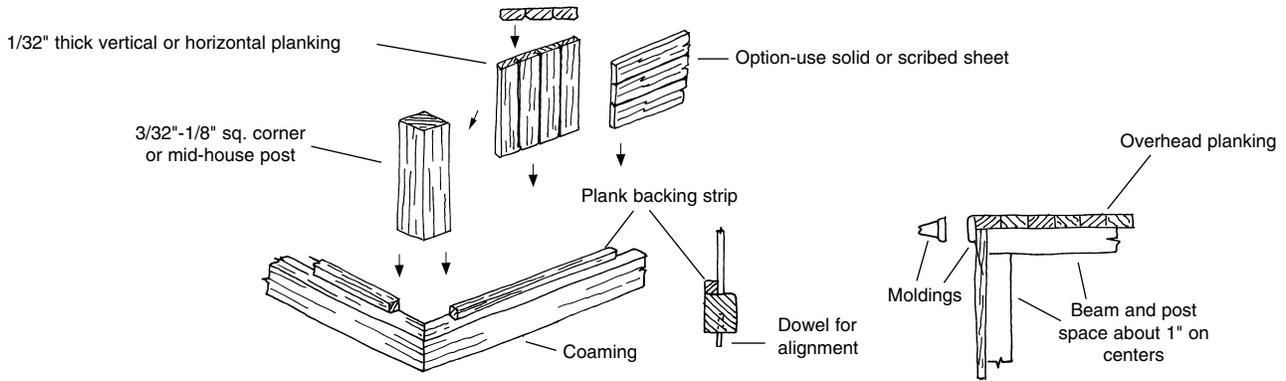
Most planked structures have pronounced seams. Sand their edges a little to emphasize those joints when glued. Check the plans for other fittings that may be easier to install before the furniture is added. Think about painting before mounting. Don't back yourself into a corner.

Option: Those who prefer not to plank the structures can substitute the sheet basswood. Leave it plain or scribe plank seams with a sharp pointed instrument. Commercially scribed planking sheets are also available. Although the scores are a little wide for *Morgan's* scale, they are visually effective.

3. Skylight

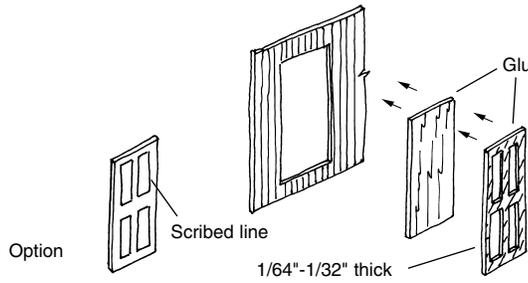
The aft skylight is an interesting, but tedious structure to construct (Figure 5-2). For the panes, use sheet plastic or microscope slide covers with the back painted light blue. Panes can be left clear, but paint the area under the skylight black if not detailed. Cut mullions and stringers from brass rod or wire; or, fake it and paint on the dividing bars. Eliminate some if too tedious. Even with less than the correct number, the visual effect will be good.

Fig. 5-1 Building Deck Structures

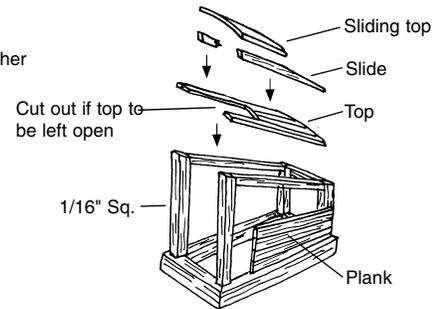


A. Typical construction

B. Corners and tops

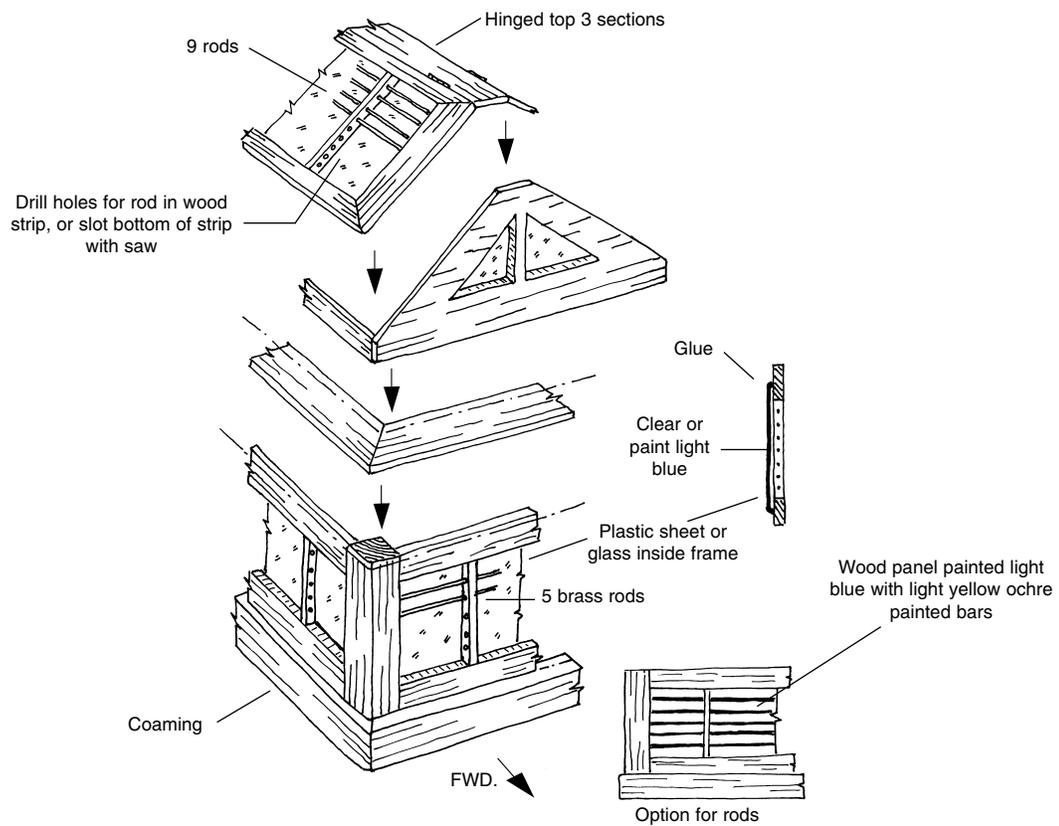


C. Panel doors



D. Companionway

Fig. 5-2 Skylight Construction



4. Hatches and Gratings

If the coamings are installed, make the hatch covers or gratings. Precedence exists for displaying the model with hatches covered. Gratings on the hatch, and companion doors are to provide ventilation at Mystic Seaport. They are not historical, so use only solid covers and doors to represent the original ship. Making gratings is no longer a lot of work. The laser-cut material can be assembled two ways (Figure 5-3). Edge-to-edge gluing produces a thinner, more realistic grating. It seats in the hatch better and the ledges need not be so deep.

5. Tryworks and Workbench

The tryworks is interesting, but tricky to make (Figure 5-4). Chimneys, pots, side knees, and sliding fire doors are Britannia fittings. Make the tryworks structure from wood strips or sheets. Paint the brick areas to look like bricks. It may be possible to find printed brick paper sheets in hobby catalogs. Hang the sliding fire doors by drilling a hole in each hinge tab, then inserting a brass rod. Don't forget to add the ring to the side knees.

Make the workbench and chicken coop from stripwood (Figure 5-5). The plans show where to glue the Britannia bench vise.

6. Grindstone

Although a cover hides the round stone, add a brass wire to represent its crank handle. (Scratch build the grindstone if the stone is to be visible.) Because the grindstone is portable, position it anywhere on the deck near the workbench. The plan location need not be followed.

7. Ladders

Each side of the anchor deck has a ladder (actually steps); another leads to the hurricane house, and the other is on the rail. Fabricate them from 1/64" thick wood. Delicate ladders enhance a model, so do not make them too thick. Use the fixture shown in Figure 5-6 to align the parts while gluing.

8. Galley Stack

The galley stack has a pad at its base. Notice that the Britannia fitting is based on Mystic's plans. However, a recent photo reveals a taller stack. If desired, duplicate it from brass tubing.

Fig. 5-3 Assembly of Grating Strips

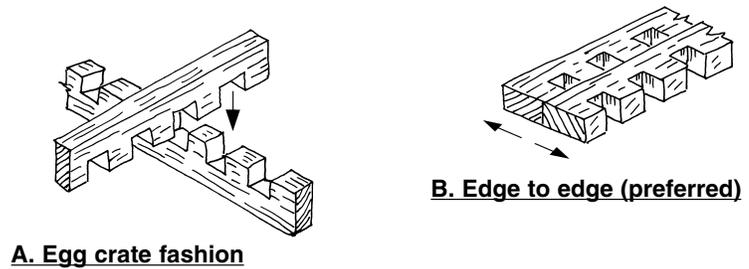


Fig. 5-4 Building the Tryworks

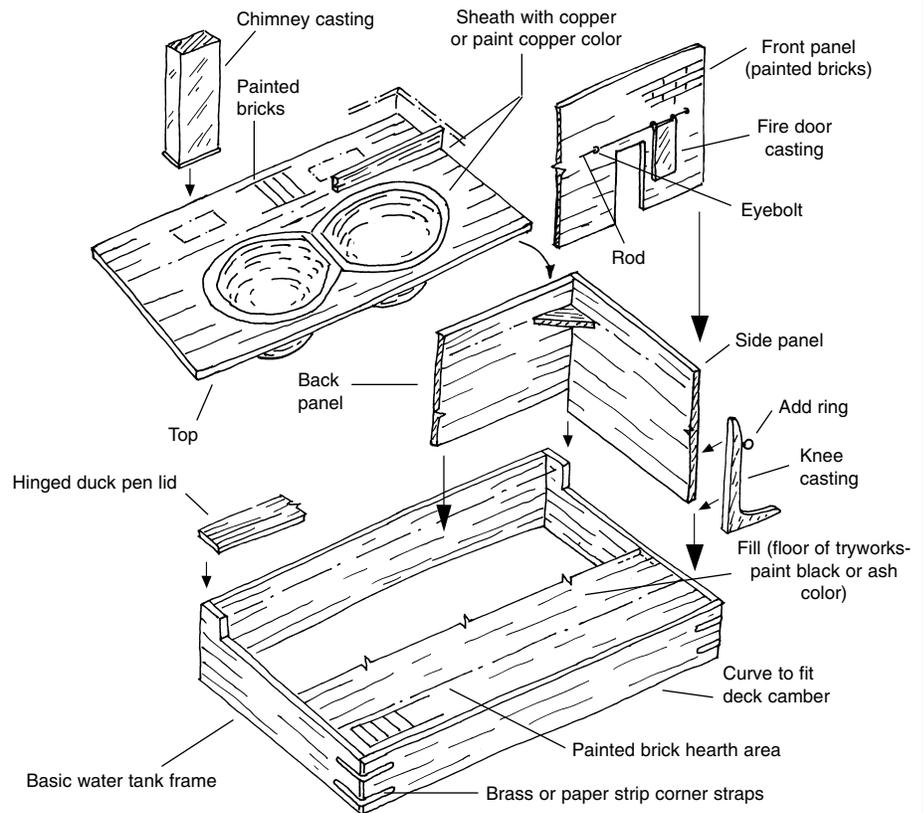
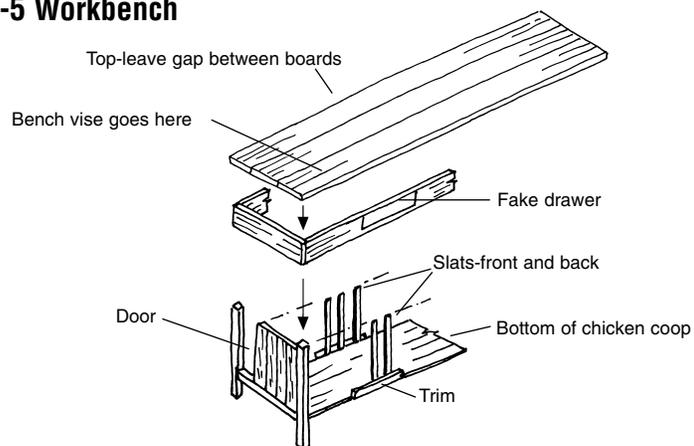


Fig. 5-5 Workbench



9. Main Fife Rail and Bilge Pumps

Make the bitts and fife rail from wood. Stanchions are Britannia. Britannia bilge pumps secure to the rail, so drill holes in the deck to accept them. Peg the fife rail bitts to the deck with a dowel, or cut a square hole in the deck per Figure 5-7. In any case, make the attachment a secure one, for belayed lines will put stress on the rail.

The foremast and mizzenmast have a spider band, but no fife rail. This will be discussed later.

10. Chain Pipes

Right next to the main fife rail are two chain pipes. Drill a hole in the deck for each one. To display the pipes with some chain going down them, bore a hole in the Britannia fittings.

11. Windlass

Windlass barrel, purchase quadrants, pawl, and brake crosshead are Britannia. Make the pawl bitt from strip-wood. Carrick bitts, knees, and the deck insert pad are laser-cut wood pieces. Fashion brake handles and the quadrants' connecting links from brass (Figure 5-8).

The symmetrical windlass barrel is based on Mystic's drawings. However, in 1990 the windlass was modified to reflect *Morgan* in her 1885-1905 configuration, and this is presented as an option. In 1886, a ring gear was added to the starboard end of the windlass and covered with a wooden box. A steam donkey engine and bailer were installed below deck to operate the windlass. If following this modification, add the wooden box.

12. Catheads and Anchors

Make the catheads from wood. Anchors are Britannia. If desired, substitute a wood stock for the Britannia one; otherwise, paint it to resemble wood. Stow the anchors per Figure 5-9. Each cathead has a thumb cleat. These are for stowage and the anchor release chain.

13. Deck Bitts, Fluke Pipe, and Belly Chain Chock

A whaler has three important bitts and corresponding chocks on its starboard side. Forward is the fluke chain bitt to which a chain is attached. It feeds through the fluke pipe in the hull.

Fig. 5-6 Building Ladders

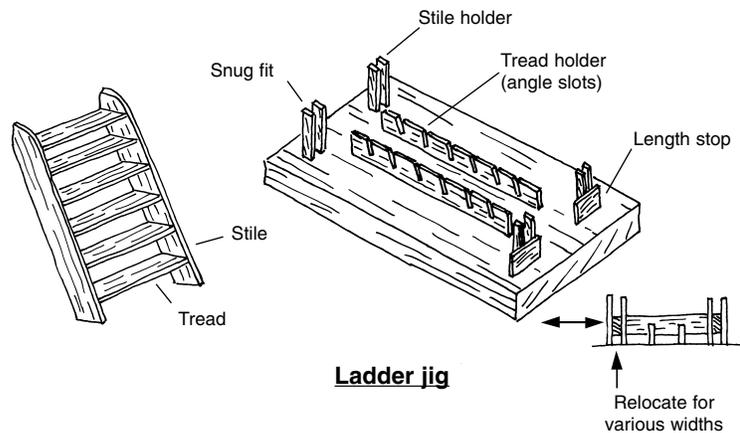


Fig. 5-7 Main Fife Rail

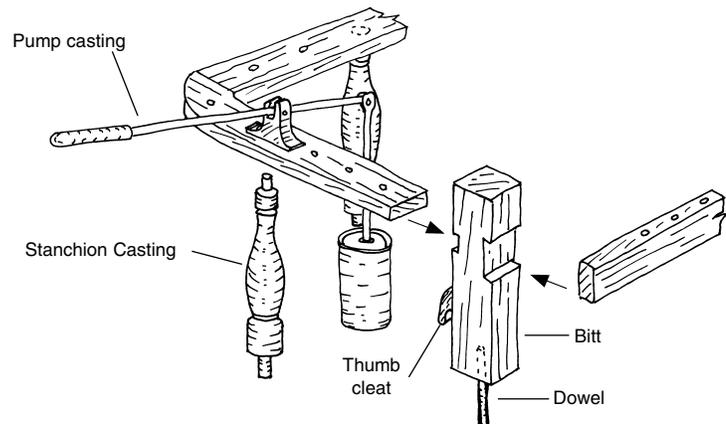
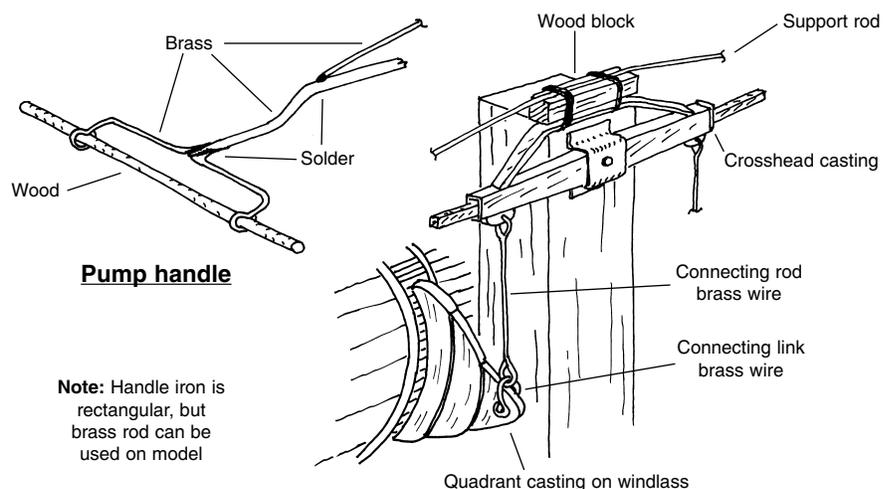


Fig. 5-8 Windlass



The chain is tied to the whale's tail when cutting-in. At midships is the belly chain bitt. A chain feeds through the belly chain fairlead chock at the rail. Aft is the head bitt. Its chain feeds through one of the oblong chocks along the rail.

Make the bits from wood and a brass pin (Figure 5-10). Chocks and fluke pipe are Britannia. Drill and file the correct diameter hole in the deck for the fluke pipe, then glue it in place. Unless the model will be displayed with a whale alongside, omit the chain. Or, tie the chain to the bits and pile some on deck beside them.

14. Port Rail and Whaleboat Loggerheads

Loggerheads are Britannia. Drill and glue them to the port rail and in each whaleboat as shown on the plans.

15. Mooring Chocks and Hawse Pipes

The forward round mooring chock, oblong chocks along the rail, and anchor hawse pipes are Britannia. Mount them per the plans. Make cavils from stripwood and install along the inside of the bulwarks.

16. Open Chocks, Starboard Rail Chock, and Cleats

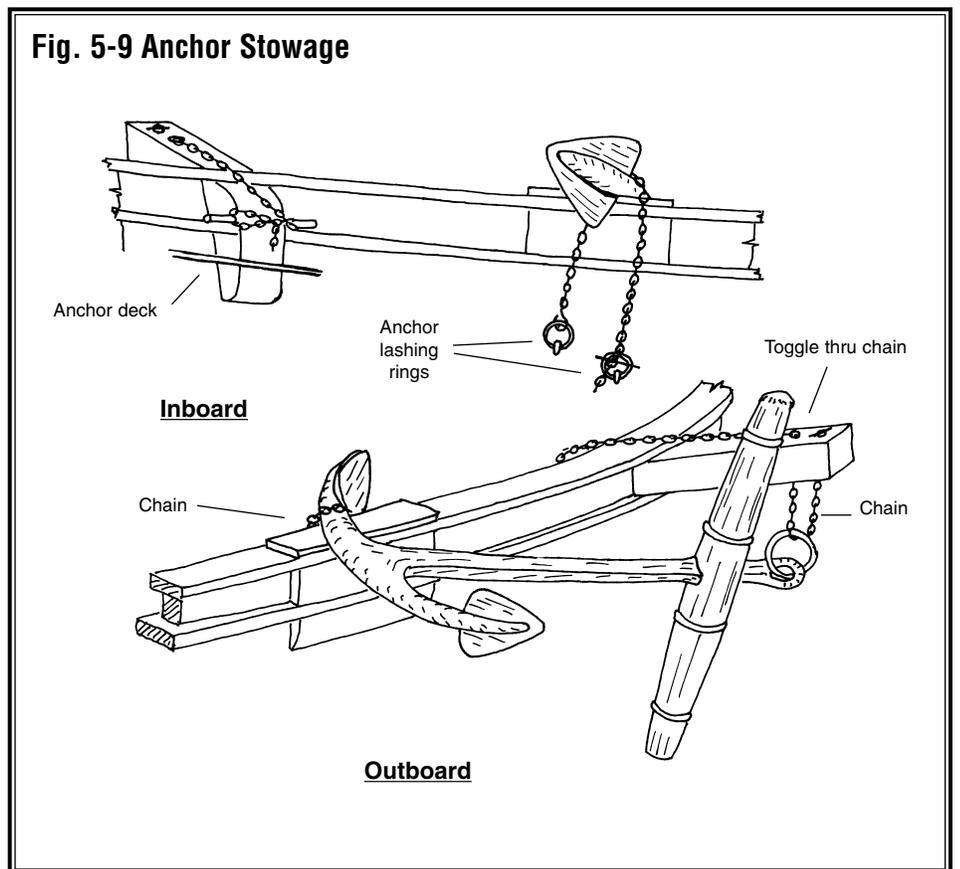
Along the rails are small cleats and open chocks in addition to a larger open chock on the starboard rail. These are Britannia. Install according to the plans. Glue and peg if a rigging line will put strain on them.

17. Eyebolts

Eyebolt locations are shown on the hull and rigging plans. The kit has a sufficient number of them. Drill a hole to accept each one. Using a toothpick or Microbrush, spread a thin film of cyano on the bolt, then insert. Don't overdo the glue. Tug on the eyebolt to check that it will not come out.

Eyebolts are simply wire bent into a loop. To close the loop, touch with a little solder or epoxy. Figure 5-11 shows an easy way to produce scale eyebolts.

18. Rudder and Steering Wheel



Although the rudder is laser-cut, it must be shaped according to the plans. Create pintles and gudgeons from paper or brass sheet (Figure 5-12). After installing the rudder, make the tiller from wood and strap it to the rudder stock. The steering wheel, posts, and line drum are Britannia. Fit these to the tiller. Rig the wheel per the plans.

19. Cutting Stage

Make the cutting stage and its post from wood, then rig as shown on the plans. The stage can be presented in its lowered or stowed position (Figure 5-13). Don't forget to leave gaps between the planks. This platform had to drain fast to prevent the mates from slipping while cutting blubber from the whale.

20. Whaleboat Davits, Bearers (Lashing Posts), Cranes, and Slides

Davits are laser cut. Make the lashing posts, cranes, and slides from strip-wood. They look like metal in photos, but are actually oak. Longhorn cleats and snatch blocks are britannia. Note: Cleats are higher on the aft port and starboard davits to clear the hurricane house. Make the davit stays from brass wire fitted into eyebolts (Figure 5-14).

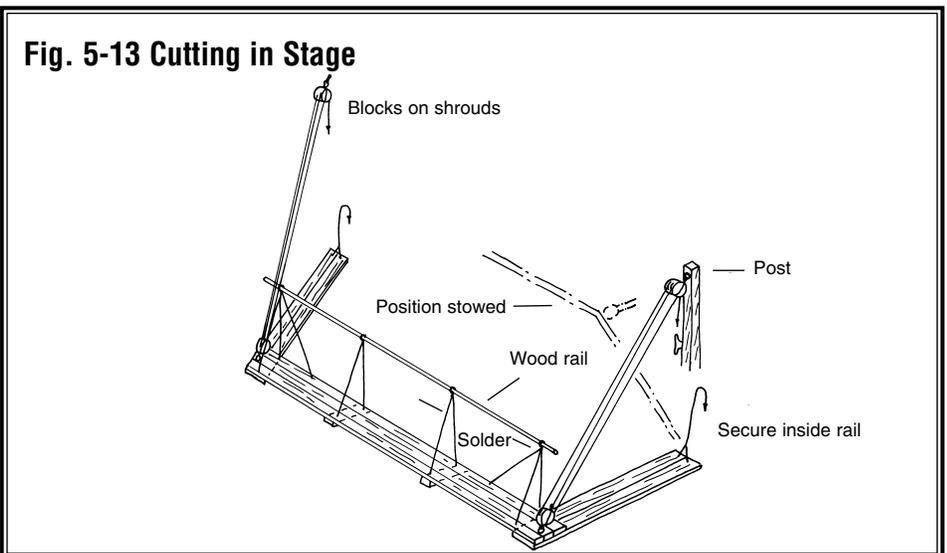
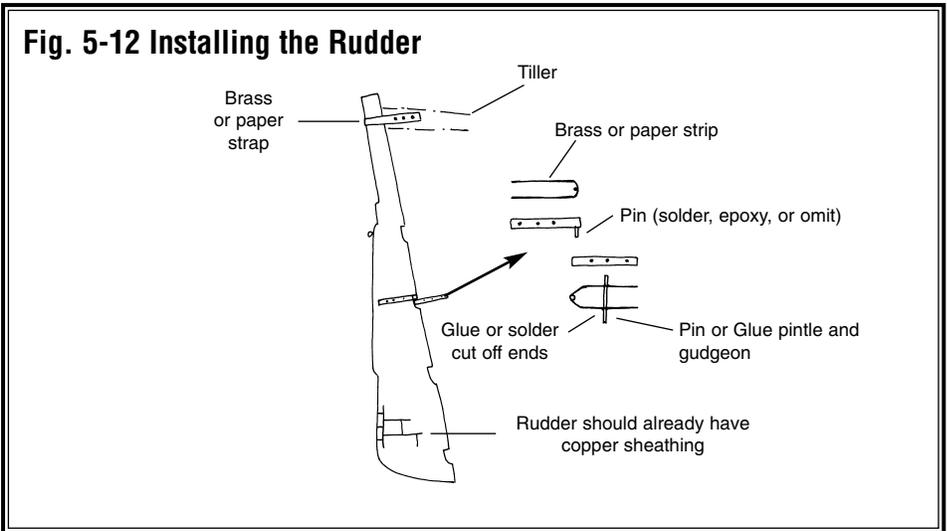
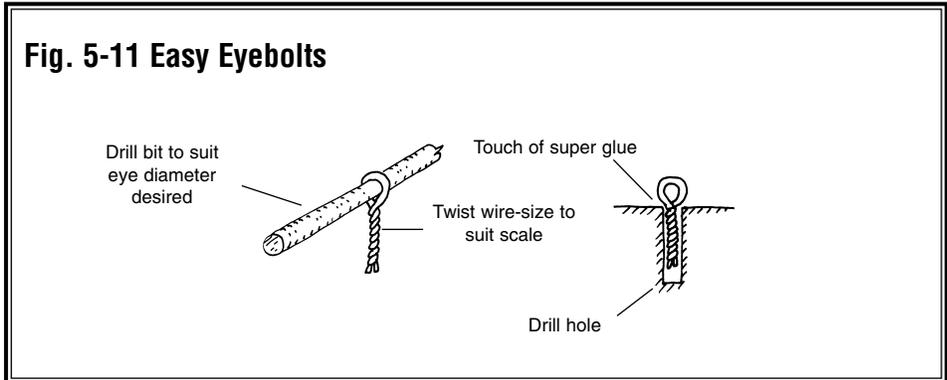
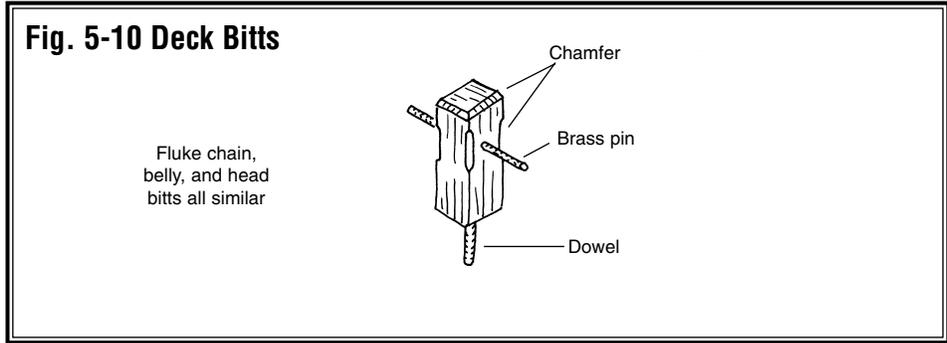
No two davit pairs have the same spacing, so double check the plans when locating them. Since every whaleboat is identical, their lifting eyes may not line up with every davit set. This is no problem, because the tackle is either slightly in or out. To achieve vertical, parallel tackle, adjust the lifting eyes on each boat to correspond with its davit set.

Morgan has a pair of straight davits at the stern. *Mystic Seaport* installed them based on photographic records, but has no idea what their function was. They may be for another whaleboat or workboat.

21. Whaleboats

Five whaleboats hang from davits and two are stowed upside down on the amidships shelter. Inboard detail can be omitted for the stowed boats.

End tabs on each lift will assist with alignment. The wide tab is the stern and the narrow one the bow. Each lift from tab end to tab end is the same length. When assembling the lifts, keep the tabs in line. Use only a thin coat of white or woodworker's glue. Too thick a layer will affect the hull's over-all height. You can also use cyano.



These whaleboat models are unique. Instead of the usual Britannia casting or solid hull, Model Shipways has laser-cut lifts for bread-and-butter construction Wire (Figure 5-15). When hollowing these hulls, the challenge is to carve them as thin as possible without breaking through the wood.

Hollow the boat with chisels and sandpaper. Carve or sand the inside corners to the intersection of two lifts. When all is smooth, the shape should be correct. Next, cut off the tabs and carve or sand the exterior hull to its correct profile. Be careful; the hull is becoming thin. Make templates from the body lines to fine tune the hull's shape. Add the keel and the basic hull is done.

Carving a small boat hull is difficult. One way to check its thickness is shown in Figure 5-16. This is a homemade double-ended caliper. Commercial metal ones are too big for model work.

Carving Option: Temporarily omitting the bottom lift might make hollowing the hull easier. Carve the inside close to what is required, then glue on the bottom lift and complete the carving. Or, carve the hull to the inside of the ceiling planks, add those planks, then install frames above the ceiling as shown on the plans. This is a good approach, because the hull is thin and fragile.

How much detailing to include is an individual choice. Soles, frames, thwart knees, moulding, and other items shown on the plan add to the model, but might be a little difficult to make. Don't be afraid to try. Just keep the scale in mind.

Whaleboat Gear: The kit provides a Britannia loggerhead plus small and large line buckets. Fabricate the oars, harpoons, and small buckets from wood and brass wire. These are fun to make and really add to the look of the model. Everything is on the plans.

Colors: Whaleboat colors are based on those at Mystic Seaport.

22. Ship's Name

The stern and forward hull sides carry the ship's name. The best way to add this detail is to buy dry transfer letters (available at art and office supply stores or model railroad shops). After applying, give the letters a coat of flat varnish.

23. Miscellaneous Boxes

Fig. 5-14 Whaleboat Davit Stowage

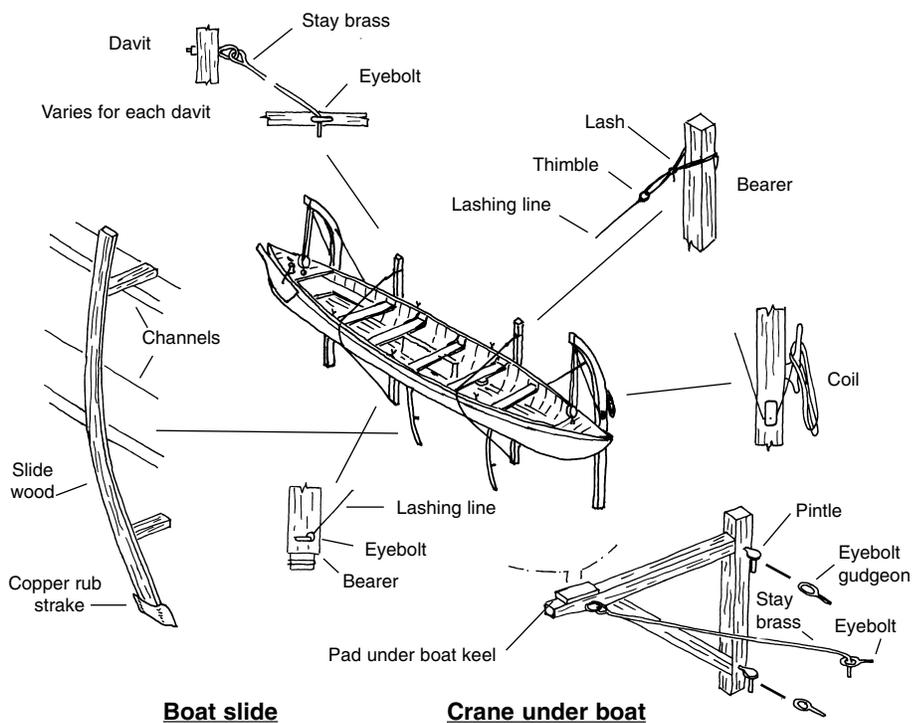
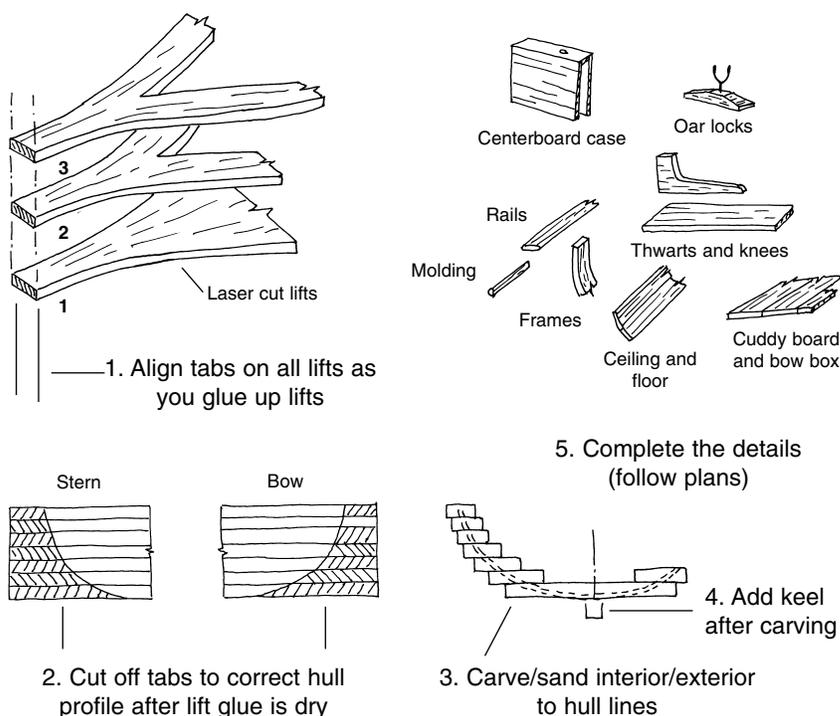


Fig. 5-15 Building the Whaleboats



Make the cooling tank, scrap hopper by the tryworks, and vegetable bin aft from stripwood (Figure 5-17). Because the real cooling tank is copper, brass sheet can be used if desired.

24. Stern Eagle, Stars, and Billethead

The stern eagle and billethead are Britannia. Paint on the stars at the stern.

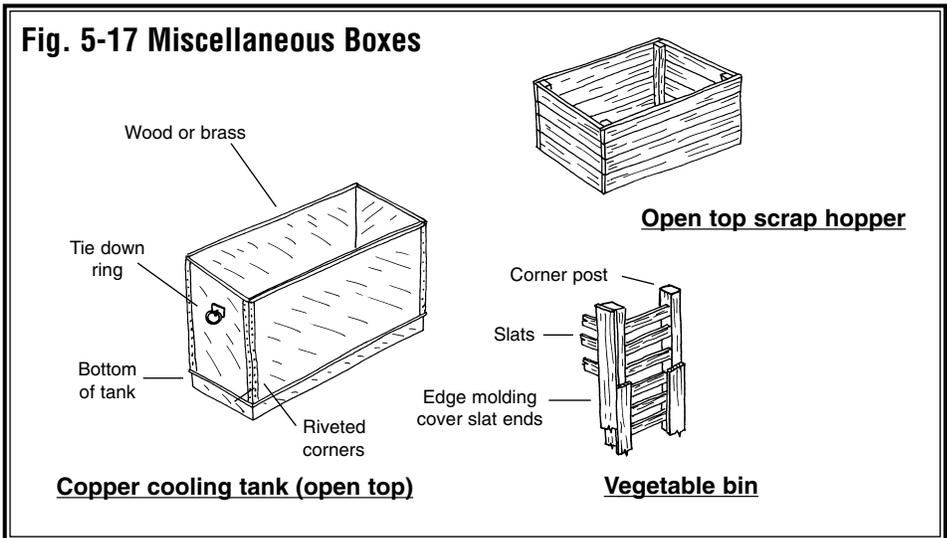
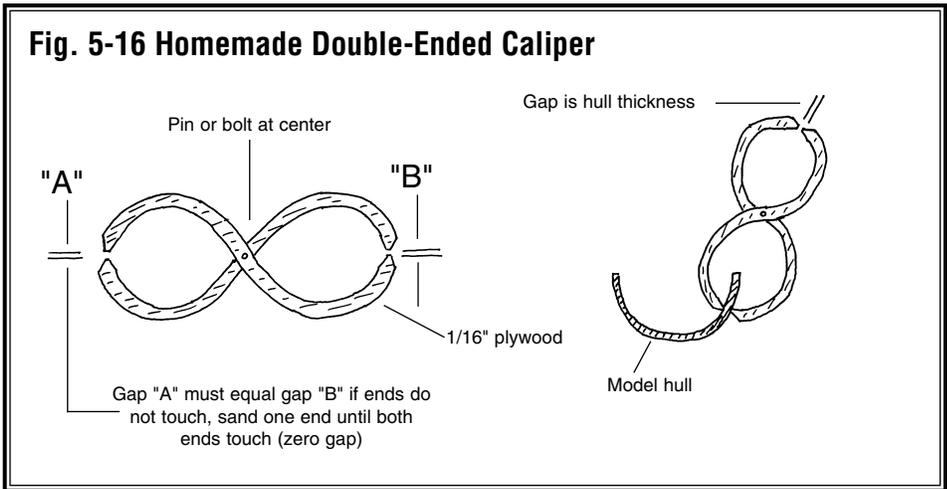
25. Sea Ladder and Portlights

Morgan has sea ladders (wooden steps) on either side of the hull. Round portlights and the rectangular one can be simulated by drilling a shallow hole in the hull, then painting it black.

26. Channels

Either fashion the channels from stripwood and install them now, or wait until it's time to make the chainplates. Consult Stage 9 for chainplates and channel details.

At this point, the model has a considerable amount of fittings on board. Take another look, correct mistakes, and touch up paint blemishes. Go over the plans again. Has anything been missed? When all is satisfactory, get ready for the masts and spars.



STAGE 6

Mast and Spar Construction

1. Shaping and Tapering Masts and Spars

Masts and spars are drawn to scale on the plans. Dowels for provided, but require final tapering. A dowel, because it is round, is difficult to taper. The best approach is to taper the dowel from its maximum diameter to square at the ends, then eight-sided. Sand to achieve final rounding. This prevents a dowel from becoming an oval (Figure 6-1).

Although a little tricky, dowels can be tapered by chucking them into an electric drill or lathe. As the dowel turns, taper with sandpaper.

Experienced modelers file masts and spars from square stock, because marking tapers is easier. Applewood is excellent here, because its dense, twisted grain is strong and resilient.



2. Building and Installing the Masts

After squaring mast heads to their proper width, cut the tenon or tongue at the top (Figure 6-2).

On most ships, the heel of the topmasts and topgallant masts has a rectangular or square section. Although the restored *Morgan's* heels are round like the rest of the mast, they do have a fid slot. Drill this hole, then shape it with a file. The fid, a rectangular or square pin, prevents the mast from falling through the top (Figure 6-3).

After completing the basic masts, drill holes for the required sheaves (pulleys). A sheave is used for yard halliard tyes. Once a line runs through a hole, it's impossible to tell if a sheave is present, so don't install real ones.

Mast Bands: Use brass or paper strips for the mast bands. Figure 6-4 shows some options. Fit the bands on the spars as soon as they are tapered. Do not install eyebolts or other fittings that could prevent attaching the mast bands, or tubs for the upper topsail yards.

Mast Caps, Tops, Trestletrees, Crosstrees, and Spreaders: Although mast caps are laser-cut, some filing may be necessary if the holes don't fit the masts. Glue eyebolts in the mast caps per the plans.

The basic platform for the fore and main tops and the curved supports are laser-cut. Make the other straight parts from stripwood (Figure 6-5). Tops are simple and fun to do.

Fashion trestletrees, crosstrees, and topmast spreaders from stripwood. Curved crosstrees are laser cut. Figure F-6 illustrates the mizzen crosstree assembly.

Eyebolts, Jackstay, Boom and Gaff Fittings, and Spider Bands: The mizzenmast and yards have wooden jackstays for securing the spanker. Jackstays are laser-cut and about the right size for the mizzenmast and lower yards, but a little large for the topgallant and royal yards. Slightly sand the strips or make new jackstays from 1/32" square stock (Figure 6-7). Pin and glue them to the spars.

Cyano a large eyebolt to the spanker boom and gaff. The masts have smaller eyebolts for rigging. Check the plans for their locations, drill a hole, and cyano the

Fig. 6-1 Shaping & Tapering the Masts and Spars

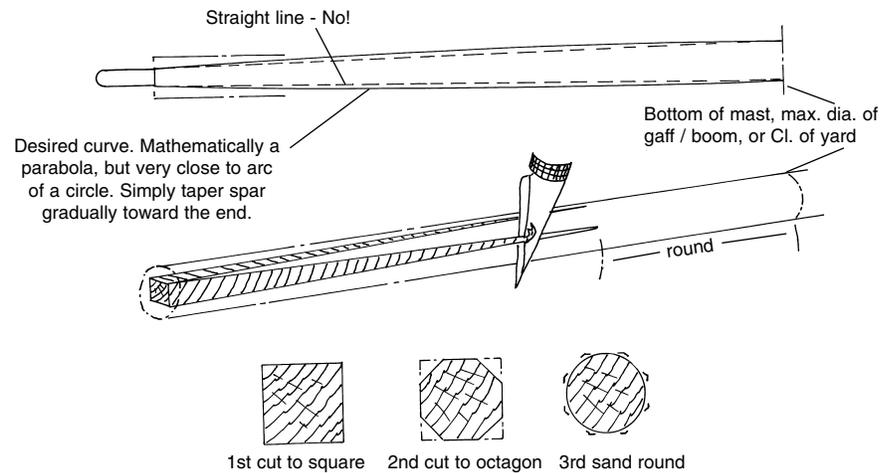


Fig. 6-2 Squaring the Mast

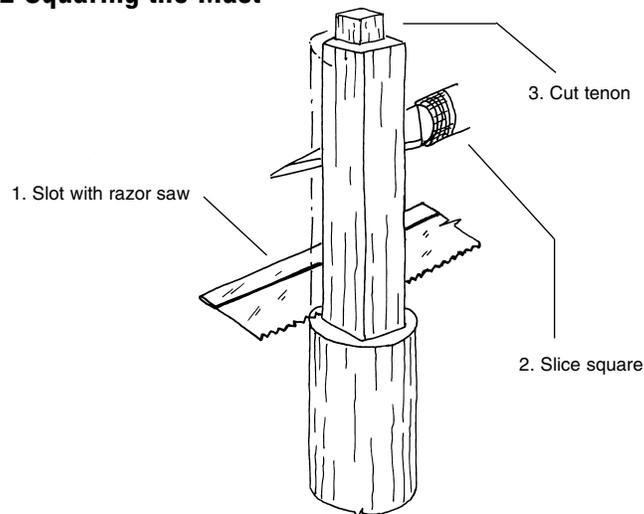
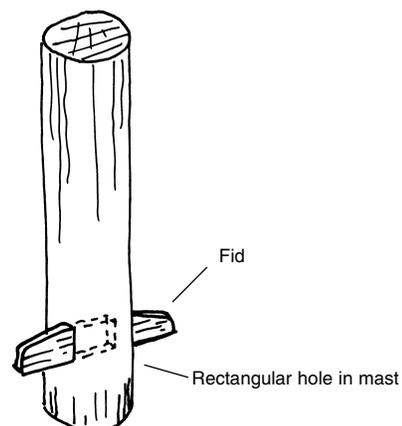


Fig. 6-3 Fid in Topmast Heel



eyebolt in place.

Britannia spider bands may need their holes filed before they will slip on the masts. It may also be necessary to ream their belaying pin holes. Option: Add the belaying pins before installing the spider bands.

Note: The mainmast spider band is high above the deck, probably so it won't interfere with the fife rail. This is unusual, but that's how it is on the real ship. Sailors belayed lines by climbing on the fife rail.

Fairleads, and Stay Leads: The fore and mainmasts have wooden fairleads for running lines, in addition to cleats and a chock for the main and mizzenstays. Add these per the rigging plans.

Mast Assembly: With parts made and pre-fitted, assemble tops, caps, crosstrees, and trestletrees on the lower masts, topmasts, and topgallant masts. Before gluing, check to make sure the lower mast, topmast, and topgallant mast align. Check the profile and fore and aft views. Adjust the upper mast heel holes if necessary.

Option: Some modelers like to build mast assemblies as they rig; install lower masts, do the shrouds and lower stays, then add the topmasts, etc. Just keep checking the alignment at each level.

Mast Wedges and Mast Installation: A laser-cut ring represents the mast coat (Figure 6-8). Shape these parts by filing the edge. Slip a mast coat over the mast before stepping it. Add slivers of wood as necessary to jam the mast in the hole. Check the alignment forward, aft, and athwartships, so it matches the plans. Finally, slide the mast coat down and glue to the deck.

The foremast coat is shaped differently from the main and mizzen coats. This was observed from photographs.

3. Building and Installing the Bowsprit and Jibboom

Make the bowsprit from square strip-wood. It has an unusual shape with a flat top. Taper the wood, then cut the tenon for the cap (Figure 6-9). Although the bowsprit cap is laser-cut, enlarge and angle its holes and taper the top and bottom edges. The jibboom is a simple tapered spar. Drill holes to represent sheaves for the stays.

Add the bees and various eyebolts for

Fig. 6-4 Making Mast Iron Bands

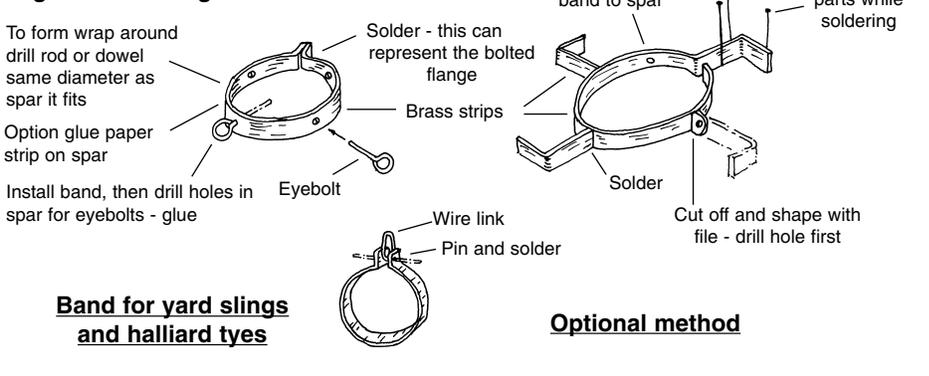


Fig. 6-5 Building the Tops

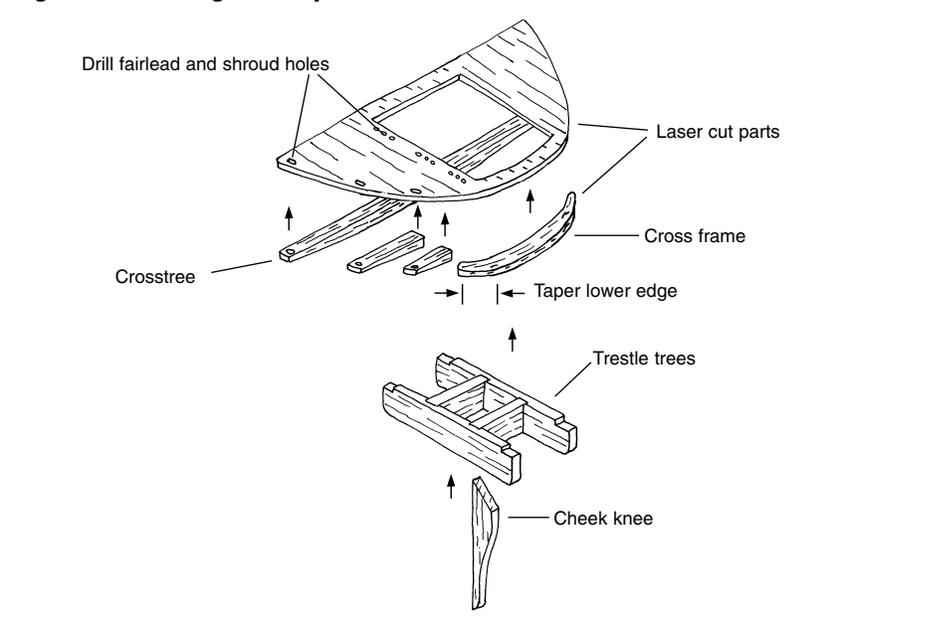
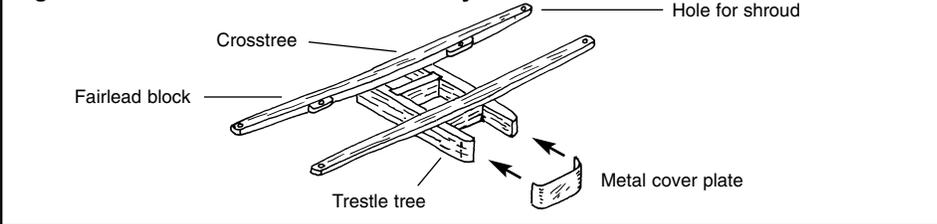


Fig. 6-6 Mizzen Crosstree Assembly



rigging. Assemble the cap and jibboom on the bowsprit. Be careful and align it correctly before gluing. Mortise the aft end of the jibboom into the block at the bow as shown on the plans.

Insert the bowsprit through the opening in the bow, seat it between the bitts. Check the side angle and make sure it lines up with the centerline.

Dolphin Striker: Hook the dolphin striker into the proper eyebolt on the bowsprit cap. It can hang loose until rigging begins.

4. Building the Yards

The yards are made now, but installed as rigging progresses. Footropes are included at this point, because they are easier to do with yards in hand. They and spar details are shown on the plans (Figure 6-10). Paint the yards as they are finished. Then they will be ready to mount when rigging starts.

5. Building the Spanker Gaff and Boom

Complete these spars in hand as much

as possible. They will be installed later.

Note: The maximum diameter of the gaff and boom is not at the center, but about one-third out from the forward end. This is not clearly seen on the plans. Gaff and boom are tapered just like a yard, only the taper begins at a different place.

The spanker boom and gaff have a hook gooseneck (Figure 6-11).

Fig. 6-7 Making a Wooden Jackstay

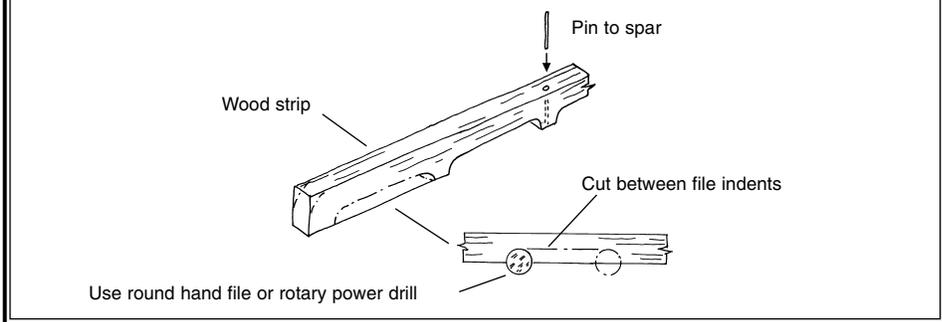


Fig. 6-8 Mast Coats

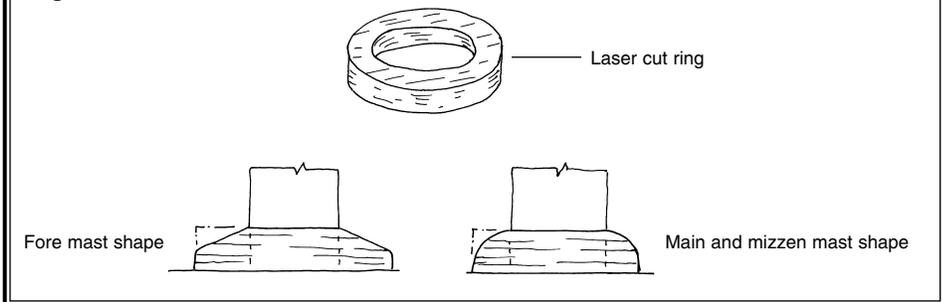
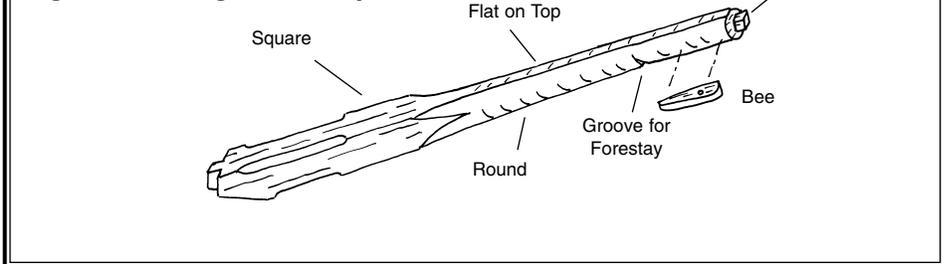


Fig. 6-9 Making the Bowsprit



General Rigging and Sailmaking Information

Newcomers to the nautical world should learn the following rigging terms. Old salts can skip this part and grab a mug of grog.

1. Each edge and corner of a sail has a name. On a square sail, the top is the *head*, the bottom the *foot*, and the sides the *leech*. Lower corners are the *clews*. On a fore-and-aft sail, the top is the head, bottom the foot, aft side the leech, and forward side the *luff*. The lower forward corner is the *tack*, aft lower corner the clew, upper forward corner the *throat*, and the aft upper corner the *peak*. A triangular sail is similar, except the upper corner is called the head. It has no throat or peak.

2. *Standing rigging:* Fixed lines supporting masts and spars. Standing rigging is generally tarred; hence, it is black or dark brown.

3. *Shrouds:* Transverse lines supporting masts. *Deadeyes* are wood and have three holes for reeving the lanyard.

Fig. 6-10 Yard Details

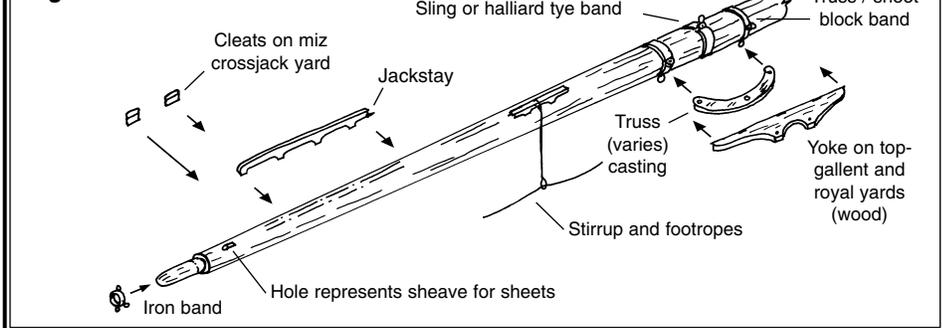
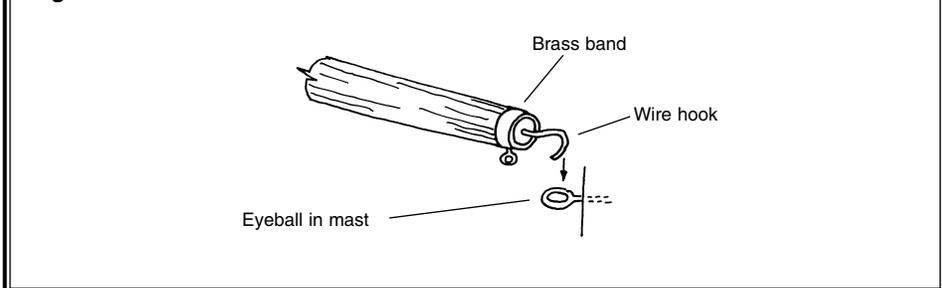


Fig. 6-11 Boom & Gaff Gooseneck



STAGE 7

Lanyards are lines used to tighten shrouds, stays, or other lines. On modern ships, metal *turnbuckles* have replaced *deadeyes*. A *heart* or *bullseye* is similar to a *deadeye*, except it has one large hole. They are used for more permanent installations.

4. *Chainplates*: Iron bars or rods holding the *deadeyes*. Topmast shrouds have no *chainplates*. Instead, rods or lines run from the *deadeye* or *bullseye* to the mast band. These are called *futtock shrouds*. If they go just to the lower shrouds, they generally tie to a wooden or metal rod called a *futtock stave*. However, this is not the case on *Morgan*.

5. *Footropes*: Lines seamen stand on when working and furling sails. *Stirrups* hold the *footropes*.

6. *Stays and backstays*: Lines supporting the masts from fore and aft forces. A *running backstay* has a movable tackle on deck. *Morgan* has no *running backstays*.

7. *Bobstays*: Support the bowsprit from upward loads. *Guys* support the jibboom and bowsprit from side forces. Bowsprit guys are sometimes called

bowsprit shrouds. Bowsprits occasionally have a vertical strut below the jibboom cap to increase the stays' downward pulling force back to the hull. This strut is the *martingale* or *dolphin striker*, and *Morgan* has one. Head stays run through the jibboom, down to the *dolphin striker*, and back to the bow. *Martingale stays* are separate, and start at the jibboom rather than continuing from the head stays.

8. *Running rigging*: Lines that move, reeve through blocks, or operate sails and spars.

9. *Blocks*: Wooden or metal shells with sheaves (pulleys) for handling lines. A *purchase* (tackle) consists of several blocks and a line to provide a mechanical advantage for handling sails and spars.

10. *Halliards* or *halyards*: Lines for raising and lowering a sail, yard, boom, gaff, or flag. The part of a *halyard* attached to a yard is called a *tye*. For gaffs, the outer *halyard* is the *peak halyard*. At the gaff jaws is a *throat halyard*, named for the part of the sail it operates. *Downhauls*, *outhauls*, and *inhaul*s drag a sail along a boom or up and down a stay.

Sheets: hold the lower corners of a sail or

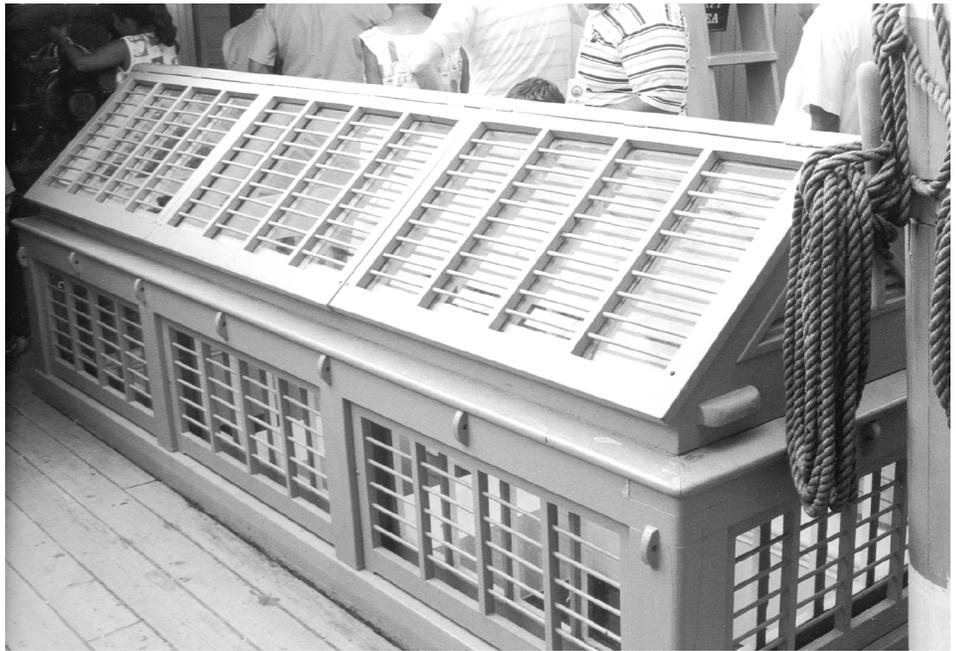


Fig. 7-1 Seizing the Lines

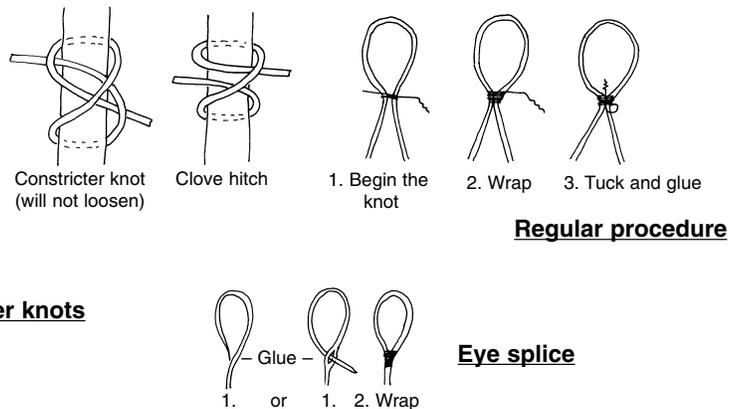
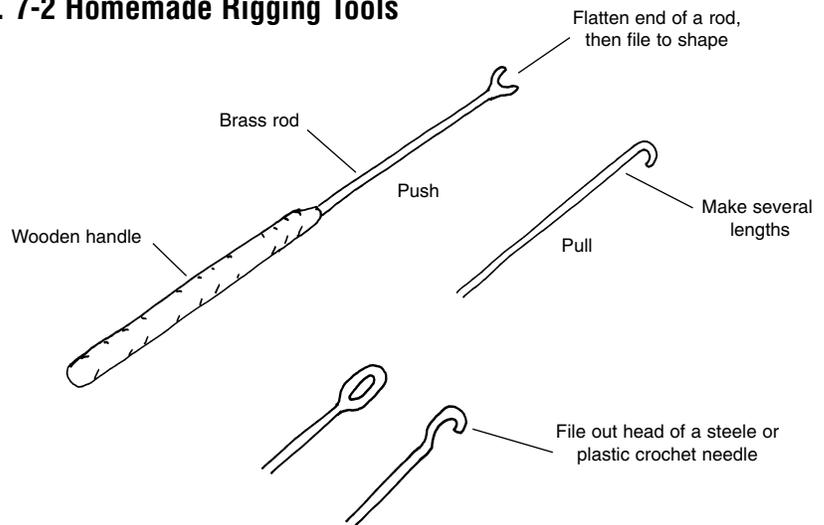


Fig. 7-2 Homemade Rigging Tools



boom. When not in use, sails are furled (bundled on the yard, boom, or mast). Clew lines pull up the corners of a square sail, leechlines pull up the sides, and *buntlines* pull up the belly for furling the sail. *Brails* are like buntlines, except they pull loose-footed fore-and-aft sails toward the mast for furling. *Bowlines*, attached to the sides of a square sail, pull it forward. These are used primarily on 18th century and older ships.

11. *Reef bands*: Horizontal reinforcing bands on the sail. They have short lengths of rope called *reef points*. In heavy weather, sailors tie the reef points to a yard or boom to shorten the sail.

12. *Parrels or parrals*: Lines or devices for holding yards, booms, and gaffs to their respective masts and spars. A *truss*, *jeer*, and *sling* are similar to a parrel. These are lines or iron fittings holding a yard up and against the mast. They are most common on the stationary lower yards.

13. *Braces*: Lines attached to the ends of yards for directing their angles and holding them taut. *Lifts* are standing or running lines for holding yards when lowered. A *topping lift* is a line holding up the end of a boom when the gaff is down or absent. *Vangs*, port and starboard lines, prevent a gaff from swinging sideways.

1. Rigging Options

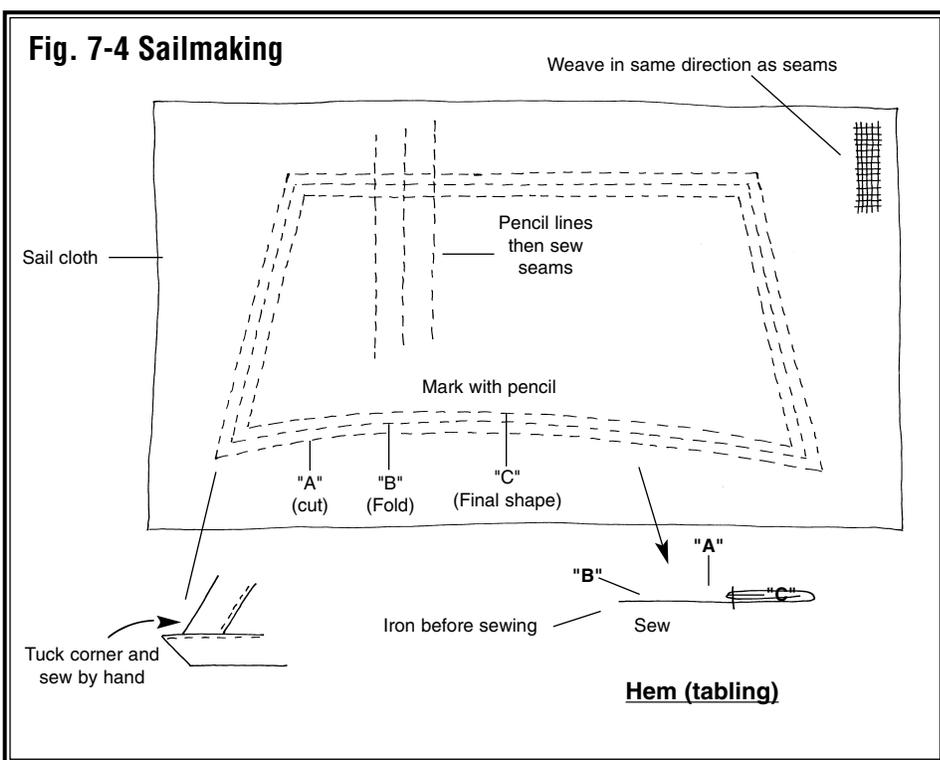
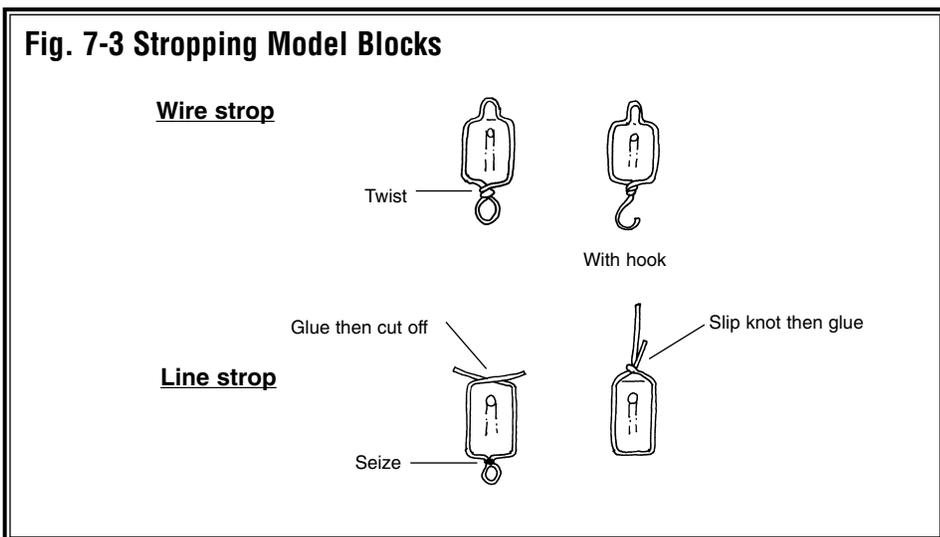
Like the real ship, the model can be rigged four ways. The plans cover the details. It's your choice, but consider these comments.

Full set of sails including fore-and-aft and square sails: Not many modelers go to this extreme. It's a good approach, if the objective is to own one model like that. However, the mass of sails obscures most spar and deck details. Sails look better on a ship at sea.

Sails furled, yards lowered on their lifts: Here is a pleasing compromise. Reality is maintained without sacrificing detail.

Sails furled and hoisted: This creates the illusion of a ship in port with some sails still drying after a day's run. Mix furled sails with full open ones, or sails with yards partially down. Use buntlines and clewlines to partially pull up square sails. Possibilities abound, so look for a pleasing effect. Study paintings for ideas. Marine artist John Stobart's work is an ideal reference.

No sails, yards lowered on their lifts: Now the ship is in port with her sails removed for repairs. Most modelers



choose this approach, and beginners should definitely opt for it.

Because more line diameters are shown on the plans than provided in the kit, use the following guide:

2. Using the Detail and Rigging Plans

Sheets 5 and 6 show the masts and spars with attendant rigging. They are drawn so every line is clear and its belaying point known. Study them and have a complete picture of each rig before starting. Do this and rigging will proceed smoothly.

3. Rigging Line and Block Sizes

Use every diameter available to enhance the model's scalelike appearance. Additional diameter lines are commercially available. Some modelers substitute the kit's nylon cordage with linen

or cotton lines.

4. Treating the Lines

Worming, Parceling, and Serving: Lines on ships were wormed, parceled, and served wherever chafing might occur. Shrouds are a prime example. Worming inserts thin pieces of line (worms) between the strands. Parceling winds canvas strips saturated with tar around the wormed part. Happily, that isn't necessary for the model. Only consider serving (binding the wormed and parceled area in the opposite direction with spun yarn). Use fine silk or linen thread. Avoid cotton. It's too fuzzy.

Range of lines shown on plan	Kit supplied line diameter to use
Less than 1/16"	0.01"
1/16" to 1/8"	0.02"
1/8" to 1/4"	0.03"
1/4" to 3/8"	0.04"
3/8" to 1/2"	0.05"
1/2" to 3/4"	0.06"
3/4" to 1"	0.07"
1" to 1 1/4"	0.08"
1 1/4" to 1 1/2"	0.09"
1 1/2" to 1 3/4"	0.10"
1 3/4" to 2"	0.11"
2" to 2 1/4"	0.12"
2 1/4" to 2 1/2"	0.13"
2 1/2" to 2 3/4"	0.14"
2 3/4" to 3"	0.15"
3" to 3 1/4"	0.16"
3 1/4" to 3 1/2"	0.17"
3 1/2" to 3 3/4"	0.18"
3 3/4" to 4"	0.19"
4" to 4 1/4"	0.20"
4 1/4" to 4 1/2"	0.21"
4 1/2" to 4 3/4"	0.22"
4 3/4" to 5"	0.23"
5" to 5 1/4"	0.24"
5 1/4" to 5 1/2"	0.25"
5 1/2" to 5 3/4"	0.26"
5 3/4" to 6"	0.27"
6" to 6 1/4"	0.28"
6 1/4" to 6 1/2"	0.29"
6 1/2" to 6 3/4"	0.30"
6 3/4" to 7"	0.31"
7" to 7 1/4"	0.32"
7 1/4" to 7 1/2"	0.33"
7 1/2" to 7 3/4"	0.34"
7 3/4" to 8"	0.35"
8" to 8 1/4"	0.36"
8 1/4" to 8 1/2"	0.37"
8 1/2" to 8 3/4"	0.38"
8 3/4" to 9"	0.39"
9" to 9 1/4"	0.40"
9 1/4" to 9 1/2"	0.41"
9 1/2" to 9 3/4"	0.42"
9 3/4" to 10"	0.43"
10" to 10 1/4"	0.44"
10 1/4" to 10 1/2"	0.45"
10 1/2" to 10 3/4"	0.46"
10 3/4" to 11"	0.47"
11" to 11 1/4"	0.48"
11 1/4" to 11 1/2"	0.49"
11 1/2" to 11 3/4"	0.50"
11 3/4" to 12"	0.51"
12" to 12 1/4"	0.52"
12 1/4" to 12 1/2"	0.53"
12 1/2" to 12 3/4"	0.54"
12 3/4" to 13"	0.55"
13" to 13 1/4"	0.56"
13 1/4" to 13 1/2"	0.57"
13 1/2" to 13 3/4"	0.58"
13 3/4" to 14"	0.59"
14" to 14 1/4"	0.60"
14 1/4" to 14 1/2"	0.61"
14 1/2" to 14 3/4"	0.62"
14 3/4" to 15"	0.63"
15" to 15 1/4"	0.64"
15 1/4" to 15 1/2"	0.65"
15 1/2" to 15 3/4"	0.66"
15 3/4" to 16"	0.67"
16" to 16 1/4"	0.68"
16 1/4" to 16 1/2"	0.69"
16 1/2" to 16 3/4"	0.70"
16 3/4" to 17"	0.71"
17" to 17 1/4"	0.72"
17 1/4" to 17 1/2"	0.73"
17 1/2" to 17 3/4"	0.74"
17 3/4" to 18"	0.75"
18" to 18 1/4"	0.76"
18 1/4" to 18 1/2"	0.77"
18 1/2" to 18 3/4"	0.78"
18 3/4" to 19"	0.79"
19" to 19 1/4"	0.80"
19 1/4" to 19 1/2"	0.81"
19 1/2" to 19 3/4"	0.82"
19 3/4" to 20"	0.83"
20" to 20 1/4"	0.84"
20 1/4" to 20 1/2"	0.85"
20 1/2" to 20 3/4"	0.86"
20 3/4" to 21"	0.87"
21" to 21 1/4"	0.88"
21 1/4" to 21 1/2"	0.89"
21 1/2" to 21 3/4"	0.90"
21 3/4" to 22"	0.91"
22" to 22 1/4"	0.92"
22 1/4" to 22 1/2"	0.93"
22 1/2" to 22 3/4"	0.94"
22 3/4" to 23"	0.95"
23" to 23 1/4"	0.96"
23 1/4" to 23 1/2"	0.97"
23 1/2" to 23 3/4"	0.98"
23 3/4" to 24"	0.99"
24" to 24 1/4"	1.00"

Seizings: Seize lines with cotton, nylon, or silk thread. Do not secure lines with knots. Knots are for shoelaces. Touch seizings with diluted white glue (Figure 7-1).

Beeswax: Beeswax protects lines against moisture and lays down fuzz. To soften beeswax, hold it to a light bulb. Run the line across the beeswax, then through your fingers to soften and smooth it out. Do this several times to thoroughly coat the line.

5. Belaying Pins and Their Lines

Sheet 6 includes a complete belaying pin plan. Each belaying point and its appropriate line have the same number. Some lines run through fairleads before they belay. Sketches on the plans show which lines have fairleads.

6. Rigging Tools

Some homemade tools are essential for the rigging process (Figure 7-2). Similar shapes are commercially available.

7. Blocks and Deadeyes

The kit may or may not include bullseyes. If not, take a deadeye and ream its center. Wooden bullseyes and hearts are sometimes not available in the required sizes.

Stropping 3/16" scale blocks is difficult. Some alternatives are shown in Figure 7-3.

8. Sailmaking

Choosing the proper material is critical. Sailcloth must be lightweight, yet fairly opaque. Tightly woven cotton is acceptable and available from Model Expo. Although linen is ideal, most is too heavy for 3/16" scale models.

Wash sailcloth several times to preshrink it. When dry, iron the cloth, but be careful not to scorch it. Next, lightly draw the seams and hem (tabling) lines in pencil, then sew the seams using light tan cotton thread. A sewing machine makes fast work of the project. Practice on scrap cloth and set the stitch so it doesn't pucker the material. (Figure 7-4).

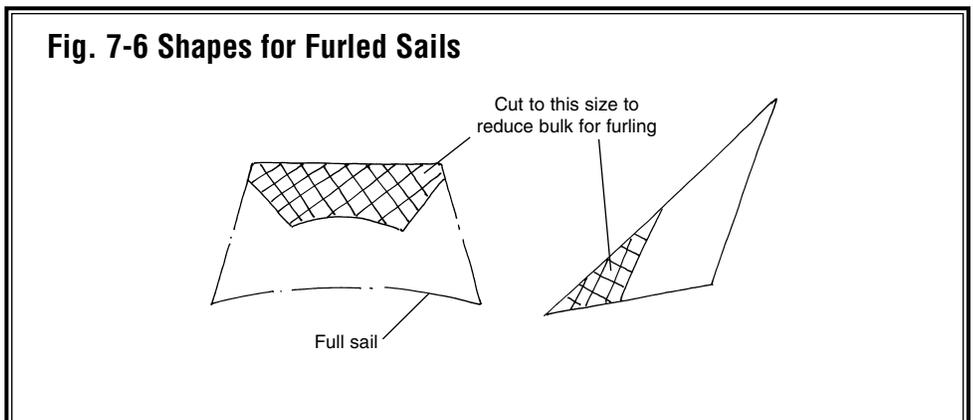
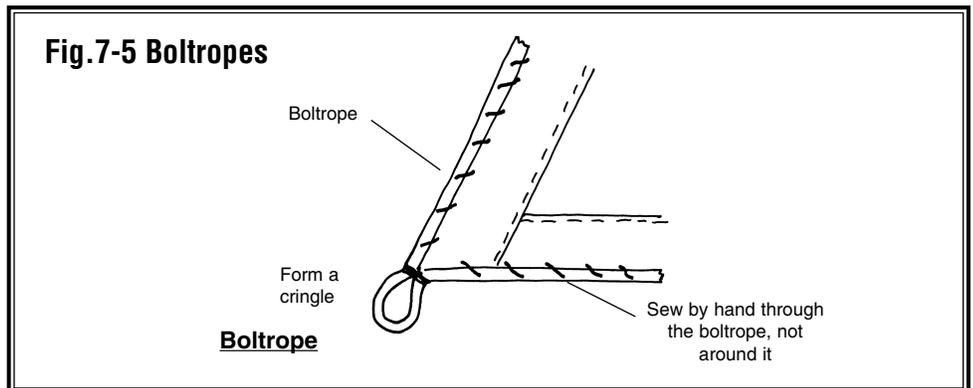
When done, iron the sails. Be careful not to burn them. Next, cut the sail's shape using Line A in Figure 7-4. Fold over the hem, iron it flat, and sew as close to Line B as possible. Tuck the ends and hand stitch the corners. The sail is now ready for stretching.

Stretching the Sails: This step assures the sail's proper shape, since sewing may have altered it. Using the original pattern, trace the sail's outline onto a piece of paper. Place the paper on a solid, but porous backing, such as a wood or cork board. Now wash the sail again and lay it over the outline. Stretch the wet material to the sail's outline, then secure with stick pins through its outer edges. When dry, the sail will have resumed its proper shape. Iron it one more time.

Boltropes and Reef Points: Boltropes can be omitted, since they are nearly invisible at 3/16" scale. However, to include them, follow the tedious method in Figure 7-5.

For the restored period, *Morgan* had no reef bands and reef points on any sail.

Furled Sails: Don't furl sails made from sailcloth and cut to the original's scale size. The material is usually too heavy, resulting in a bulky furled sail. To solve this problem, either proportionally reduce the size of a sail by one-third when using sailcloth (Figure 7-6), or buy a lighter material such as Silkspan (model airplane covering tissue). Depending on their size, even Silkspan



sails may require being reduced by one-third. Test first to see how much material is required for a neat, tight furl.

Even furled sails need some seams and hems, as these details are visible.

9. Rigging the Model Without Sails

Even though sails are omitted, include most of the lines attached to them; i.e., clewlines and sheets, buntlines and leechlines, and fore-and-aft sail halliards and downhauls. These lines remain when sails are removed. They are shackled together, tied off, or secured to some other stowage point. The sketches here and on the plans show some details.

When rigging a model without sails, most builders do not install bunt and leechlines or their blocks. Furthermore, most of the fore-and-aft sail sheets are omitted. The choice is yours. However, more lines mean more fun and, in the end, more realism. Try to visualize which lines to remove with the sail and which ones are easily left in place after being unhooked or untied from the sail.

Standing Rigging

Before starting, sort lines by size, coat with beeswax, and keep them handy. Use cotton, silk, or nylon sewing thread for seizings. Treat this with beeswax. Keep white glue at the ready for dabbing on a seizing if necessary. Usually sewing through the shrouds followed by a half hitch will prevent a seizing from unraveling.

Caution: Before rigging the mizzen topmast, install the gaff topsail mast hoops.

1. Shrouds

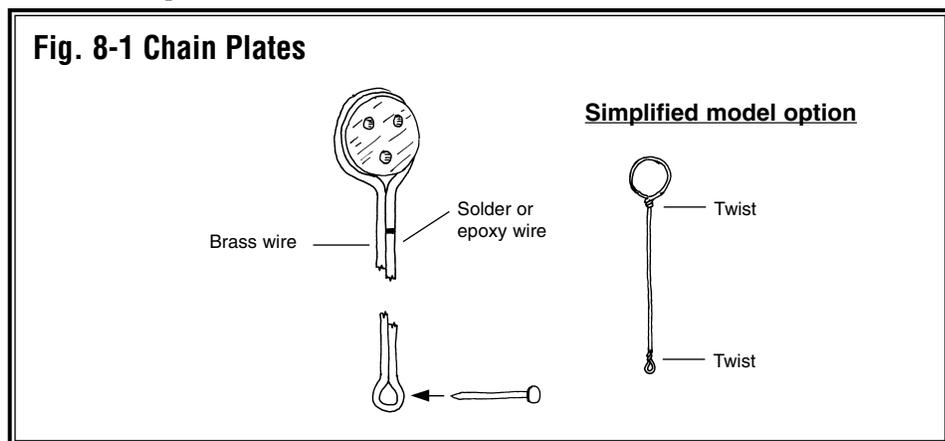
Note: These directions assume the shrouds will be installed first, then fore and aft stays. However, as an option one could install lower shrouds, then lower stays, followed by upper shrouds and upper stays. Just remember that at each mast-head the stays go on top of the shrouds.

Begin the standing rigging with the lower



shrouds. *Morgan's* lower deadeyes have steel rod chainplates. Make these from

brass wire (Figure 8-1).

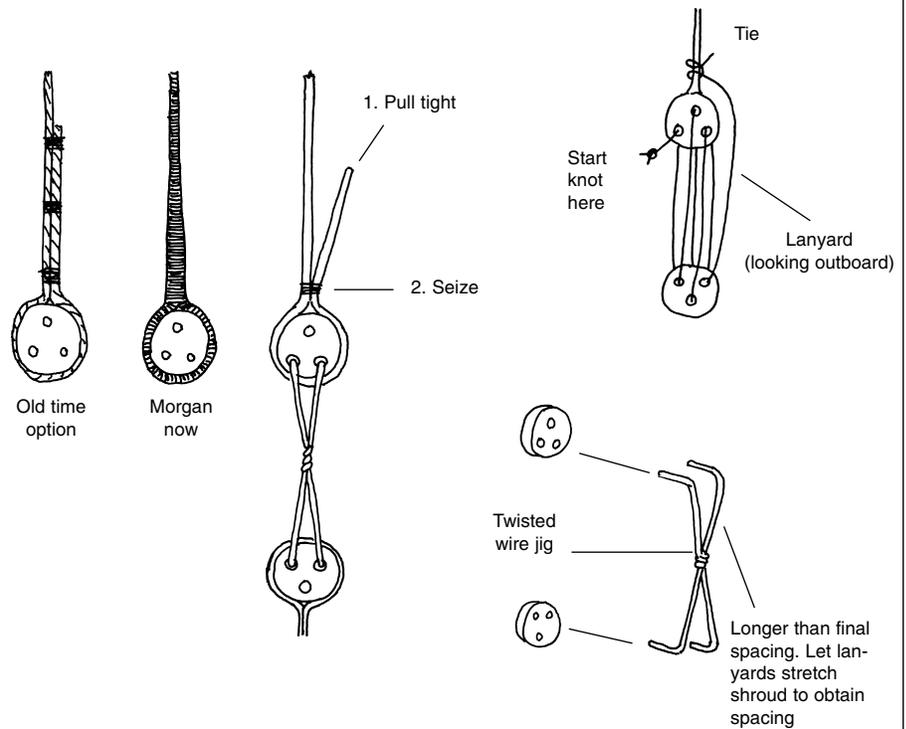


STAGE 8

The rigging plan shows the proper sequence for installing the shrouds. To set up the shrouds, make a temporary brass wire fixture to space the deadeyes as seizing progresses (Figure 8-2). The fixture should be longer than the final spacing of deadeyes. Reeving the lanyards will tighten the shrouds to their final proper spacing. Make a test shroud first to see how much it stretches. Figure 8-2 also shows the sequence for reeving lanyards. When looking outboard at any deadeye, always start with a knot in the upper left-hand deadeye hole. Consequently, port deadeyes have the knot aft and starboard deadeyes have it forward. Keep an eye on the masts. Rigging the shrouds can pull them out of alignment.

Note: In her later years, *Morgan* carried iron wire shrouds on the main and mizzenmasts and hemp ones on the foremast. By the time she came to Mystic Seaport, all her rigging was iron wire. Consequently, *Morgan's* shrouds are spliced around the deadeyes, then served. Because this is not a conventional method for older ships with hemp shrouds, use a triple seizing. It's easiest.

Fig. 8-2 Deadeye Spacing & Seizing Details

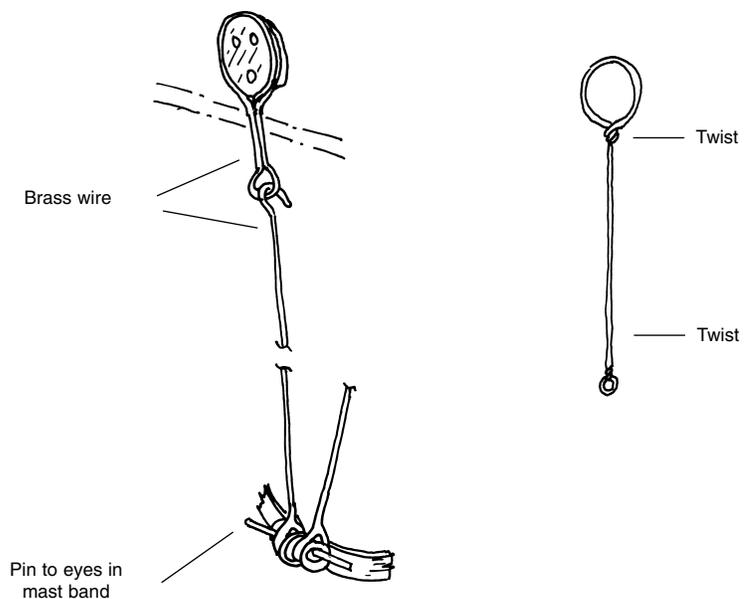


Instead of chainplates, the topmasts have deadeyes and futtock shrouds (Figure 8-3). Make the futtock shrouds from brass wire. *Note:* Topgallant shrouds have bullseyes, but the royal mast has no iron futtock shrouds, deadeyes, or bullseyes. Its shrouds pass through the crosstrees and set up with a lanyard at the futtock band.

After the shrouds are in place, add the ratlines (Figure 8-4). Lower shrouds have wood battens instead of ratlines. Stain the battens, then seize them to the shrouds. Make the sheer pole from brass wire, then paint.

Before installing the upper ratlines, give them a generous coating of beeswax. This will help hold them in a slight downward curve. If the ratlines tend to bow upward, tug them gently into position. Touching the loops with white glue will help freeze them. Ratlines are difficult to do if tied with clove hitches. Use half hitches and avoid pulling the ratlines too tight, thereby altering the spacing between shrouds. The step or space between ratlines should be a scale 14 to 15 inches.

Fig. 8-3 Futtock Shrouds



2. Backstays

Topmast, topgallant, and royal backstays are similar to shrouds, except no ratlines connect them. Install them after the shrouds are up. *Note:* The royal backstays use bullseyes rather than deadeyes and set to an eyebolt instead of a chainplate.

Cleats on the topmast spreaders pull the fore and main topgallant and royal backstays outward. Careful! Don't apply too much tension or the spreaders could break.

3. Fore and Aft Stays

Install the fore and aft stays once the shrouds and backstays are up (Figure 8-5). Be careful! Don't pull the masts out of line when installing the stays. Begin with the forward lower stays and work aft and upward.

The mainstay is double and goes on each side of the foremast, through the holes in the anchor deck, and seizes to the bullseyes in the bow planksheer. Those who read the caution and didn't install all the anchor deck planking will have no problem with this step. Others will find it more difficult.

The mizzen and forestay are set up by a lanyard at the head.

Most forestays go through the bowsprit and jibboom, down to the dolphin striker, and back to the hull. These runs are shown in the sketch along with other bowsprit rigging. Rigging the bowsprit is probably easier prior to completing the forestays.

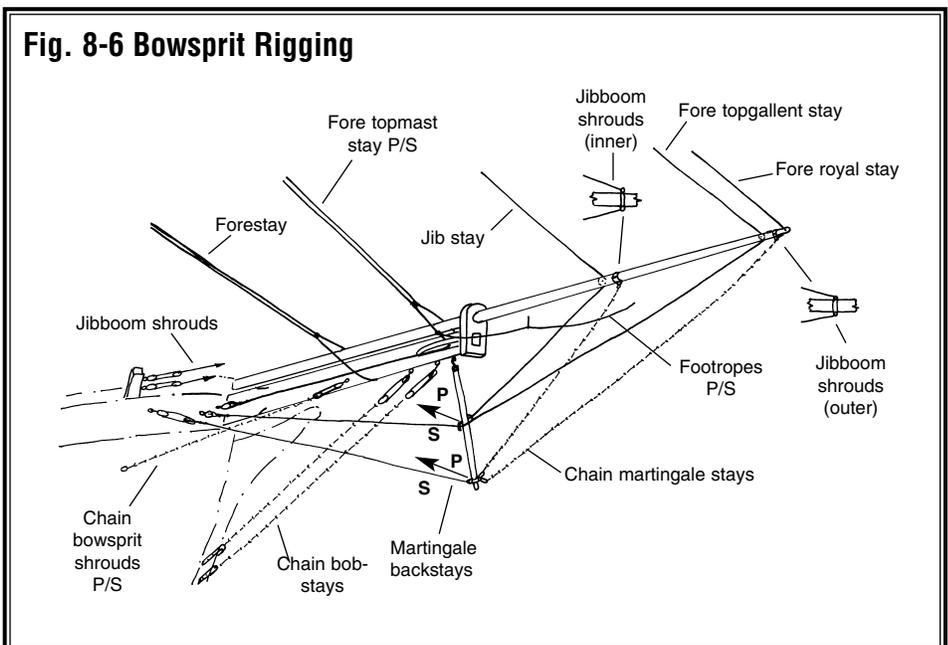
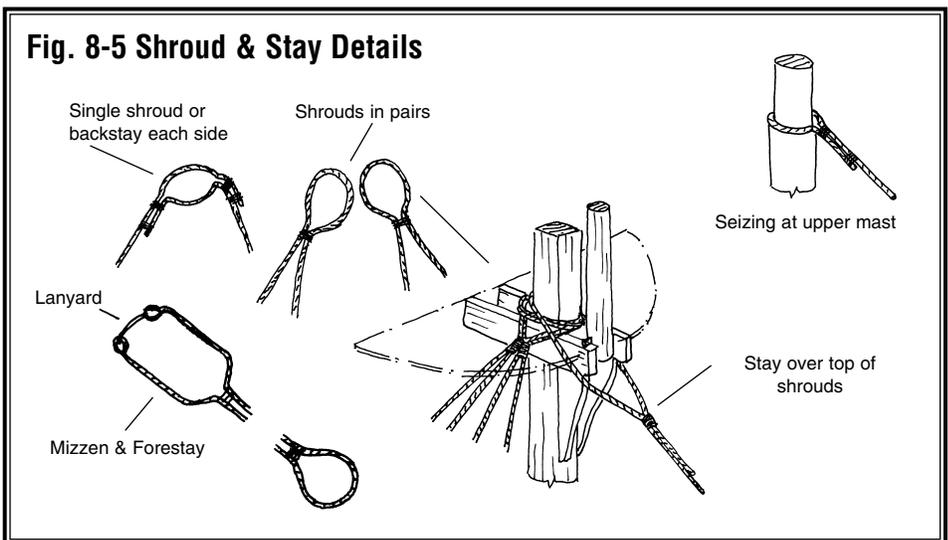
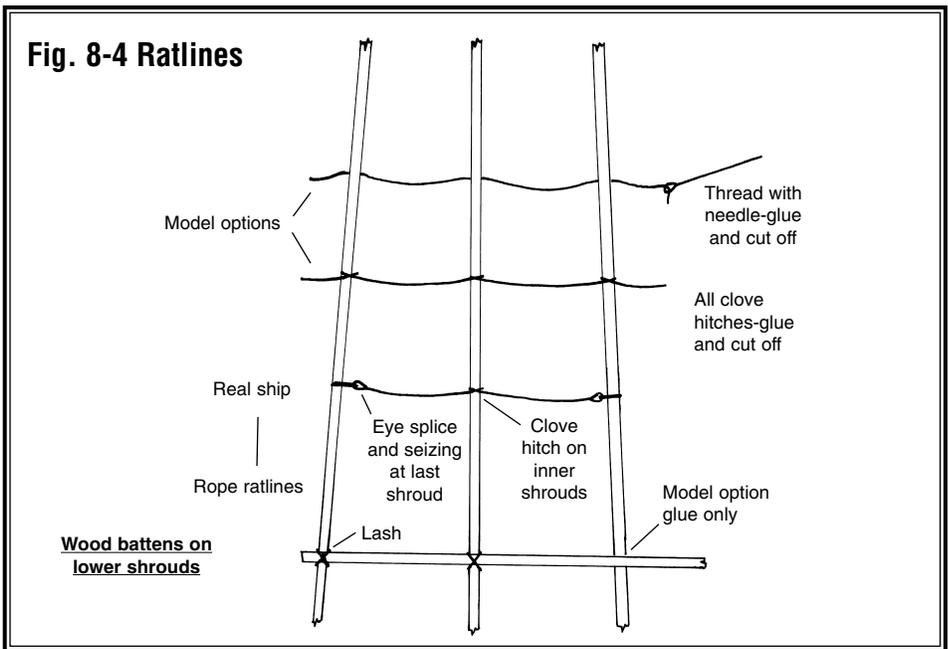
4. Bowsprit Rigging

Figure 8-6 shows the standing rigging at the bowsprit. When rigging, keep the dolphin striker in position. Adjust the martingale stays and backstays to accomplish this.

The plans show 60-link-per-inch chain for the martingale stays. The smallest chain manufactured is 32 to 40 links per inch, and 40-link chain is becoming scarce. Simply use the smallest chain provided. While not to scale, it still looks satisfactory.

5. Spanker Gaff and Boom Topping Lifts

Although these lines are standing rigging, they are installed after mounting the gaff and boom and are discussed under running rigging. The gaff topping lift is like the martingale stays. Use the



smallest chain provided.

6. Footropes, Furling Stops and Fixed Lifts

As noted earlier footropes, and even the ends of fixed lifts, are easier to install with the spars in hand. Like the ratlines, footropes may require some work before they hang naturally.

Add the footropes on the jibboom. Furling stops (tan lines) should be added before seating the jibboom.

7. Manropes and Bow Netting

When the standing rigging is completed, add the netting over the bowsprit. The rigging plan shows the net. Use fine thread and tie knots, or just glue the threads to form a net. Or, look for netting in a craft or florist shop.

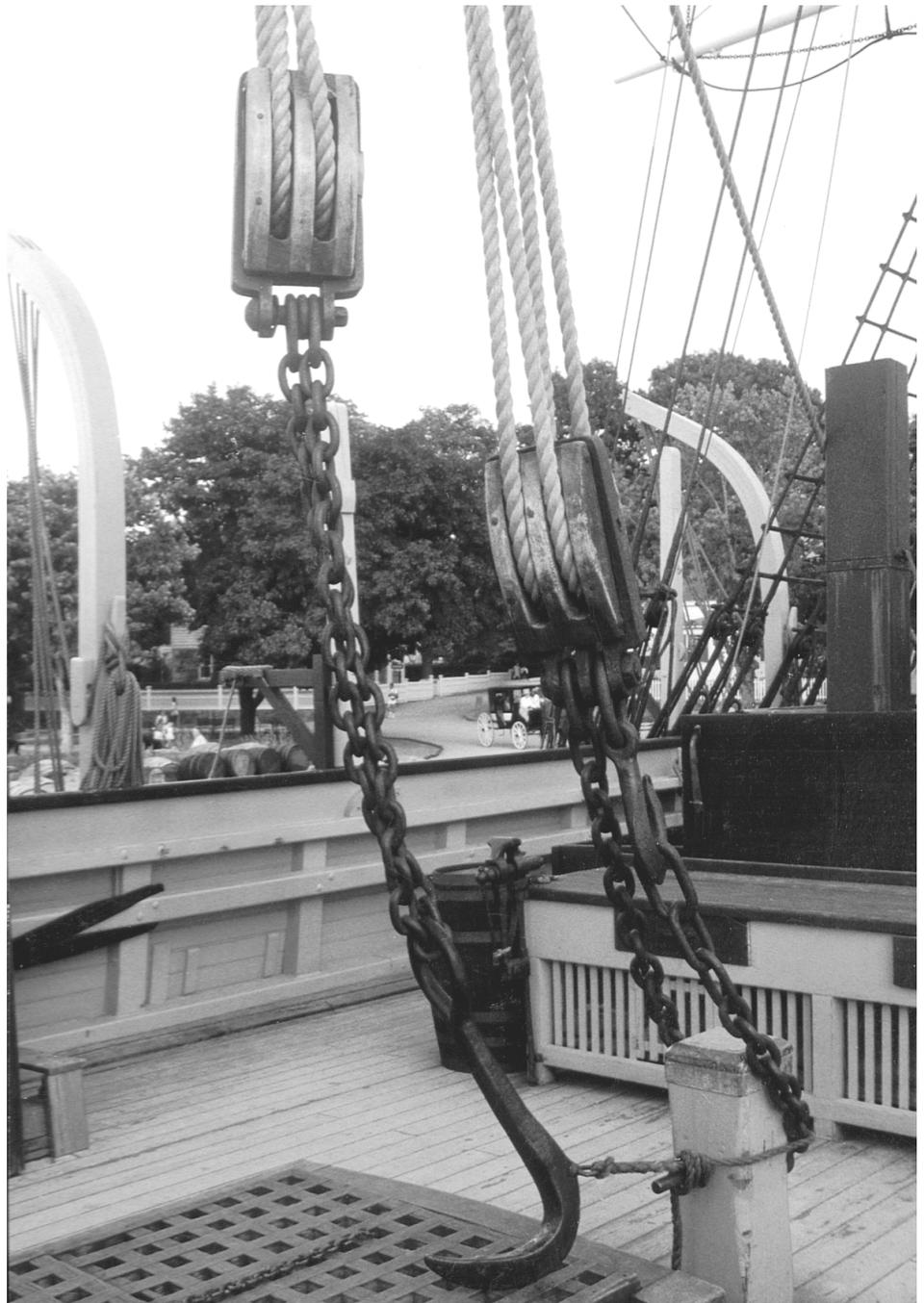
8. Running Lights

Add the Britannia running lights on the mizzen shrouds. Make the box from stripwood. File the casting flush on one side to fit against the box. This is actually a bow light and, consequently, not the correct shape.

Examine the model before moving to the next stage. Is a mast or the bowsprit and jibboom out of alignment? Now is the time to correct these mistakes.

Running Rigging

Decide whether or not to rig with sails. The following discusses both choices and how to rig them. Each sail, along with its spars, is presented separately so one group can be finished before moving to the next. Although the sequence isn't critical, we recommended starting at the bow with the fore-and-aft sails, then adding the square sails.



1. Head Sails

For simplicity, the forestay sail, fore topmast staysail, jib, and flying jib can be called head sails. Add the halliard, downhauls, and sheets to the sails before installing on the model. Leave enough extra line for belaying after reeving through the various blocks.

Morgan has metal hanks for bending the head sails to the stays. A detail is on the plans. For the model, use a simple brass ring.

If sails are not installed, attach the halliard to the downhaul and run it to the end of the bowsprit (Figure 9-1).

STAGE 9

Halliard runs are identical to a ship with sails, except for the head block's location. Sheets are removed with the sails.

2. Staysails

Staysails between the fore and mainmasts and main and mizzenmasts are treated like head sails. If rigging with sails, notice on the plans that the mizzen topmast staysail sheets pass through a fairlead block, or thimble, on their way down to the deck. Lower staysail sheets go directly to their

belaying points.

Note: Some belaying points for the lower staysail sheets were not identified on Mystic's drawings. Consequently, Model Shipways' plans reflect an educated guess.

3. Spanker and Gaff Topsail

Set up the gaff and boom topping lifts, then hook the gaff and boom to the mast eyebolts. Rig the spanker first. If a sail is installed, rig the brails. If no sails are used, knot the brails at their blocks on the mizzenmast, or omit them.

If showing a furled spanker, furl it against the mast and partway on the gaff with brails pulled tight.

Boom sheets will pull everything tight. If they pull the boom too low, adjust the length of the gaff topping lift chain or boom topping lift.

The gaff topsail is furled against the mast doublings almost in a bundle. Use a small piece of cloth for the furled sail. On a real ship, the bundled sail is not that bulky. With no sail, the mast hoops simply stack on the mast. Figure 9-2 illustrates some rigging possibilities with sails removed.

4. Fore and Main Yards

Secure the yard truss and add the chain sling. Add the yard lifts next. The plans illustrate the lower yards with a course in place. If no sails are used, here are some options. Knot leechlines and buntlines at the thimble fairleads, or omitted. With the sheet, pull the clew garnet block at the tack up to the block on the mast, then remove the tack. Or, hook the sheet and tack to the clew garnet, then hoist the yard (Figure 9-3). In this case, sheet and tack drape along the hull over the shrouds.

Although the braces can be added now, waiting until last is better, since they may get in the way when rigging other yards.

5. Mizzen Crossjack Yard

The mizzen crossjack yard has no sail. It simply provides a place for the main yard braces. Set the yard with its parrel, sling, and lift. The lift is a fixed one, secured at the masthead by a lanyard (Figure 9-4). Steady the yard by adding the port and starboard guys.

6. Fore and Main Upper and Lower Topsail Yards

Fig. 9-1 Jib Rigging Without Sail

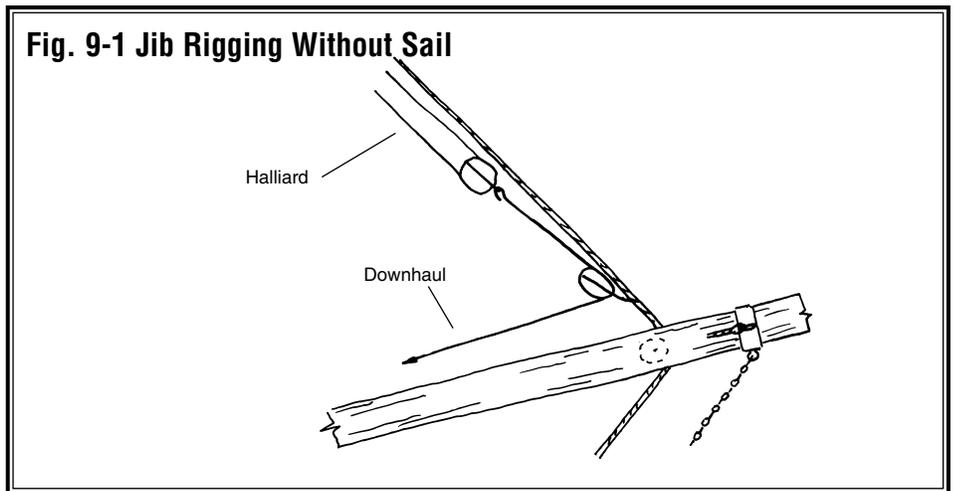
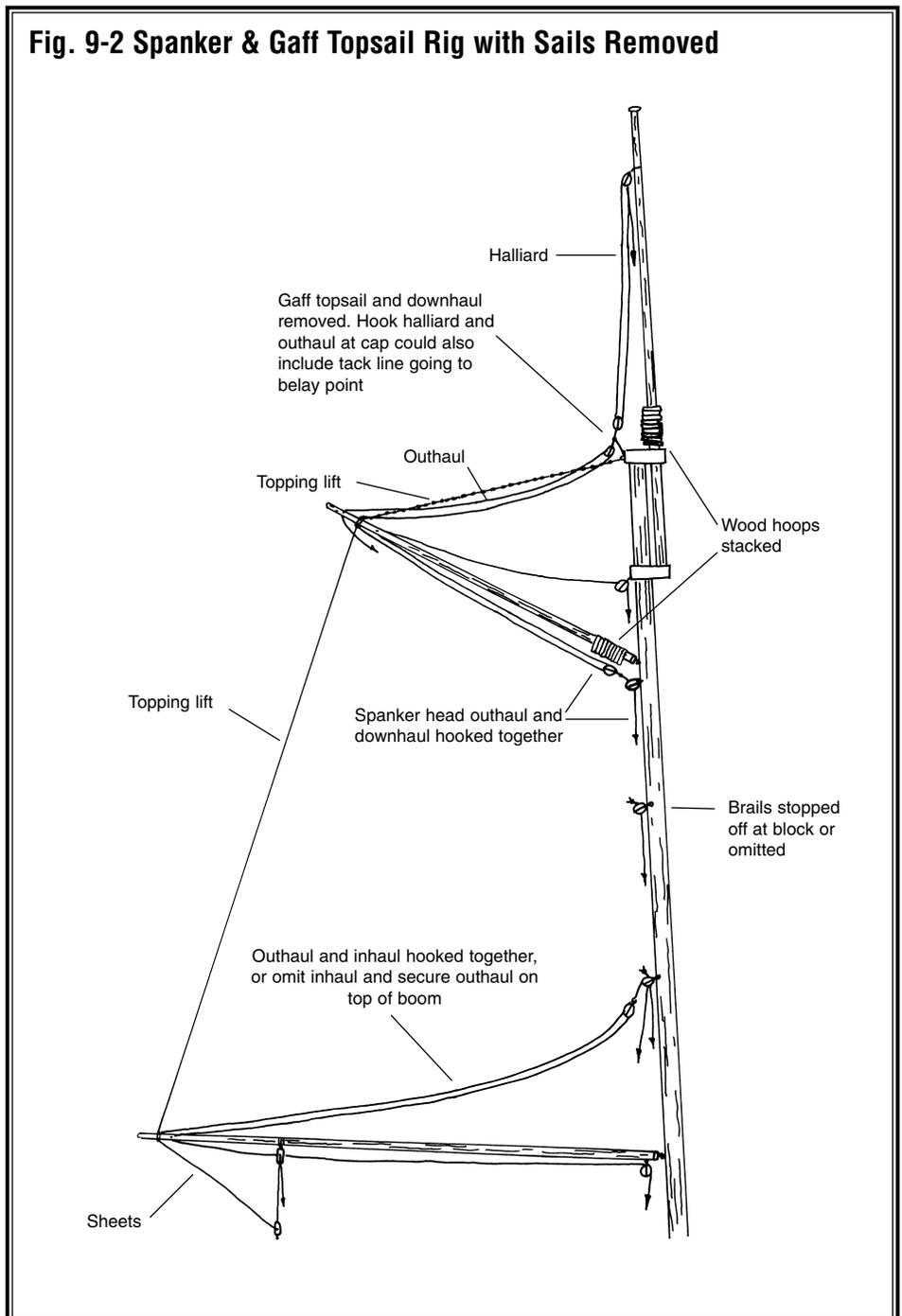


Fig. 9-2 Spanker & Gaff Topsail Rig with Sails Removed



The lower topsail yard is fixed. Secure it to the truss, then add the chain sling. Set the upper topsail to the tub parrel. The plans show these yards rigged with furled sails and with no sails.

The lower topsail yard does not have a lift. The upper topsail yard lift is fixed to eyebolts at the cap. Note: The upper topsail has no clewlines or buntlines, but does have a downhaul at the yardarms. Its sail is furled by lowering the yard.

The upper topsail sheets are an unusual rig (Sheet 6). Port and starboard sheets are interconnected, and only one line belays on deck (Figure 9-5).

The upper topsail yard has a tye and halliard. Rig the tye through the mast sheave, then add the remaining lines. The tye and halliard are mostly chain. Use the smallest chain provided, or obtain it from some other source.

7. Fore and Main Topgallant Yards

These yards are fitted with parrels and have fixed lifts, a buntline combined with a leechline. For model without sails, tie these at the fairlead thimbles on the yard, or omit. Hook sheets and clewlines together similar to the lower yards. The plans show the position of the yards when lowered for furling and without sails.

Halliard tackle blocks set up on the fore and main tops instead of at the deck. This helps keep the deck free of clutter.

8. Royal Yards

The fore and mainmasts have royal yards, but the fore royal yard is sent down while the ship is on the whaling grounds. This is how *Morgan* is displayed. The main royal yard is rigged similar to the topgallant. It has no bunt or leechlines, but it does have running lifts. Blocks are seized to the mast.

Like the topgallant, the royal halliards set topside. The royal tackle belays to an eyebolt in the topmast trestletrees.

9. Braces

Fig 9-3 Lower Course Rig Without Sail

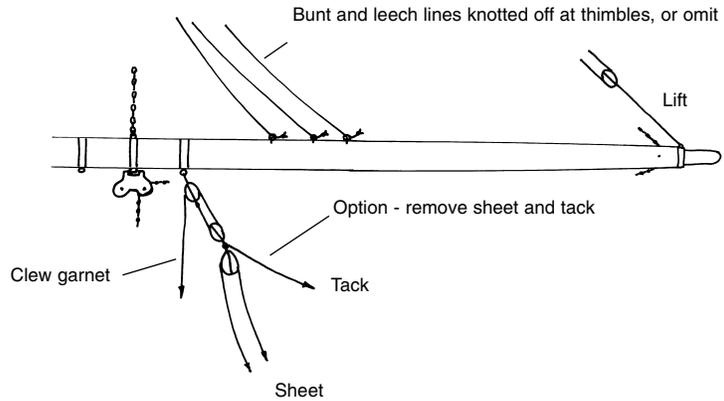


Fig 9-4 Mizzen Crossjack Yard Rig

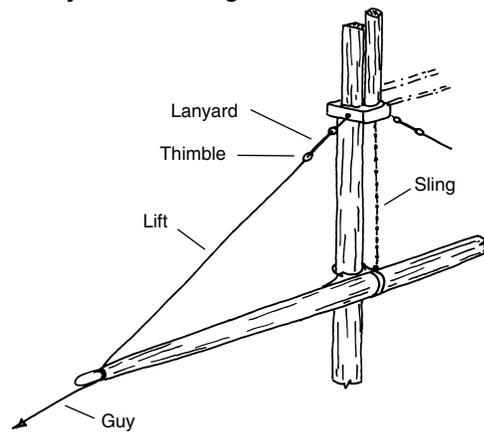
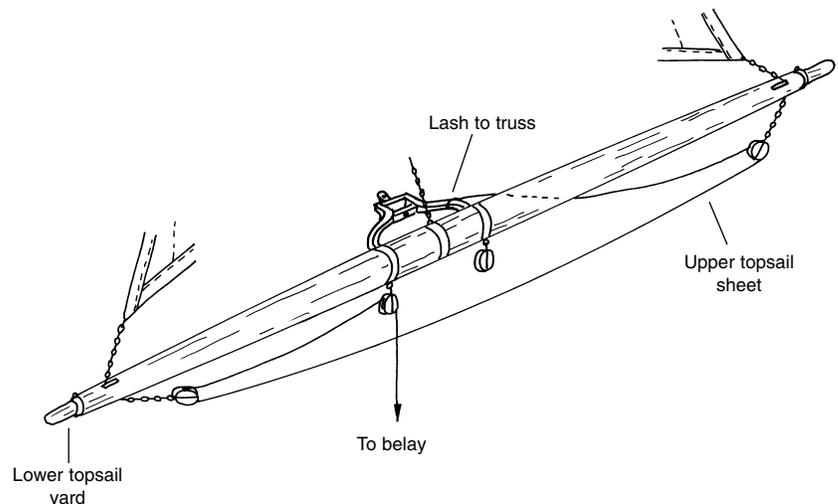


Fig 9-5 Upper Topsail Sheets



Braces can be installed taut, or allowed to droop a bit. If not taut, beeswax them thoroughly and shape with your fingers until they hang in a realistic curve. Some brace runs are shown in Figure 9-6.

10. Miscellaneous Rigging

Flags and Flag Halliards:

Flag halliards are located at the fore, main, and mizzenmasts, and at the end of the spanker gaff. Halliards are a single line reeved through a small block or thimble. An eyebolt will suffice for this model.

Fashion flags from lightweight cotton cloth and paint with acrylics. Acrylic paint is flexible. If flags are cut from paper, shape the paper before installing so the flags hang naturally.

Fish Tackle:

A fish tackle is used to hoist the anchor. For stowage, it hooks to the cathead pin. The hook at the end is britannia.

Cutting Tackle:

Whaleboats and cutting or cutting-in tackle give whalers their uniqueness. Drill sheave holes in the large, laser-cut blocks, and make brass strops for the lower blocks. Large and small blubber hooks are Britannia. Shape some large shackles for the chain at the top (Figure 9-7).

Whaleboat Rigging, Cutting-Stage Tackle, and Steering Gear Tackle:

Rigging for these items was discussed in Stage 5.

FINAL TOUCHES

When all the rigging is up, recheck every seizing. If necessary, add another touch of white glue. Check for shiny places on the rig. If necessary, touch up standing rigging with Floquil's Dark Stockholm Tar stain or black liquid shoe polish. For running rigging, use Floquil's Weathered Manila stain or brown liquid shoe polish. Check if any painted wooden parts have fouled during the rigging process and make repairs.

Congratulations

Fig 9-6 Brace Runs

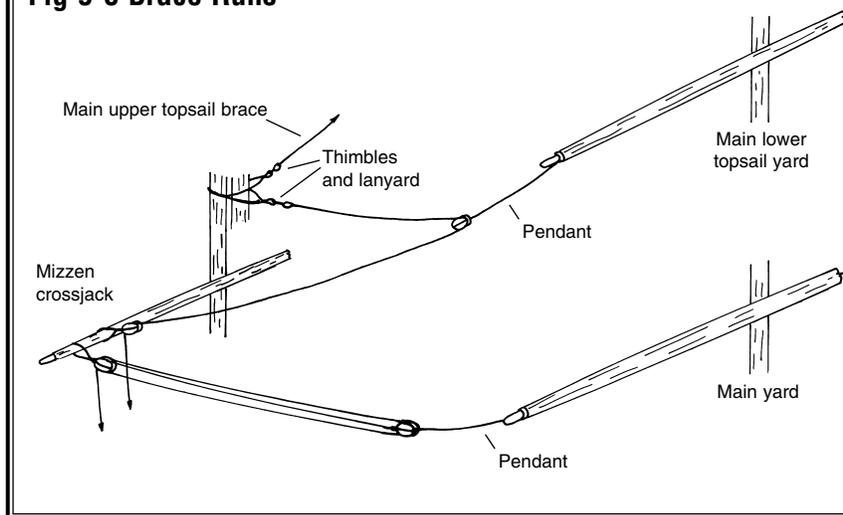
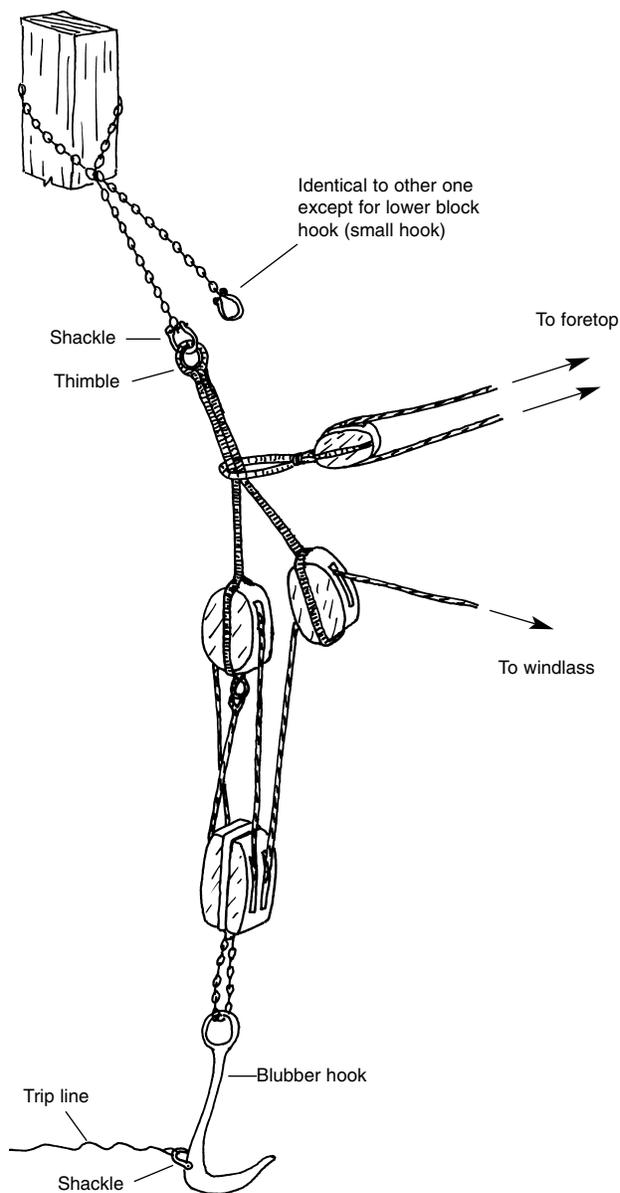


Fig 9-7 Cutting Tackle



Charles W. Morgan is finished! Take a moment to revel in your accomplishment. You have done what others only wish they could do. You've persevered when the going became rough and your effort has produced results. You've developed skills you never knew you had, increased your vocabulary, and become a time traveler. We hope you've enjoyed your voyage on this remarkable whaler and look forward to sailing with you on your next shipmodeling project.

ing from out-of-print source. Most of the data was taken from the *Charles W. Morgan*.

6. *The Story of Yankee Whaling, American Heritage*. 1959.

Good account and pictures of the whaling industry. Availability unknown.

7. *Sperm Whaling from New Bedford*, by Elton W. Hall. 1982, New Bedford Whaling Museum Publication

Superb photos, taken by Clifford W. Ashley, of the Bark Sunbeam in 1904. Great action photos.

8. *To Build a Whaleboat*, by Erik A.R. Ronnberg, Jr., Model Shipways

This is a Model Shipways publication which accompanies the Model Shipways whaleboat kit. Wonderful for a close-up view of the small whaleboats carried by the whalers.

9. *The Ashley Book of Knots*, by Clifford W. Ashley.

By far, the best book on knots ever written. This book is a modeler's dream because it details the rope work done on old sailing ships. Every type of knot, basic and fancy, is shown, along with hundreds of rigging procedures. An excellent drawing of a whale-ship cutting-in tackle is included.

10. *The Whaleboat; A Study of Design, Construction, and Use from 1850 to 1970*, by Willits D. Ansel, 1978, Mystic Seaport Publication.

Everything you ever wanted to know about a whaleboat.

Bibliography

1. *The Charles W. Morgan*, by John F. Leavitt. 1973, Mystic Seaport Publication.

A complete history on the *Morgan*. Every voyage is logged, and the crews identified.

2. *Whale Ships and Whaling - A Pictorial History*, by George Francis Dow. 1925 (Dover Reprint).

Very good account of whaling and whaleships. Many excellent photos of *Charles W. Morgan*.

3. *The Yankee Whaler*, by Clifford W. Ashley. 1926 (Dover Reprint)

History of whaling and many photos of Clifford W. Ashley's oil paintings, many of which are now in the New Bedford Whaling Museum.

4. *Whale Ships and Whaling*, by Albert Cook Church. 1938. (Reprinted)

Excellent photo record of all kinds of whaleships, *Morgan* included. Great for detail.

5. *Birth of a Whaleship*, by Reginald B. Hegarty. 1964 (Out-of-print)

This book describes the construction and rigging of a whaleship in detail by a man who was there. Wonderful text, worth find-

SCALE CONVERSION TABLE

R I G G I N G

Diameters for Lifesize Vessel	Diameters in Tenths of an Inch	Diameters Converted to 3/16" Scale
		Inches in 10ths ÷ 64=
5/16"	.3125"	.005" (.12mm)
3/8"	.375"	.006" (.15mm)
1/2"	.5"	.008" (.20mm)
5/8"	.625"	.009" (.25mm)
3/4"	.75"	.012" (.30mm)
7/8"	.875"	.014" (.35mm)
1"	1"	.016" (.40mm)
1-1/4"	1.25"	.020" (.50mm)

B L O C K S

Lengths for Lifesize Vessel	Lengths Converted to 3/16" Scale
	Inches in 10ths ÷ 64=
4"	.06" (1.52mm or 1/16")
5"	.08" (2.03mm or 5/64")
6"	.09" (2.28mm or 3/32")
7"	.10" (2.54mm or 7/64")
8"	.13" (3.18mm or 1/8")
10"	.16" (4.06mm or 5/32")
12"	.19" (4.83mm or 3/16")

