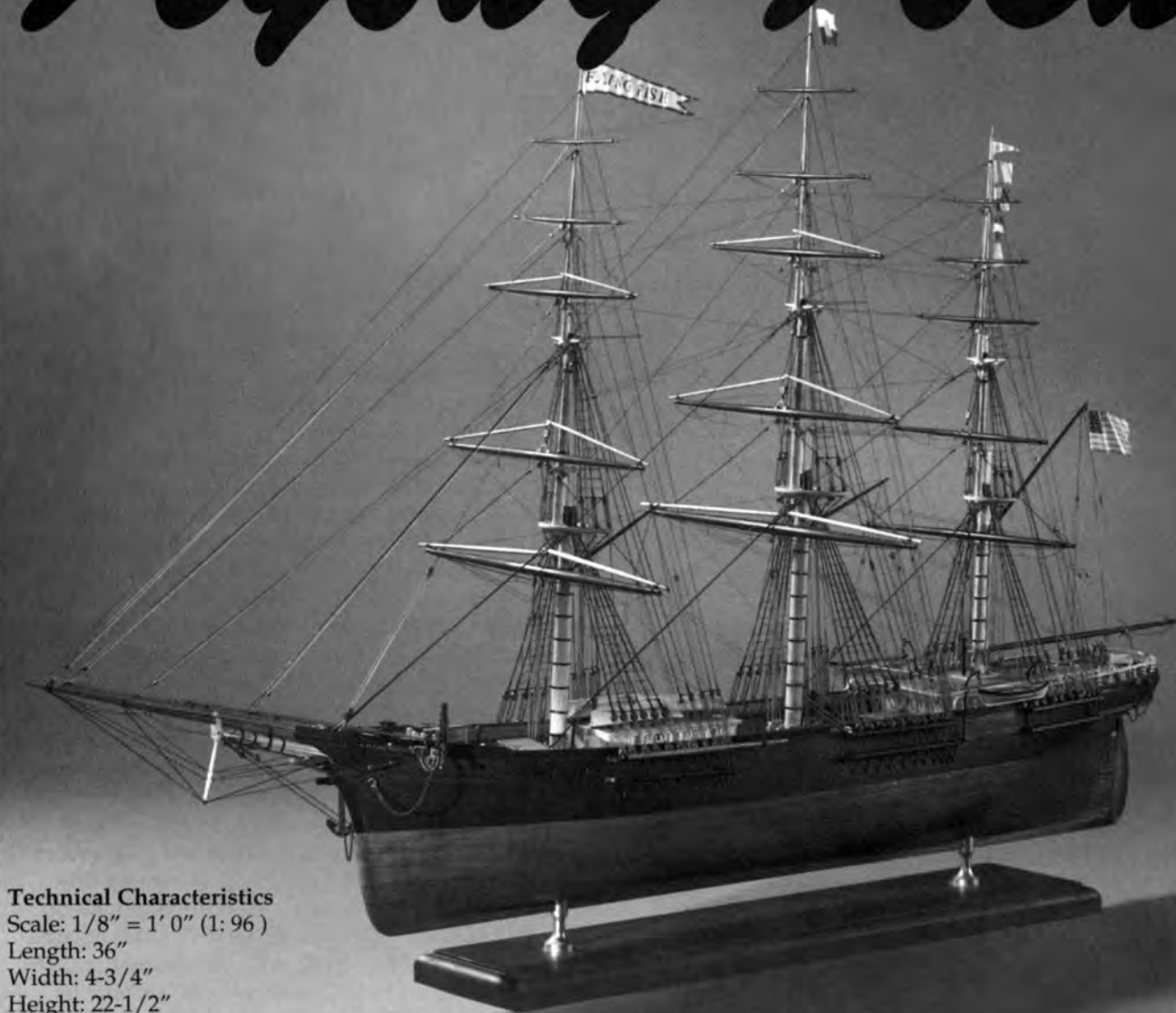


Flying Fish



Technical Characteristics

Scale: 1/8" = 1' 0" (1: 96)

Length: 36"

Width: 4-3/4"

Height: 22-1/2"

Manufactured by
Model Shipways

Kit No. 2018

The clipper ship era of the mid to late 19th Century is a most interesting phase in Sailing ship history. The craft that evolved were fast and sleek vessels with fine hull lines and massive sail areas. Perhaps because of an increasing interest in speed and beauty they became the most written-about and discussed ships of all time.

But let us digress for a moment to the years 1820 through 1845 and look at the clipper's predecessor, the packet. It was during this period that major changes in sailing ship design and construction methods were produced, and it was the packet's design that created a faster ship than previous merchant craft. Because it was reasonably fast, offering good average speed and maximum cargo capacity for delivering goods across

the oceans, the packet became important as a type. Rapid mail delivery and a reduction in time for stocking imported goods was becoming economically beneficial to merchants.

By the middle of the 19th Century, ship speed was becoming the all-important requirement. One of the contributing factors was the China tea trade which was becoming very profitable. Speed was also essential for passenger runs around the Horn to San Francisco and beyond, and fast passage was especially in demand in 1848 to 1849 during the California gold rush. In certain trades, a fast, early-arriving ship might earn most of its construction cost in a single voyage.

(Continued on pg. 5)

Instruction Manual

The American Clipper Ship

Flying Fish

1851

By Ben Lankford

Built-up Ship Model by William Hitchcock

The first set of Flying Fish plans suitable for building a model was developed in 1953 for Model Shipways Inc. by Mr. H.S. Scott. He was ably assisted by John Lyman, Thomas Hornsby, Michael Costagliola, John Flynn, Winthrop Pratt, Jr. and Richard McKay.

The Scott design plan for reconstruction of the ship was made possible by the earlier discovery of two major documents. First, a set of hull lines was found by John Lyman in Sjøfarts Museum in Bergen, Norway.

The plan is believed to have been taken to Norway in 1854 by Jens Gran, son of Herman Gran, a leading shipbuilder in Bergen. Jens Gran had been sent to America for training in Donald McKay's shipyard and probably worked on *Flying Fish*. Secondly, a comprehensive description of the ship written by Duncan McLean was found in an article printed in the Boston Atlas newspaper on November 4, 1851. For those interested, copies of the Boston Atlas may be found at the Library of Congress, or you may also find the entire McLean article published in the Nautical Research Journal. For additional reading, see the Bibliography at the back of this manual.

As with any research project of this nature there were differences of opinion as to what deck arrangements should be depicted. The information was limited at the time, but a reasonable model building plan evolved. There was a controversy over the length of the ship. The Boston Atlas article provided exact length dimensions and also the distance between masts. Together, these dimensions indicated a hull approximately twelve feet longer than the Bergen plan. The lines were therefore lengthened by adding twelve feet to the mid body and refaired accordingly. Discrepancies of this nature are a common occurrence with old ships and their plans. There may have been another set of lines developed which were never found, or more likely the length

was modified on the building ways. In any case, the lines in this kit probably represent a reasonably accurate representation of *Flying Fish*.

Since 1953, more historical information has been found on *Flying Fish*. Research of this most recent collection of photographs, drawings and other data have made a new reconstruction possible. As a result, a new plan was developed by the author in 1980, drawing on the important assistance provided by Erik Ronnberg, Jr. of Rockport, Massachusetts, whose work is greatly appreciated. In fact, Mr. Ronnberg's contribution can be considered key to the success of the project.

Mr. Ronnberg's considerable research on clippers turned up some excellent bits of information on *Flying Fish* which apparently were not available or discovered for the original Scott reconstruction. A description of the *Flying Fish* hull dimensions was found in Henry Hall's manuscript information which provides a more thorough description of the *Flying Fish* framing than described by the Boston Atlas. In addition, photos of two old paintings were used for their valuable details. One of the photos depicts an artwork which appears to have been painted by J. E. Buttersworth, the famous marine painter of clipper ships. The other is most likely Chinese. Both are probably based on first-hand knowledge of the *Flying Fish*, since it was determined that the two paintings show remarkably similar rigs, deck arrangements and figureheads.

In 1993, two new plans were added to the *Flying Fish* model kit. These plans convert the original model from a solid hull kit to a plank-on-bulkhead (also at times inappropriately referred to as plank-on-frame, which is entirely different) kit. The only historical change in this conversion is the addition of a stern knuckle below the planksheer. This will be discussed in detail later.

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(Continued from the cover)

The clipper era had begun to produce these ships for carrying passengers and relatively light cargoes.

Many of the clippers have been referred to as China clippers, or China tea clippers. The term, however, seems to have been used loosely. Some clippers were designed specifically for carrying tea from China. Others were designed for a varied cargo, as was the case for most American transatlantic passenger types which also could be used to load tea. The British-designed clippers built in the 1860's were possibly the only true tea clippers, after builders had time to settle on the best type for the trade. *Flying Fish* is not a true China tea clipper, although she was at times used as one for the same purpose.

The packet ship period produced many skilled ship designers and builders. One of the best was Isaac Webb who contributed most to the follow-up development of the clipper ship. His acclaim was not because of his own designs, as he died in 1840, but because of his ability to teach and pass on his knowledge to others. Three of his apprentices became well-known and highly skilled designers and builders: William H. Webb (his son); John W. Griffiths; and Donald McKay.

Donald McKay designed and built many fine clipper ships. One of them was *Flying Fish*, which was launched in September of 1851 at East Boston, Massachusetts. *Flying Fish* was registered at the Boston Custom House as a ship of 1,505 tons and measurements of 207' x 39' 6" x 22'. She was owned by the firm of George M. Sampson and Lewis W. Tappen, and commanded by Captain Edward C. Nickels. Sailing under the Sampson and Tappen house flag, *Flying Fish* achieved an outstanding record. Only 18 clippers sailed from Boston or New York to San Francisco in less than 100 days. *Flying Fish* accomplished the feat in 92 days, only three days short of the record voyage of *Flying Cloud* which achieved the voyage in 89 days.

Clipper ships were designed for fast passage to deliver passengers and cargo, and are best remembered for their famous races. On her maiden voyage, Donald McKay's *Flying Fish* was up against fellow apprentice William H. Webb's *Swordfish*. These races were a challenge for the master and an outlet for gamblers, but more importantly, a test of rivalry between the two famous designers, and the cities of Boston and New York which had become major shipbuilding and transportation centers. *Flying Fish* lost the first race, but won many others against the best clippers of the time.

Flying Fish sailed proudly for seven years between Boston, New York, San Francisco, Manila, Hong Kong and Foochow. In November of 1858, after loading tea at Foochow, she went aground at the mouth of the Min River and received considerable damage. Condemned and sold to a firm in Manila, she was rebuilt and renamed *El Bueno Sucesco*. She traded between Spain and the Philippines and eventually sank in the China Sea.



(Continued from the cover)

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BEFORE YOU BEGIN

In the interest of preserving history, the 1980 revised plans of *Flying Fish* were designed to illustrate the ship as it actually may have been. Consequently, no short-cut modeling methods were included on the plans. Simplification, if desired, was left to the individual modeler. But, throughout this 1993 revised manual, the addition of various methods and more details will simplify things for the beginner and provide greater scope for the more experienced modeler.

The *Flying Fish* kit is manufactured to a scale of $1/8" = 1' 0"$ and reflects the scale of the plans. Originally supplied with a solid wood hull, the kit has been converted to include a plank-on-bulkhead hull. As a result, two new plans have been introduced to incorporate the change and the solid hull has been replaced with several laser cut parts for constructing the hull.

Please note that while the kit plans are for *Flying Fish*, many of the clipper ship information details can be considered typically American, especially the rig. However, the arrangement of deckhouses varied considerably among the clippers, so caution must be exercised when utilizing these details for other ship reconstructions. The kit is also supplied with Britannia metal, brass, and wood fittings to eliminate problems in

making or machining such parts from scratch, which may be beyond the ability or resources of the average modeler. Many of these fittings, however, will require final finishing before they are suitable for installation on the model. This will be especially true for the Britannia items and will be discussed later.

This kit will provide less experienced modelers with the opportunity to acquire some scratch-building techniques. As an aid, various techniques will appear throughout the instructions. While the modeling progresses, you will see where you may want to substitute some of the kit fittings with your own creations. By all means try them, especially if you think you can improve the model. The worst that can happen is a little lost time. But, the experience gained will be most valuable for future projects. Full-scale ship practice followed by simplified modeling techniques also will be shown for the more experienced modeler interested in precise modeling. For further reading on modeling techniques refer to the Bibliography at the back of this manual.

Assuming a modeler works with reasonable skills about 15 hours per week as a hobby, the *Flying Fish* model should take about 10 months to complete (roughly 600 hours). The most time-consuming tasks will be planking the hull and com-

pleting the masts and rigging. Of course, the time will be extended if any scratch-built items are substituted. But, don't let time govern your progress. The best approach for the beginner, and experienced modeler alike, is to tackle the job as a series of small projects which are conveniently laid out for you in stages. So, don't look too far ahead, or you may become discouraged. Assume each small project is an end unto itself and work on it until it is correct. You will ultimately do a better job on that particular part, and the overall completed model will approach perfection.

Beginners, no doubt, will have some problems with this particular model. The important thing, however, is to learn from making mistakes. Seek help from more experienced modelers or the excellent reference material that is available to you. And regardless of how the model is turning out, finish it completely. Improvement takes experience; it cannot be gained with half-completed models. It would be advisable to follow the instructions in sequence until you gain the experience to work up your own procedures. Have fun with the project and think about how nice it will look on your mantel when it is completed. Good Luck!

HOW TO WORK WITH THE PLANS & PARTS

Before starting model construction, examine the kit and study the plans carefully. Familiarizing yourself with the kit will serve two purposes. First, it will let you determine that all parts have been supplied as listed on the List of Parts sheet included separately in the kit. And second, you'll be surprised at just how quickly handling the parts allows you to better understand the kit requirements. Try to visualize how every part will look on the completed model. Also, determine ahead of time what must be done first. The instructions will help you in this regard, but a thorough knowledge of the plans at the outset is essential.

It is also suggested that all small fittings and hardware be sorted into labeled boxes or compartments to avoid loss during the building process.

1. The Plans

The *Flying Fish* model kit contains the following 1980 plans:

- 1) Hull Details - Plan Sheet 1 of 4
- 2) Rigging Profile - Plan Sheet 2 of 4
- 3) Rigging Sections/Sails - Plan Sheet 3 of 4
- 4) Belaying/Spars/Misc. Details - Plan Sheet 4 of 4

... and the following 1993 plans:

- 5) Plank-on-Bulkhead Hull Construction - Sheet 1 of 2
- 6) Plank-on-Bulkhead Hull Construction - Sheet 2 of 2

In addition, a set of sketches appears throughout the instruction manual to further illustrate the various stages of construction.

The *Flying Fish* kit is manufactured to a scale of $1/8" = 1' 0"$. Each plan sheet is drawn to the exact scale that the model is to be built, except where some details have been enlarged for clarity. Therefore,

most dimensions can be lifted directly off the plans by using a set of draftsman dividers or by using a "tick" strip, which is simply a piece of paper used to "pick-up" the dimensions (a roll of calculator tape works very well). Lay your paper strip down on the plan and carefully mark each dimension to be transferred with a sharp pencil. Then "lift" these measurements by placing the strip down on the wood or item to be made to scale and transferring them. You should also obtain a 1/8 inch-to-the-foot architect's scale, since all dimensions on the plans are full ship sizes. Conversion tables are given on Hull Details sheet 1 of 4 for rigging sizes, blocks, etc., so the full scale can readily be converted to the 1/8-inch model scale. The 1/8-inch scale is very critical. As scales get smaller, the tendency is to build on the heavy side, possibly from concern about breaking small parts. Models look best, however, if built to exact scale and even to thinner-than-scale, which should be the case for a rigging line if the exact size is unavailable.

2. Making Allowances Along the Way

Try to be exact when following the plans, but use common sense along the way. You may need to make adjustments or allow for small differences in how your model is shaping up; perhaps your mast has too much rake (the angle at which it sits). When lines go to belaying points they should not drape over parts or conflict with other lines. If necessary, move a belaying point or a fairlead block. In other words, put yourself on the ship and use your judgment. That is how the old-time ship riggers worked!

3. Understanding the Hull Lines

Beginners may not be familiar with hull lines. They are shown on the Hull Details plan. The buttock lines (they are the vertical lines and shown as curved lines on the profile view) are simply vertical longitudinal sections taken through the hull. The waterlines or half-breadths are horizontal planes, and the section lines numbered 1 to 19 are vertical transverse sections. All of these lines define the hull shape and are used by the draftsman to fair (create regular even curves) the hull form. With the plank-on-bulkhead construction, the laser cut bulkheads define the hull form. These are based on the hull lines, but are made smaller to allow for the thickness created by adding the planks.

4. Cast-Metal Fittings

The *Flying Fish* kit is supplied with Britannia metal, brass, as well as wooden fittings to eliminate problems in making such parts from scratch. The Britannia metals are a great improvement over the white metal that was used in some older kits. Unlike pewter, Britannia does not contain lead, so there are no possible corrosion problems. Many of these fittings, however, will require final finishing before they are suitable for installing on the model.

5. Soldering & Working with Brass

Some fittings for the *Flying Fish* model, such as mast bands, must be made from brass. Hence, a certain amount of metal working and soldering will be required. Brass strips are included in the kit. The brass sheet can be cut with a small pair of tin snips or heavy scissors. Heavier brass will require the use of a jeweler's saw. After cutting, all edges should be smoothed with needle files and fine wet-or-dry sandpaper. When cutting slivers from the brass sheet, you may notice that shears tend to bend the sheet sideways, as well as curl the piece. To straighten the edges in both directions, grip with a pair of small pliers.

Drilling holes in brass can be accomplished using small drills and a pin vise, which is a slow process. A Dremel Moto-Tool mounted on a Dremel drill press is

ideal. This tool is worth the cost. Prior to drilling, use a small centerpunch to start; otherwise, these small drills tend to wander. Lubricate with a light oil and drill very slowly to avoid breakage. When using the Dremel, clamp the pieces in place or hold down with a stick of wood. The brass will be very hot, so keep your fingers off!

Soft Soldering: The key here is to keep all brass parts clean. Use a solvent, or lightly sand, or both. Keep your fingers off to avoid grease spots. Soldering is easy if care is taken to properly set up your work area first. Use jigs or other holding devices, so the parts do not move around. Soldering can be done with a small torch or pencil soldering iron. First, add flux to the joint, just enough to do the job. The solder will flow where the flux is applied. Next, heat the joint.

This sequence is important. The larger the parts, the longer it will take to heat the brass before the solder will flow. If you get too much solder on the joint, file it off with needle files. You'll want the joint to look like the real thing, not a big glob of fillets.

Today, most solders are lead-free, but melt at low temperatures and are easy to use.

Silver Solder: If extra strength is desired, and also to avoid the lead in softer solder, pure silver solder can be used. A propane torch is a must, as the melting point of silver solder is much higher.

Clean the metal and apply the flux (liquid silver solder flux is better than the borax type). Cut a very small piece of solder and lay it next to the joint. This is necessary because, unlike soft solder, silver solder will not break away from the

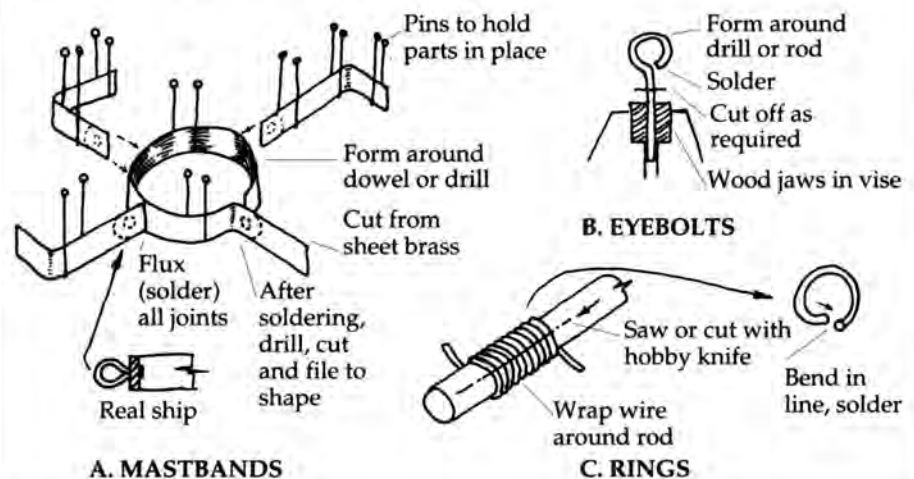
roll. It tends to ball up on the end. Next, heat the joint and solder it together. When the correct temperature is reached the solder will jump into the joint—job completed! Be careful to remove the heat as soon as possible, because the brass also will be near its melting point.

All in all, with lead-free soft solder, there is no real reason to use silver solder. The lead-free soft solders are strong enough.

Scratch-built Mast bands, Eyebolts & Rings: A suggestion for making mast bands, eyebolts and rings from scratch has been made (see figure 1). Rings can be soldered after they are used on the model or not soldered at all unless there is some strain on the ring from rigging.

To have some real fun (and frustration, but a great experience) ... try making the bilge pump from scratch. You will need to use brass tubing, rods and sheet brass—and you'll go nearly crazy trying to solder one area without loosening another! You will need to employ heat sinks, and really think about what kind of jig you'll need to hold all the parts.

FIG. 1 - Making Mastbands, Eyebolts & Rings



WHAT YOU'LL NEED TO START CONSTRUCTION

The following tools and supplies are recommended for the construction process. Modelers who have built before may have their own favorites.

A. Knives:

1. Hobby knife
2. No.11 blades

B. Files:

Set of Needle files

C. Sharpening Stone:

Necessary to keep the tools razor sharp

D. Clamps:

1. A few small C-clamps
2. Several wooden clothespins
3. Rubber bands

E. Wire Cutters & Tin Snips:

For cutting fine wire & chain; for cutting brass sheet

F. Boring Tools:

1. Set of miniature drills: #60 to #80
2. A pin vise
3. Larger bits: 1/16", 3/32", and 1/8"

G. Miscellaneous:

1. Tack hammer
2. Tweezers (a few)
3. Small fine scissors
4. Miniature pliers
 - a. small round for forming rings and eyes
 - b. flat nose
5. Bench vise (small) with own base for mobility
6. Soldering iron with 1/8" diameter tip and/or propane torch
 - a. solder
 - b. flux
7. Sewing thread (for seizings & lanyards; other rigging in kit)
 - a. Black
 - b. Beige
8. Beeswax (for treating rigging lines)
9. 1/2" or 3/4" masking tape

H. Sandpaper

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

I. Finishing:

- Paint brushes
1. fine point for details
 2. 1/4 to 1/2" flat square for hull

J. Supplies: (Covered in detail in the Painting & Staining section and throughout instructions.)

1. Paints
2. Primer
3. Brightwork
4. Stain or Minwax
5. White or Carpenter's (yellow) wood glue
6. Five-minute epoxy

7. Contact or model airplane acetate
8. Super glue

K. Cotton or Linen Cloth:

(fine weave) for sails if added

L. Plastic:

Plastic sheet or glass for windows, skylights

Note about Glues: White or Carpenter's yellow wood glue will suffice for most of the model. Five-minute epoxy provides extra strength for gluing fittings. Cyanoacrylate (Super) glue such as Jet, can be used for quick adhesion and is ideal for dabbing onto a rigging seizing to hold it in place. The best cyanoacrylate glue for most applications is a medium viscosity gap-filling type. The watery-thin type is recommended to fill a narrow crack by capillary action, and for quick setting of hull planking.

PAINTING & STAINING

It may seem strange to begin an instruction manual with directions on applying the finishes to the model. Not so! Much time and effort can be saved, and a more professional result can be obtained, if the finishing process is carried out during construction. Painting of various small parts, masts and spars should be accomplished before they are installed on the model. Painting sequence must be a well thought out procedure, otherwise you may have difficulty as you proceed with assembly. For example, it is easier to paint a deckhouse or hatch coaming before it is glued to the deck. Put the parts aside until they are ready to be installed. Proper timing in application of finishes and the use of masking tape to define painted edges should eliminate unsightly glue marks and splotchy stained surfaces. In the end, following these general suggestions will be to your advantage.

Paint colors

A suggested color scheme for *Flying Fish* is given on 1980 Plan Sheet No. 4 of 4. Many of the colors for *Flying Fish* were identified in the Boston Atlas article and are specified as follows:

Hull Bottom: copper plates (if model is not sheathed, it is suggested that you use Venus brand bronzing powder mixed with low sheen varnish). Select a color to simulate copper plates; sort of a medium copper-bronze or brassy look. Actually, *Flying Fish* was sheathed with "yellow" metal, more brass than copper.

Hull Sides: black.

Inside of Bulwarks: pearl (this could be grey). You should include the

planksheer, but exclude the main and topgallant rails, which could be bright (natural, varnish finish).

Waterways: blue; most any shade of blue, but not too brilliant. Dull any blue by adding a little orange. This should apply to the waterway piece and the binding strake on the upper deck only.

Lower Masts: white (this should include everything below the lower mast caps. McKay often left masts bright as on *Flying Cloud*. White could have been removed later, so it's your choice). It was also a practice to leave masts bright, but paint the V-shaped indentations (fore and main fished masts) white.

Mast Heads: gilded balls and spires (use gold paint or gold bronzing powder).

Yards: black.

Booms: bright.

Figurehead: gold and green (no description on exactly how the colors were applied).

Ship Names & Cathead Ornament: gilded (use gold paint or bronzing powders. No description of the cathead ornament. It could have been an oak leaf or star; it's your choice).

Capstans: mahogany with brass base plate (use a mahogany colored paint if not made of wood). The items below were not described in the Boston Atlas article. Typical colors are given.

Ladders: white or bright.

Fife Rails, Hatch Coamings, Cabin & Companionway sides, Taffrail Stanchions: white or off-white.

Trunk Cabin Roof: natural planking.

Midship Deck House: planking, but covered with canvas. Paint light blue, grey or buff (light tan).

Other Deckhouse Structure Tops: white, or a color like upper deck house. Companionway/W. C. forward has a canvas covered top.

Topgallant Rail, Pin Rail, Main Rail (Inboard), Taffrail, Bowsprit, Upper Masts, Spanker and Spencer Gaffs: bright (the top mast hounds and the bowsprit could have been painted white. Such trim would contrast nicely if white lower masts are used).

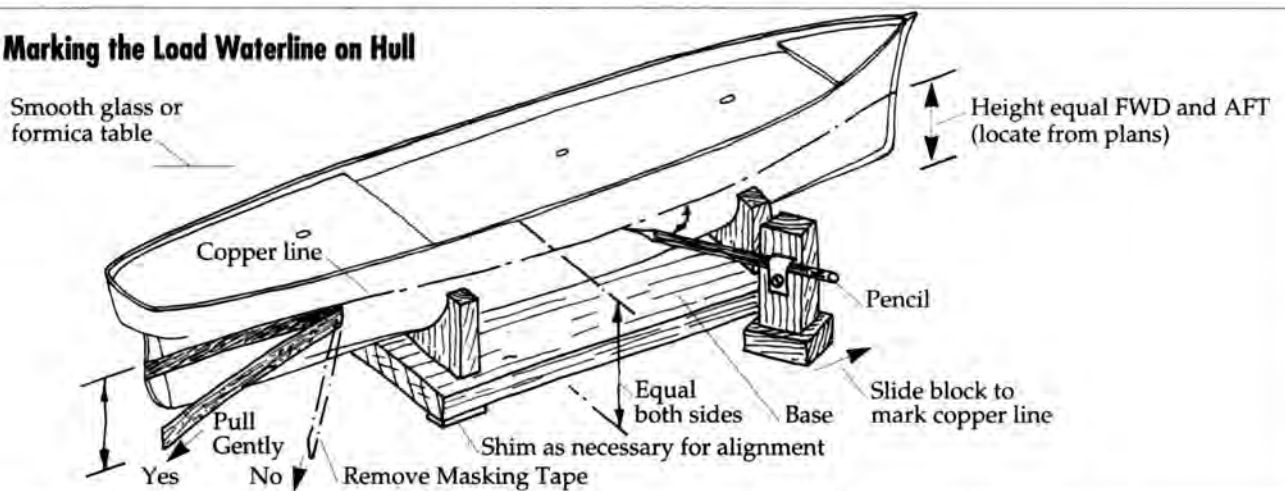
Ironwork, Deadeyes, Catheads: black.

Blocks: bright.

Boats: white hull with perhaps black or blue trim at the gunwale. Interior grey or buff.

Steering Wheel & Binnacle Box: bright (probably mahogany: use mahogany color paint or if wood, use mahogany stain).

FIG. 2 - Marking the Load Waterline on Hull



Paint

Use a flat-finish paint such as the model paints made by Floquil, Polly-S, Testors, Humbrol, and Model Masters. You could also use artist's paints by Jo Sonja (used by many bird carvers) or Holbein Acryla Gouache (the new boys on the block). These paints are a combination acrylic-gouache.

Floquil paint is a good choice because most of the correct colors for the *Flying Fish* are available. A ready-mix color saves the guesswork of mixing hard to obtain colors.

Are you ready for a real top quality paint job? Although slightly expensive, a Paasche, Badger, Bass or similar type airbrush paint sprayer is well worth the investment. These small sprayers are easy to use, work well with all the paints mentioned, and do an exceptional job. The air brush throws a pattern only about 1/2" wide, but obviously, you would still need a large work space such as a house workshop or isolated room.

Before Painting

Always make sure any work done on a part is complete before beginning the painting process, so as not to dirty or mess up the paint job. Fill any nicks, dents, or poor wood grain with spackle (author's favorite), or wood fillers such as Famowood, Duratite or any other suitable fine textured wood filler and sand it smooth. Next, apply a primer.

Primer

Use a grey primer. Floquil is excellent. The grey color will highlight sanding scratches and other defects better than white primer. Prime all woodwork to be painted, and prime all metal fittings. Lightly sand the primed items. Use a spackling compound such as Pic-n-Patch brand to fill any scratches and defects, then re-prime.

Stains & Finishes

For natural finished wood, use a protective coating after staining, such as a low-sheen polyurethane varnish. You can also use an oil-resin mix such as natural Minwax.

Brushes & Procedures

Use good quality soft sable or synthetic hair artist brushes. A small round pointed brush No. 0 to 1 is good for details. For the main hull areas, use a 1/2 to 3/4-inch flat brush.

Before painting, clean the model with a tack rag.

Apply your paint in smooth and even strokes, overlapping them as you go. Thin the paint enough to eliminate brush strokes, but not so thin that it may run. You will need four or five coats of the light colors to cover the grey primer, and maybe only two coats of the dark. Check your finish between coats and sand or add spackle as necessary to get rid of any blemishes.

Marking the Load-Waterline

If you intend to paint the bottom of the hull rather than copper it, you will need to mark the load-waterline (L.W.L.). First paint the bottom to a point above the water line. When dry, proceed to mark the waterline. (see figure 2).

Option: Instead of making the cradle shown in figure 2, you could replace the model onto the pedestals of the mounting board that you will be constructing in Stage C. Again, make sure that the water line is level before marking.

After the model is accurately aligned on its temporary or permanent base, set it on a piece of glass or formica so the marking block will easily slide along. Move the block so that the pencil is at about a 45-degree angle to the hull (going forward then aft) so the point will not dig in or jump about. When the line is marked, you may lay down the masking tape for maintain-

ing a sharp line as you apply the paint.

Note: At this line, and anywhere else two colors meet, use masking tape. Electrician's black plastic tape is ideal. It leaves a nice edge and is not overly sticky. Do not use drafting tape. The edge is wrinkled, and paint may seep under the tape.

In any case, burnish the tape's edge at the waterline with a burnishing tool or round metal object. This extra step will assure a clean line with no seepage. When the paint is dry, remove the tape immediately. To avoid pulling the paint off, pull the tape back against itself as shown in figure 2.

Copper Sheathing

While painting the hull bottom is perfectly satisfactory, a more realistic model will result if the bottom is sheathed with plates as was done on the full size ship. The task is tedious, but not difficult. *Flying Fish* was plated with "yellow" metal, which is more brass than copper. However, copper should suffice. Use the following procedures:

The Plates: The kit is supplied with self-adhesive copper sheathing strips to simplify the process, rather than working with small plates. Plates for the model can be cut to 3/16" x 1/2", allowing about a 1/16" lap. If you desire to use individual plates, cut them from the supplied self-adhesive strip, or from .001" or .002" thick copper sheet using a rigid straight edge and No. 11 hobby blade. Cut into strips equal to the width, then cut the lengths.

The Pattern: Copper plates on clippers were generally installed in a series of two "belts". At the waterline, a row of plates called the cap row could be installed, but it was often omitted. That portion of a belt which is overlapped by another is called the gore ends. The line in between is called the gore line, and is obvious by the appearance of sharp pointed ends where the lap occurs. Although exact arrangement is not known, a suggestion for the arrangement of belts, and the plates within

the belts, for *Flying Fish*, has been made (see figure 3). Please note that this arrangement is just one of several possibilities, but it is fairly typical for a clipper.

Notice how the plates appear at the bow and stern (see figures 4 and 5). The long dimension of the cap plates should run athwartship, and the rudder should be sheathed before adding the pintle straps (hinges). Also note the use of a lead cap at the stem.

Preparation: First, lay out the pattern of the body lines on the plans. Next, draw each belt line on the model, then fill in the plate lines. The gore line can be first marked on your body line templates used for shaping the hull and then transferred to the hull. The run of lines should appear fair along the hull length.

Applying the Plates: Upper plates should lap over lower plates and forward plates should lap over after plates. Hence, to apply you will need to start at the bottom aft and proceed upward and forward. Note how the plates look at the keel (see figure 6).

Work with one belt, or three or four rows at a time. Use the copper strips, or for individual plates coat the area on the hull and each individual plate with contact cement and allow it to dry thoroughly.

Apply the plates using the pencil lines to locate the upper edge. Apply a single row aft to forward, then add the next row. Stagger all butts between rows. As you complete the lower belt, allow the plates to go above the gore line. The plates can be left as is, but it is better if the plates are cut off just above the line so the ends will not be apparent under the next belt (see figure 7).

When completed, burnish the entire job with a small roller and clean with contact cement solvent and copper cleanser.

Finish: Copper plates on real ships were a copper-penny color when installed, shiny out at sea, and corrosive-green looking when out of the water. The choice for the look is yours. Leave them as is and they will eventually turn a dark copper-toned color. You can speed up the process by rubbing greasy fingers on the surface periodically. The spotty-green look can be obtained by applying thin paint or by chemically treating the plates with a chemical called Patina-It (available from Model Expo). Apply and watch closely, toning gradually. Administering the "green" treatment is difficult, so you should first experiment with plates off the model. A sponging with a weak vinegar mix will neutralize any corrosive residue. As for simulating sheathing nails; forget about it—the scale is too small.

FIG. 3 - Copper Sheathing the Hull Bottom

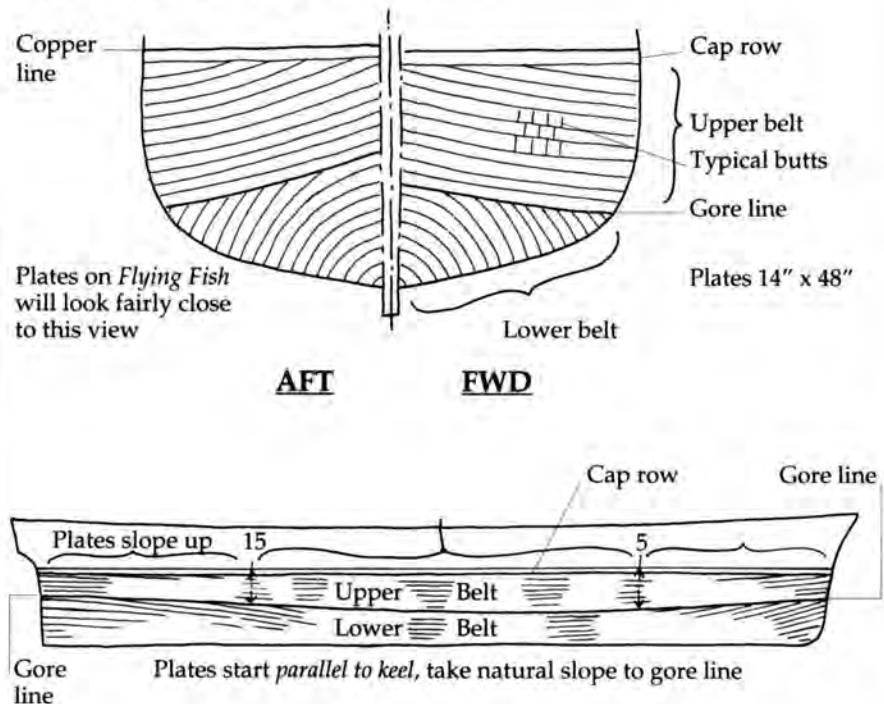


FIG. 4 - Copper Sheathing at Stern

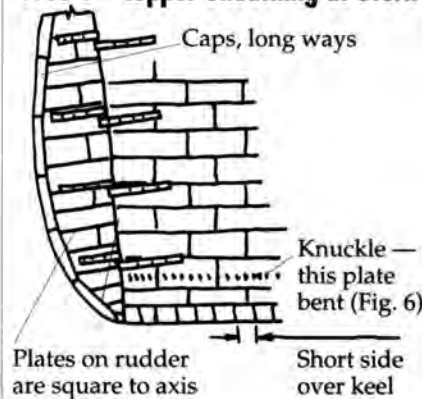


FIG. 5 - Copper Sheathing at Bow

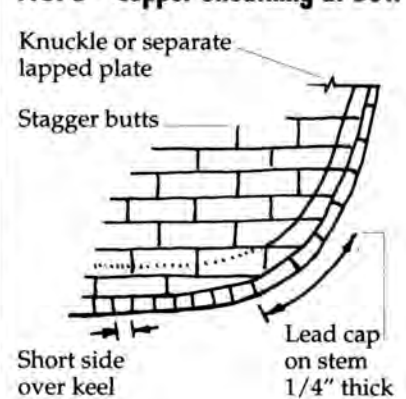


FIG. 6 - Applying Plates at the Keel

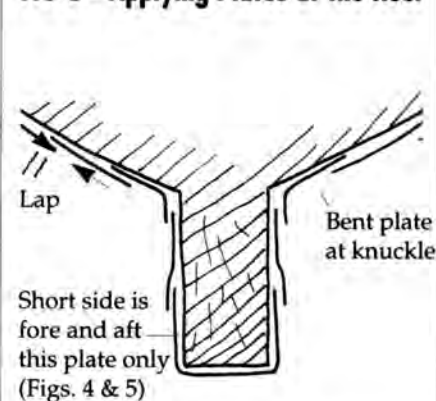
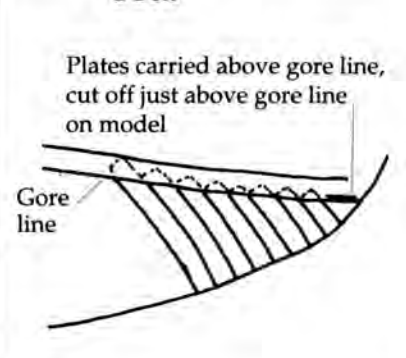


FIG. 7 - Applying Plates Within a Belt



STAGE A

FRAMING THE PLANK-ON-BULKHEAD HULL

1. Bending Wood

Building a P-O-B hull requires some wood bending and twisting of the wood parts which must remain in the desired position so as not to put too much stress on glue joints and fasteners. Following are three different methods of bending and shaping wood:

Steam Bending: This is done by holding the wood piece that you want to bend over a kettle of steaming water and then bending it. The wood must be held in the bent position until it cools. It should remain nearly in that position, but may spring back slightly.

Soaking: Another method is to soak the wood piece in warm water for several hours. Try adding a little household ammonia to the water. This speeds up the soaking process and makes the wood fibers slippery so the wood is easily bent. After soaking the wood, shape it to the desired position, using a form. Let it remain there until it has dried completely.

Hot Iron Bending: You may also bend wood quickly over a soldering iron, but don't let it get too hot. It is also possible to purchase model plank bending irons commercially.

2. Center Keel Assembly

The first step in constructing the hull is the assembly of the three center keel pieces. Place parts A, B, and C over a sheet of wax paper or plastic wrap, on a flat building board or table. Glue the joints with white or carpenter's glue. Use a steel or aluminum straight edge to align the bottom of the center keel pieces. Place a weight on each piece to hold it down while the glue dries. Let the glue dry at least overnight, preferably 24 hours (see figure 8).

After the center keel is assembled, use a sharp pencil to mark the bulkhead locations below the slots, the WL-2 (waterline) location, and the bearding line, on both sides of the center keel. Obtain the locations of these lines from the Plank-On-Bulkhead (P-O-B) plans by using a tick strip.

The next step is to cut the rabbet into each side of the center keel (see figure 9). Draw a line along the edge of the center keel $1/16''$ from the surface. This locates the depth of the rabbet. Cut the rabbet from Bulkhead 2 forward, and from Bulkhead 17 aft. Between bulkhead 2 and 17, the rabbet can be omitted as noted on the plans. The plank edge will be cut to fit. Start the rabbet cut at the bearding line and cut toward the rabbet. When the planking is installed, the planks will lie flush on the cut portion from bearding line to rabbet. This completes the center keel preparation.

FIG. 8 - Assembly of Center Keel Parts A, B, and C

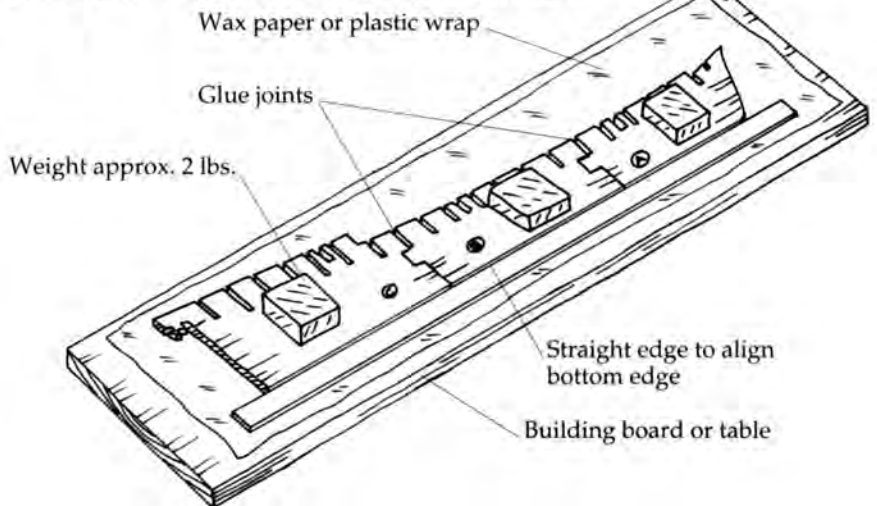


FIG. 9 - Cutting the Rabbet Into Each Side of the Center Keel

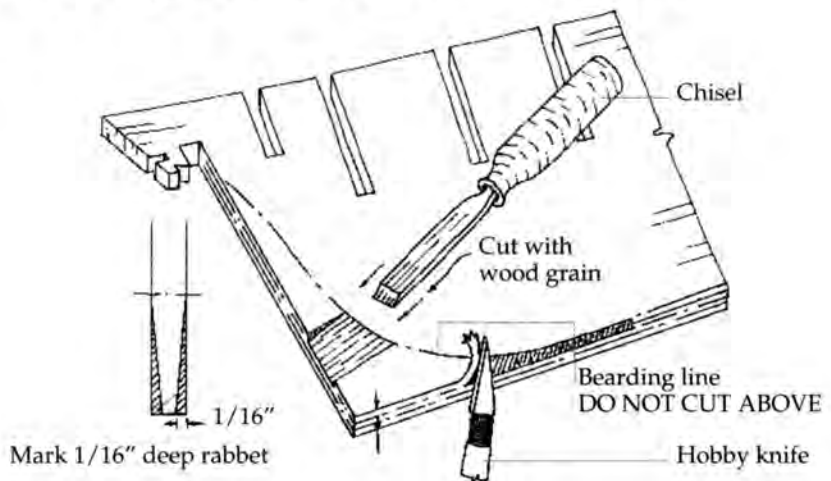
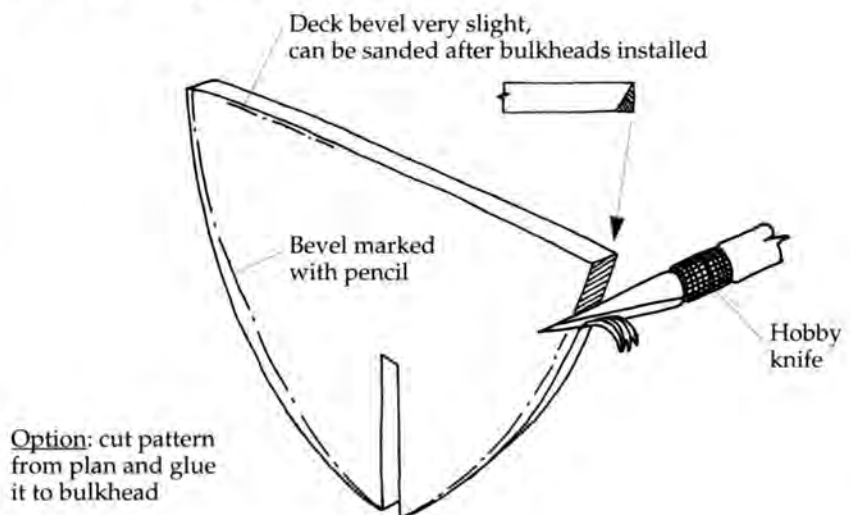


FIG. 10 - Beveling the Bulkheads



3. Bulkheads

Check each bulkhead to make sure it will slide into the center keel slots. Machine tolerances during the laser cutting process may have provided a too-tight fit. If necessary, sand the slots until the bulkheads slip on. The fit should be snug with just a little tolerance for glue.

On each bulkhead, mark the location of WL-2 in pencil. This mark should line up with the WL-2 mark on the center keel. This alignment will assure that the hull form is accurate and that each bulkhead is correctly related to the others.

Next, mark the bevels on the bulkheads. Use a tick strip to transfer the bevel line as shown on the plans, or cut the bulkhead patterns from the plan and glue them onto the bulkheads. You can also lay the pattern over the bulkhead and use a pin prick to locate the bevel. Cut the bevels with a #11 hobby knife (see figure 10). Notice on the plans that some of the bevels are very slight. You do not have to pre-cut them. They can be sanded after the bulkheads are installed.

The three forward bulkheads (B, 1, and 2) go up to the forecastle deck and form the timberheads and forecastle deck beams. Consequently, bevels must be cut on the inside of the timberheads as well as on the outside. The inside bevel is important if you plank the inside of the bulwark as shown on the plans.

Glue the bulkheads into place, making sure that the WL-2 marks on the bulkheads and the center keel line up. Use a square to make the bulkhead perpendicular to the center keel, then tack a temporary strip at the top to hold the bulkhead in place while the glue dries (see figure 11).

After all bulkheads are in place, tack a temporary batten on each side of the hull just below the main deck (see figure 12). This is a critical step. Measure the spacing between bulkheads and re-tack the battens until the hull is aligned. Even though the center keel was assembled flat, it could warp out of line. The result could be that you end up with a banana-shaped hull. Check the spacing between bulkheads, and port against starboard spacing. Check the straightness of the center keel with a straight edge. Look at the hull visually to see if it is properly aligned.

When you are satisfied that the hull is aligned, check to see that the bottom of each bulkhead feathers out and lies precisely on the bearding line. Trim as necessary to line them up. Also, check to see that the top of each bulkhead at the centerline is flush with the top of the center keel. Trim the center keel flush with the bulkheads. If the center keel is below the top of the bulkheads, leave as is. Since all alignment is based on the WL-2 marks, there could be some slight errors.

FIG. 11 - Gluing Bulkheads to the Center Keel

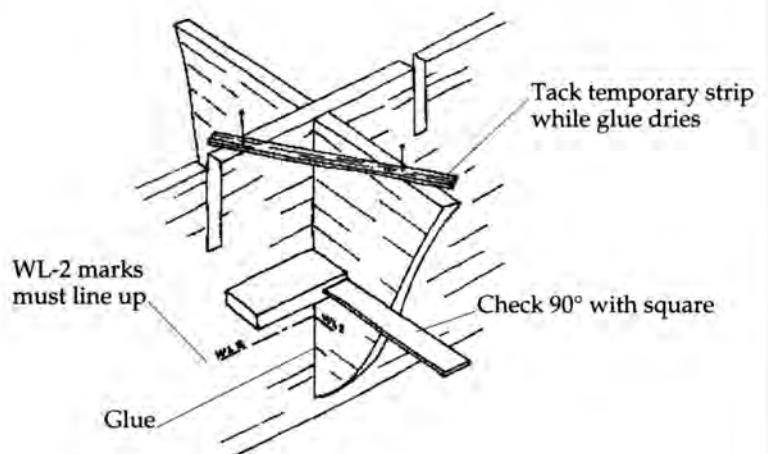


FIG. 12 - Temporary Battens For Hull Alignment

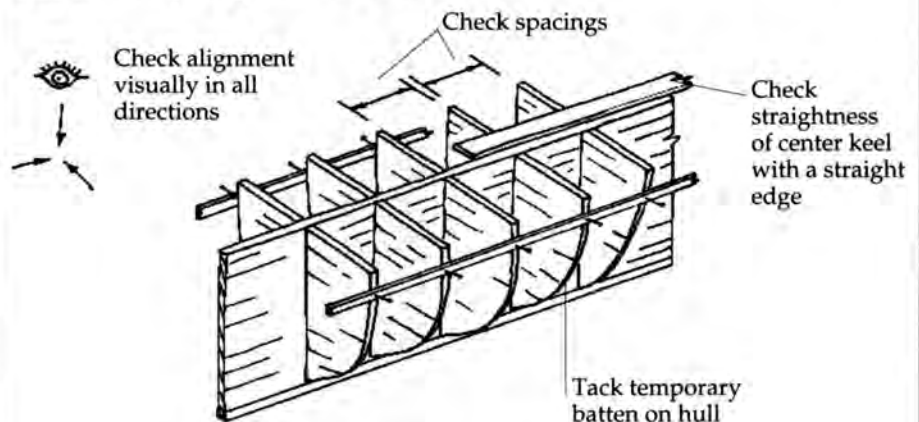
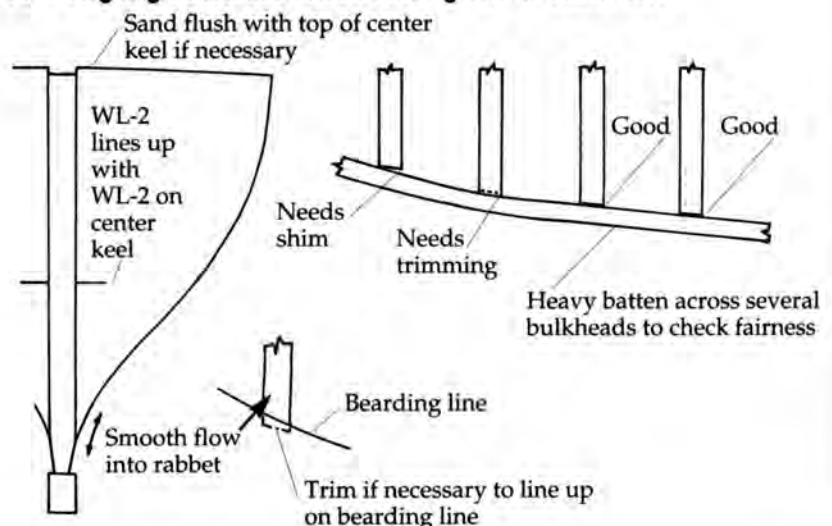


FIG. 13 - Aligning Bulkheads With Bearding Line & Center Keel



Next, check the fairness of the hull form and sand in the slight bevels that were not pre-cut. To do this, use a stiff basswood batten about 3/32" thick and lay it across the bulkhead edges and decks in various locations (see figure 13). If they are not fair, sand the bevels that stick out, or add shim material if there are dips. This is an important step. When you start planking, the planks should lie flat against the bulkheads without incurring any bumps and dips on the surface. A model like the *Flying Fish* has many bulkheads, so it is possible for manufacturing or assembly errors to creep in.

With the framework completed, you are ready to add the details. The work will progress smoothly if you used care while aligning the bulkheads and fairing the shape. Before you go on, take another look at what you have done so far.

4. Mast Slots

On both sides of the three mast slots in the center keel, add the scrap pieces shown on the plan. Glue them securely now, because you won't be able to get to them after the decking is installed.

5. Keel, Stem & Sternpost

The keel (two pieces), stem and sternpost can be added now. Taper the stem according to the plans before gluing it in place. A dowel can be used to help align and hold the pieces. Center the stem and sternpost so that the 1/16"- deep rabbet that was cut in the center keel appears on each side. Remove any glue squeeze-out from the rabbet before it sets.

6. Waterway & Planksheer

Before hull planking can begin, it is necessary to install the waterway and the planksheer. The waterway goes from Bulkhead 15 forward and is a carved piece. The thickness of the waterway is 3/16", but the width varies along the hull since it must fit the hull curvature on the outboard edge. The inboard side of the waterway is 3/16" in from the outer edge of the bulkheads, so mark a line on top of each bulkhead at this location. Cut the waterway to this shape and glue it into place. The outboard edge should protrude beyond the bulkheads. From Bulkhead 2 forward, the waterway must also be notched out for the timberheads on Bulkheads B, 1 and 2. After the waterway is in place, carve the outboard side to the curvature of the hull (see figure 14).

The planksheer is installed in four sections. From Bulkheads 2 through 15, use the lasercut planksheer. This is pre-notched for bulwark stanchions (timberheads). Glue a strip of 1/32" x 1/16" over the inboard edge of the laser cut planksheer.

FIG. 14 - Carving the Waterway

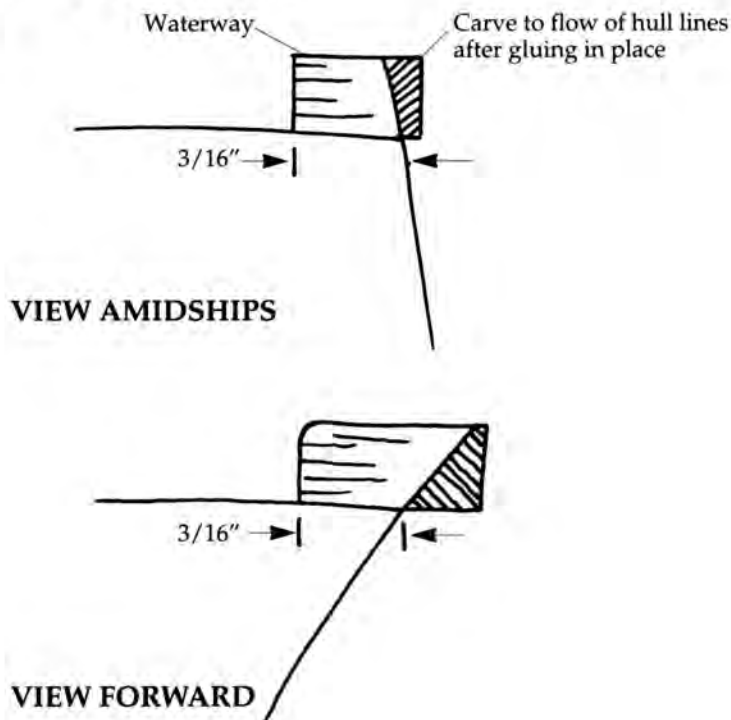
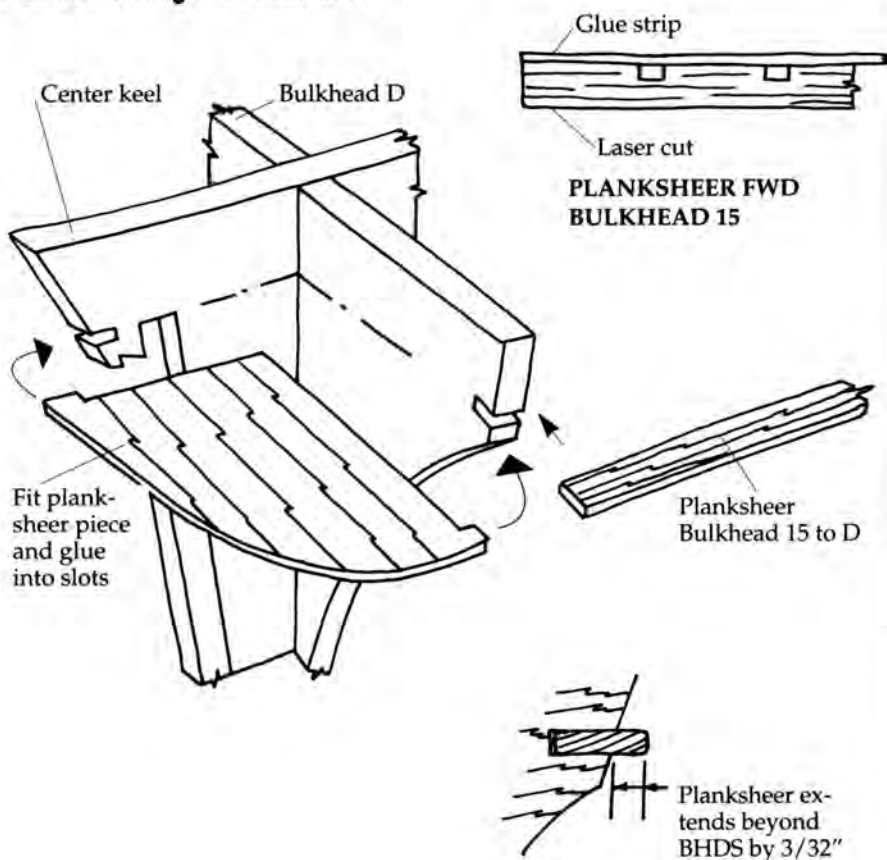


FIG. 15 - Fitting The Planksheer



Next, glue the planksheer on top of the waterway. The outboard edge of the planksheer must protrude beyond the waterway and hull edges by $3/32"$. This will cover the $1/16"$ hull plank and leave a little extension beyond the plank. From Bulkhead 2 forward, the planksheer should be custom fitted around the timberheads like the waterway. The planksheer should be a $3/16"$ wide strip which fits into the pre-cut bulkhead slots. This piece also should protrude outward by $3/32"$. The planksheer aft of Bulkhead D is from a $1/16"$ sheet, laser-cut piece. It fits into the slots in bulkhead D and the center keel (see figure 15).

7. Bow Framing

There is not much to do at the bow but add the two knightheads by gluing them into place. The plan shows the shape.

8. Stern Framing

During the development of the P-O-B hull for *Flying Fish*, a problem arose concerning the stern planking. The Bergen hull lines, shown on the Hull Detail Plan, indicate that the planking should come in flush with the bottom of the planksheer. If this is correct, a rabbet would be required in the planksheer itself to receive the planking. This did not seem logical, and certainly was not a typical McKay detail. The *Flying Cloud*, for instance, shows a knuckle below the planksheer where the rabbet could be. Erik Ronnberg again came to the rescue. He found another set of *Flying Fish* lines in the Peabody Museum in Salem. These lines, very old and drawn with ink on linen, were owned by L. F. Herreshoff. They have been reproduced in Herreshoff's "The Common Sense of Yacht Design." It is interesting to note that these lines differ from the Bergen lines and show a knuckle below the planksheer similar to *Flying Cloud*. Based on this information, the *Flying Fish* P-O-B construction includes this detail. As you can see, research on *Flying Fish* is on-going—and the findings are too!

To simulate the knuckle detail and rabbet, a laser-cut $1/8"$ -thick rabbet piece will be fitted below the planksheer piece. Cut the rabbet in the underside of the piece to receive planking. On the real ship, the outer edge of the rabbet piece was most likely the hull plank just below the planksheer that wrapped around the stern and formed the knuckle (see figure 16).

Next, add the filler block in position at the rudder post opening (see figure 17). This piece will provide a fastening piece for the hull planking at the opening. You could fill the entire cavity from Bulkhead D aft, carve to shape, then plank over the entire block. This is really not necessary, however, because below the filler piece is the sternpost rabbet which is sufficient for gluing and fasteners.

FIG. 16 - Fitting Rabbet Piece Below Planksheer at the Stern

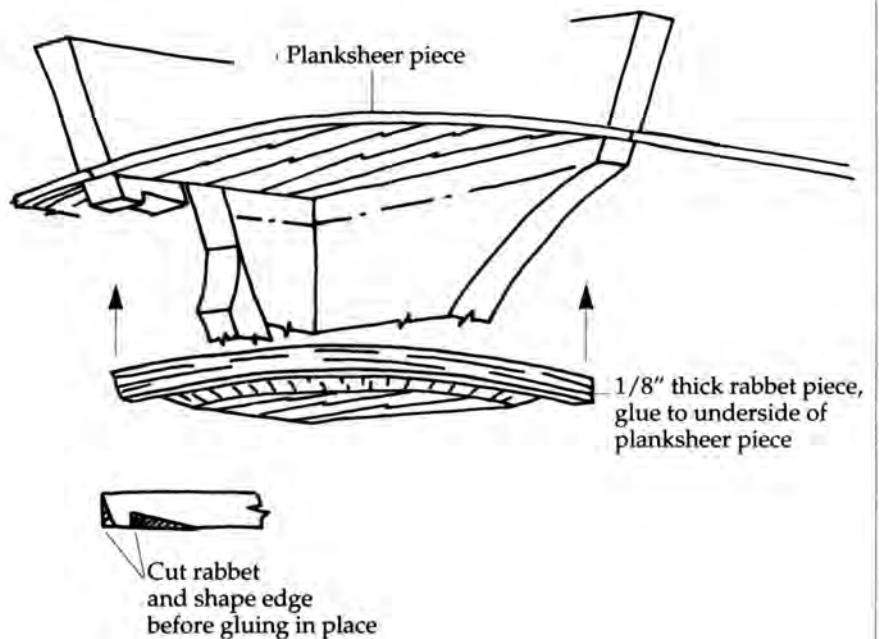
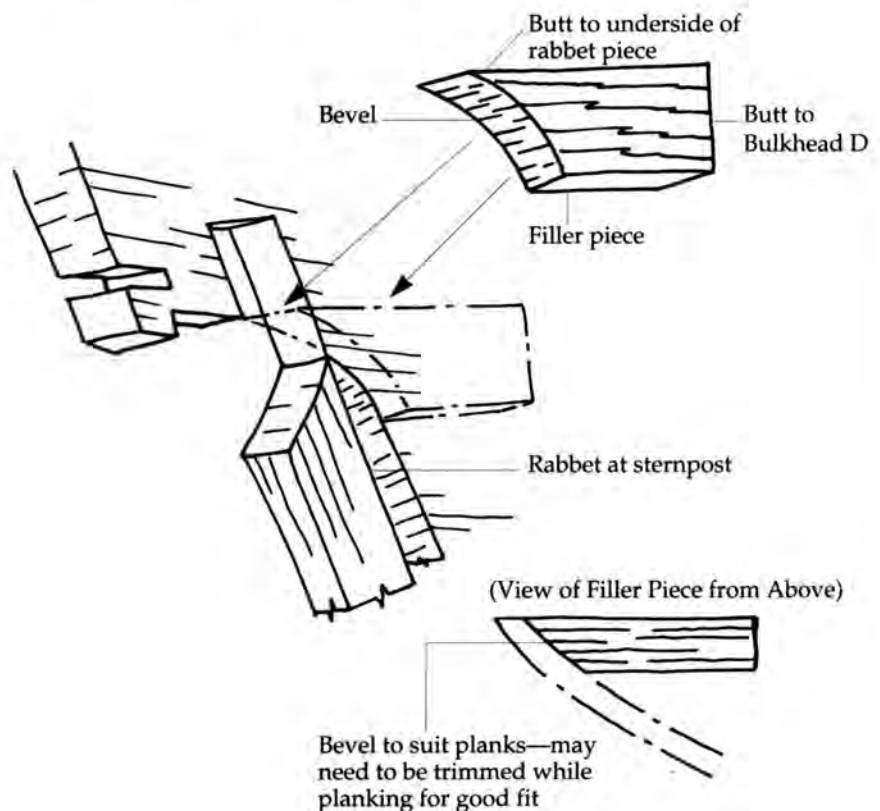


FIG. 17 - Adding Filler Blocks at the Rudder Post Opening



Above the planksheer piece aft of bulkhead D, add the solid block shown on the plans. This block simulates support for the planking provided by stern frames on the real ship.

At this point, you could plank the lower hull from the planksheer on down. It is your option. However, let's continue with the bulwark framing and do all the outer planking at once.

9. Bulwarks

The only section of bulwark which needs framing is the section between Bulkheads 2 and 15. In this area, you have already installed the planksheer with slots to receive the timberheads. Cut each timberhead to the flow of the hull lines. Use the Hull Plank Layout on Sheet 2 of the P-O-B Construction plan to obtain the shapes and lengths. Insert the timberheads into the slots, but do not glue them at this time. Run a batten, such as 1/16" x 1/8" basswood, along the top of the timberheads and clamp it to the timberheads. This is to fair the shape. Correct any timberheads that do not fair well with the batten. When the shape looks correct, glue all the timberheads into the slots. Cyanoacrylate (super) glue is good here. You can insert glue without removing the timberheads (see figure 18).

10. Main Rail

The main rail should be positioned atop the timberheads and forward along the forecastle deck. Aft of Bulkhead 15, the main rail continues but is called a covering board. The entire main rail must be cut to shape from a 1/16" basswood sheet. You should cut it out in short sections with scarf joints. Each section should follow along the grain of the wood (see figure 19).

Glue the main rail and covering board into place. Use some pins or dowels for alignment. The main rail should protrude from the hull about 1/16" to cover the 1/32"-thick bulwark plank, with just a little more lap extending beyond the plank.

The topgallant rails and other rails above the main rail will be added later. Now is a good time to commence the hull planking.

11. Bulwark Ceiling

From Bulkhead 2 forward, the inside of the bulwarks should have ceiling planks. Now is a good time to do this. Use 1/32"-thick basswood.

FIG. 18 - Using a Batten Before Gluing Timberheads to the Planksheer from Bulkheads 2 through 15

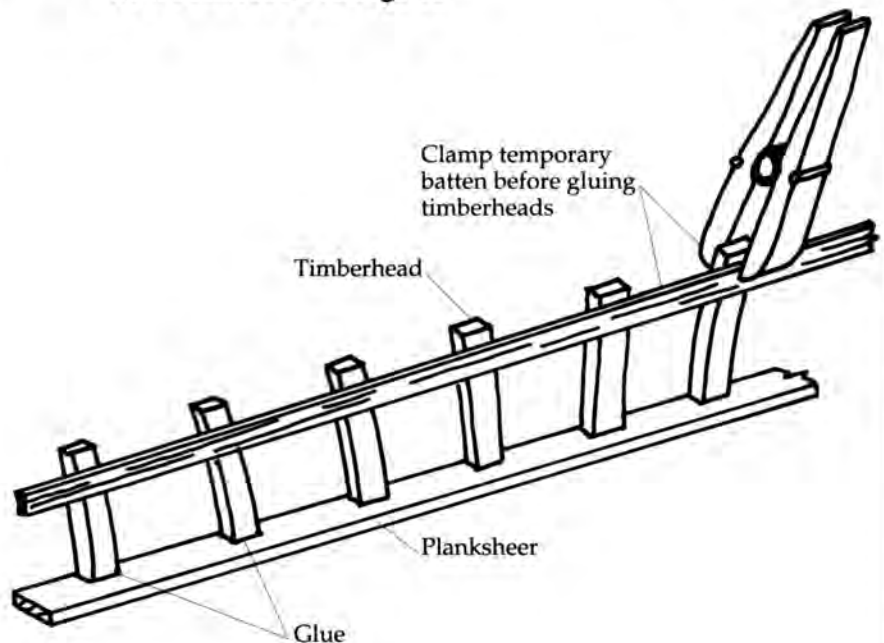
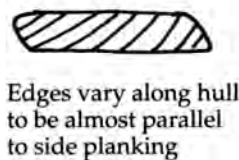
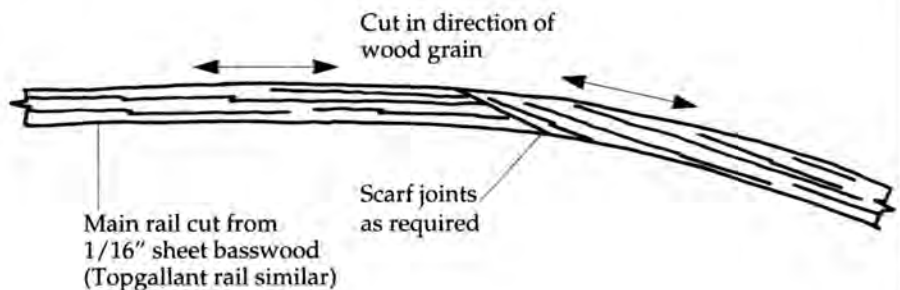
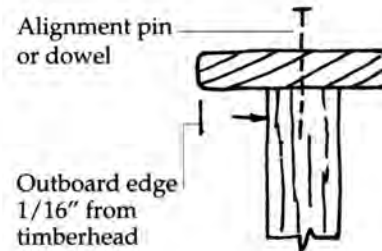


FIG. 19 - Cutting the Main Rail in Sections with Scarf Joints



(Cross-Section)



(Cross-Section)

STAGE B

PLANKING THE PLANK-ON-BULKHEAD HULL

1. Getting Started

Now the fun begins! The hull of the *Flying Fish* is relatively easy to plank. The girth of the midship section at Bulkhead 10 is greater than at the bow and stern. Consequently, the planks taper forward and aft and there are no stealers required. The planks should be narrow, and by using basswood, most all the planks can be edge bent in place. There is really no need to use the spiling process for shaping the planks. The spiling process will be discussed, however, should the occasion to use it arise.

The planking process can be tedious and you should plan on spending some time doing the job. Working about 15 hours per week, you could spend up to 3 months. Work on each plank as a project unto itself. Rushing will only result in frustration and a poor result.

2. Planking Battens & Belts

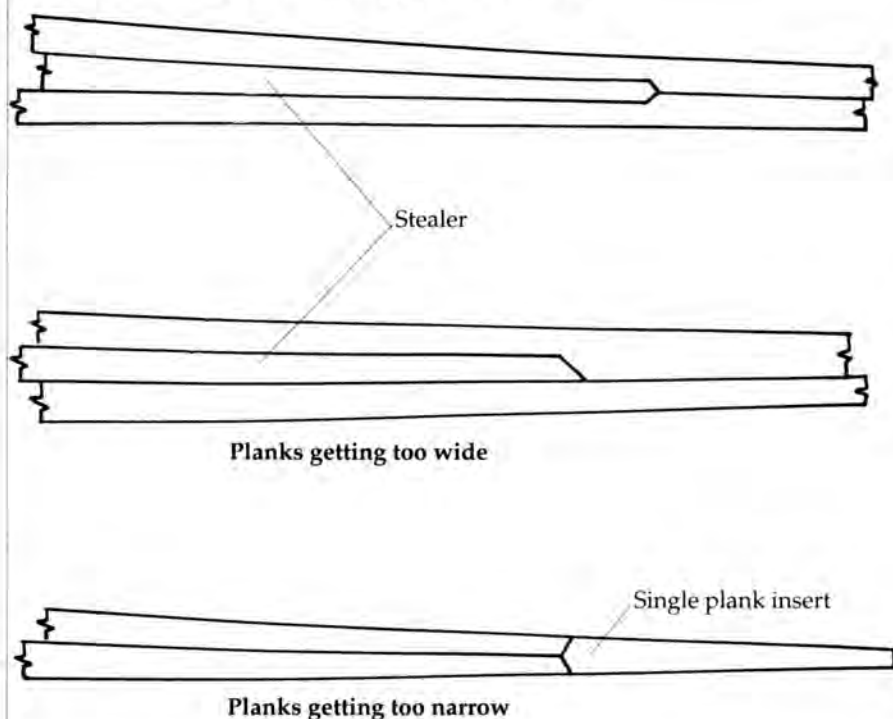
Understanding the Layout: Wooden ships are easier to plank by first dividing the hull into a series of belts. The belts flow along the hull in smooth curves. They sweep up at the ends like the deck sheer. Within each belt, the planks are evenly spaced, tapered, and fitted as required.

When selecting a belt width, you need to consider how the planks will taper. You don't want them to taper so much that there is no width left for fasteners. This would necessitate substituting a larger plank for two to increase the width. Also, in some areas, the planks may get wider rather than taper. If they get too wide, a stealer plank must be cut into the plank. While these alterations are acceptable and are used on many ships, it is best to design the run of planking to limit the number of such inserts (see figure 20).

A complete planking scheme has been worked out for the *Flying Fish* model and is shown on the P-O-B plan sheet 2-Hull Planking Layout. Obviously, there are many other schemes possible. It all depends on the selection of the belt widths, the sweep of the belts, and the plank sizes within each belt.

The Hull Detail plan shows the real *Flying Fish* midship section. The planking varies in width from 7" to 14". In order to simplify the model planking, yet keep the sizes similar to the real ship, a basic plank size of 12" was selected for midship at Bulkhead 10. To scale, this is a 1/8"-wide strip. Also, a plank thickness of 1/16" was selected for the main hull below the planksheer, and 1/32" thick above the planksheer on the bulwarks.

FIG. 20 - Planking Shown Using Stealer Inserts



Bulkhead 10 below the planksheer is divided into six belts. There are five equal belts with seven 1/8" planks each. The lowest belt, the garboard area (lowest part of a vessel), has only three planks.

The lower garboard belt was fanned out at the bow and stern to force the other belts in a more upward sweep. Each of the three garboard belt planks is about 1/8" at Bulkhead 10, then they gradually increase from 5/32" to 3/16" at the bow and stern. These three stakes of planking must be cut from 3/16"-wide basswood.

With the garboard belt (Belt F on the plan) defined, the remaining five belts (Belts A to E on the plan) can be laid out. Forward, each bulkhead has five equal spaces for the belts and seven equal spaces within each belt for the planks. From Bulkhead 10 forward, therefore, the planking is 1/8" at Bulkhead 10, gradually tapering to about 3/32" at the stem.

A similar situation occurs aft. From Bulkhead 10 to about Bulkhead 18, the planking tapers in equal belts. Therefore, for all the planking between the stem and Bulkhead 18, a 1/8"-wide basswood strip can be used. Belts C, D and E continue to taper to the sternpost so that 1/8" material can be used here also. For Belt A and B aft of Bulkhead 18, the planks start to fan out a little. These planks may need to be cut from 3/16"-wide strips.

Beginning the Planking Process: The hull should be placed upside down and secured in a vise or cradle. Something

portable would be ideal so you can rotate the hull easily. You will be working on both sides, alternating as you proceed.

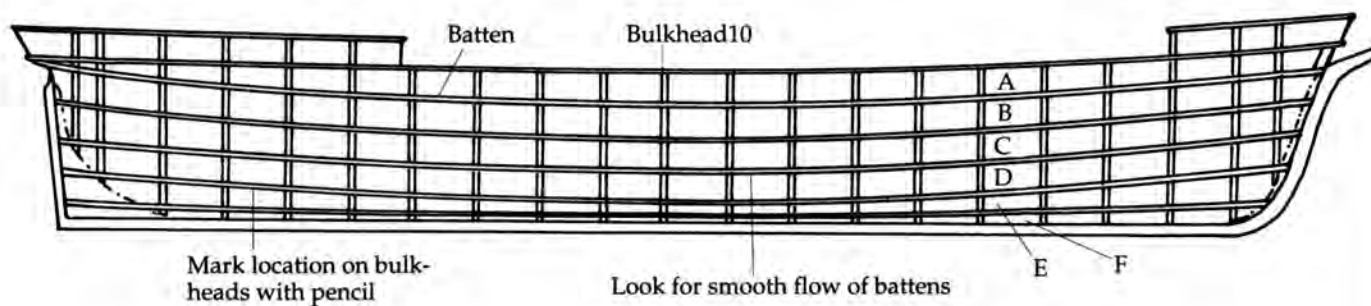
From the Hull Planking Layout drawing, use a tick strip along each bulkhead location and mark the belt seams. Using the tick strip, transfer the locations of the belt seams on each bulkhead and mark with a pencil. Now, using temporary battens, such as 1/16" x 1/8" model-length basswood strips, lay the battens along the marks and temporarily tack them in place. With all the battens in place, visually check the flow of the battens. Do they have nice smooth curves? If something does not look right, adjust the batten slightly until it does (see figure 21 for a side view). When everything seems okay, re-mark the belt seam lines on the bulkheads.

Even though the Hull Planking Layout was developed to provide an accurate flow of belts, errors in drafting and tick strip marking may occur. The battens were designed to assist in this regard. With them in place, any errors previously made can be corrected so that the belts will flow nicely. Even if the planks between belts vary slightly, the overall appearance of the planking layout will be good.

3. First Planks

Make sure that all the belt seams are clearly marked. You do not want to lose them. You could remove the temporary battens at this point. But, you may want to leave the middle batten in place for now. This

FIG. 21 - Checking the Battens for an Accurate Flow of Belts



will help hold the hull in line so it will not warp before you are able to put on the planking.

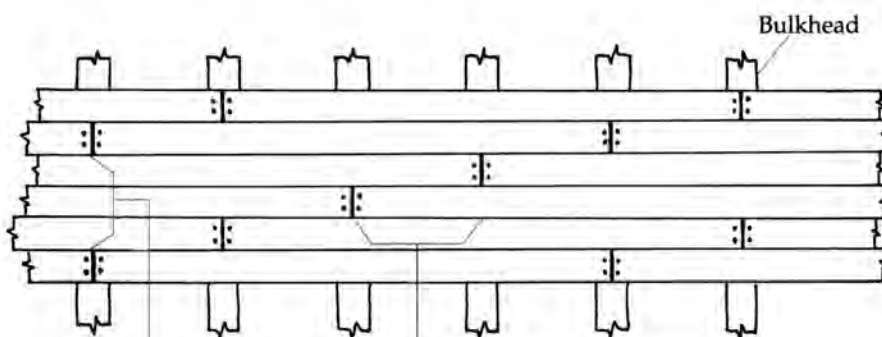
The next step is to mark the plank widths within each belt. You could do this for the entire model, but just work with one belt at a time. Use a tick strip again and lift the plank widths from the Hull Planking Layout. If you have changed the locations of the battens, just divide the space up equally. A set of proportional dividers would help. Remember, you want seven equal spaces (3 at the garboard) at each Bulkhead location. Mark these lines on the bulkheads with a pencil. You should now have a completely marked area for a belt. The next step will be to cut planks to fit between the marks. You can start anywhere as long as you work within a belt.

4. Planking Butts

Before you start, you need to consider the planking butts. Since the lengths of wood cut from trees was generally shorter than the overall lengths of the real ships, shipbuilders generally had to work with planks only 20 or 30 feet long. Some modelers think it is easier to use a plank length the full length of the model since fake butts can be scribed in later or omitted. Granted, this can be done. It's really up to the modeler. By using shorter pieces, however, there are some advantages. Since all planks should taper from midship forward and aft, the tapering you must do will be done on a short length, allowing the marking of the taper to be quick, and the plank easier to fasten into place. Also, a short piece can be held down with one hand. And, if you make a mistake, you will only have a small piece to do over. So, the following is based on the use of the shorter lengths.

A maximum plank length approximately 5" will cover four bulkhead spaces (use 5-1/4" pieces over the wider gap between Bulkheads 9 and 10). This is a good length to handle for this model. To scale, it is a plank 40 feet long. It is a little long, but with a fake

FIG. 22 - Staggering the Planking Butts



Real ship: must have 3 strakes between butts on same frame (model meets rule)
 (model meets rule with plank length selected)

butt scribed halfway, you will have a 20-foot plank. This is well within reason.

To follow real ship rules, you should stagger the butts on the model (see figure 22). The stagger also applies to the deck planking. The 5-inch plank works well with the rules. With this length you can meet the rule for three full plank widths between butts on a single frame. Had you used a plank length to cover only three bulkhead spacing, this would not be possible. Because the butts occur on bulkheads, you would wind up with only two full planks between the butts.

5. Belt F

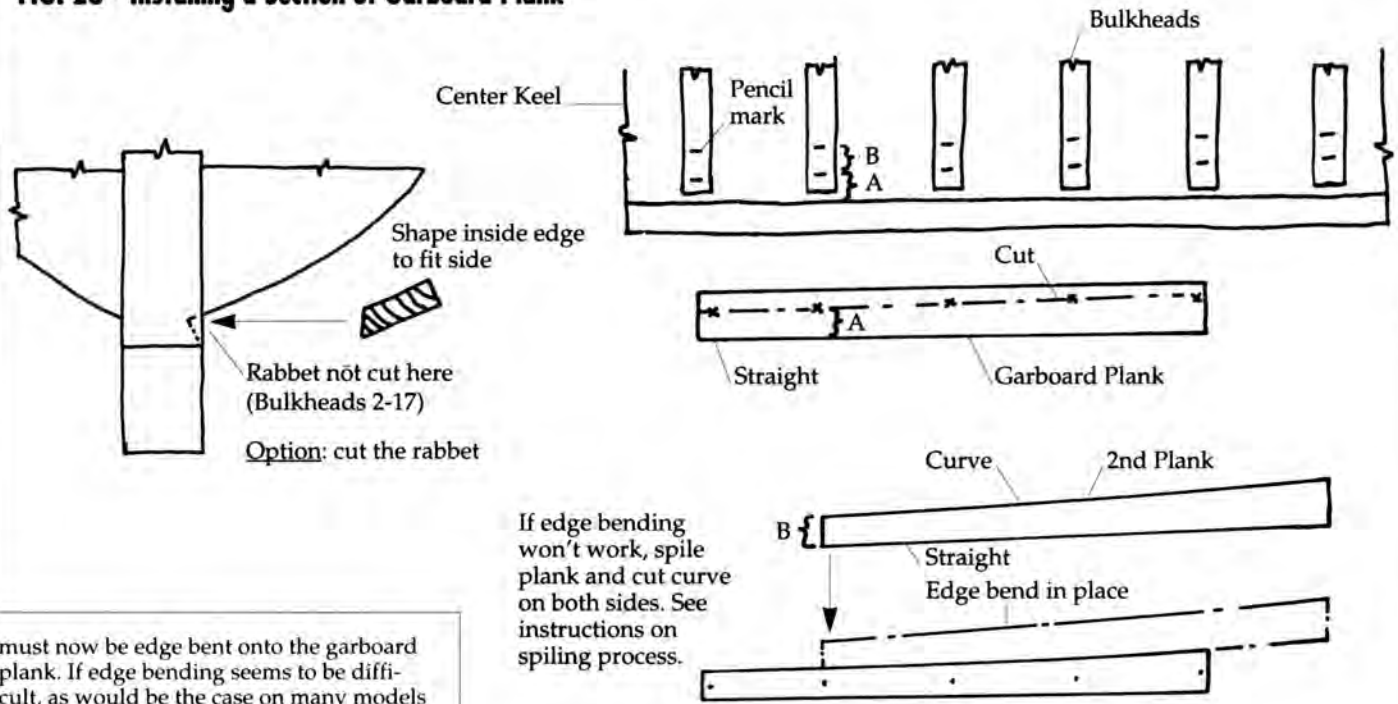
Start with Bulkhead 10 at the rabbet and work forward. Cut a length of strip to go from the center of Bulkhead 10 to the center of Bulkhead 6. Mark the location of each bulkhead. Using a pair of dividers, measure the plank width at each bulkhead and transfer the measurement to your wood stock. Draw a curve through the points, then cut the piece to

shape. One edge will be straight because you will be starting at the straight keel rabbet.

For reasons of simplicity, you were not asked to cut a rabbet into the keel from Bulkheads 2 to 17 (see discussion on cutting the rabbet). So, you will need to bevel the inside edge of the garboard plank from Bulkhead 2 to 17 so that it will fit (see figure 23). Glue the plank into place. Next, cut a strip from Bulkhead 6 to Bulkhead 2 and do the same process. The next piece reaches the stem rabbet. Do the same thing from Bulkhead 10 aft. You should now have a garboard strake in place for the full length of the model.

The next two strakes above the garboard are similar, except now you no longer have a straight rabbet for the plank. Fortunately, the basswood plank is reasonably flexible and can be bent edgewise rather easily. Cut a length of plank, but now you must stagger the butts. So, cut a plank from centerline of Bulkhead 9 to centerline of Bulkhead 5. Measure the plank widths and mark on your wood stock, then cut. It

FIG. 23 - Installing a Section of Garboard Plank



must now be edge bent onto the garboard plank. If edge bending seems to be difficult, as would be the case on many models with severe curvature, you must use the spiling process.

6. Spiling the Planks

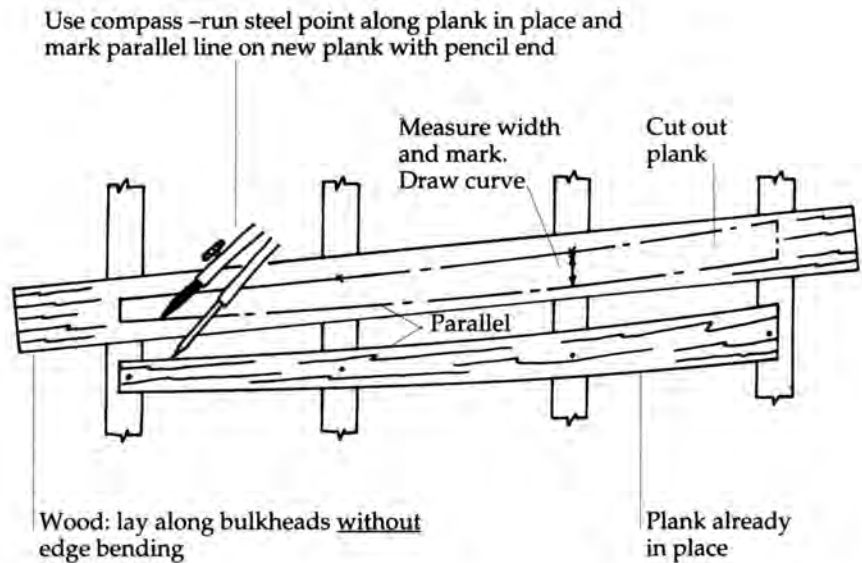
On real ships, more so than on models, edge bending is limited. The wood may be very stiff, so each plank must be cut to shape. Spiling is the term used for laying out the cuts (see figure 24 to see how this is done). It's simply a matter of transferring curves to a straight plank, then sawing the plank to shape. For *Flying Fish*, the 2nd and 3rd strakes of Belt F should be the only strakes you need to spile. Even these may be flexible enough to edge bend.

7. Belts A through E

Proceed with these belts just as you did with Belt F. However, the planks should be tapered as you go forward. Each piece should be a straight taper, and then should be edge bent into place. In the after portion of Belts A and B, the planks start to fan out a little, but each plank within the belt should be the same width.

The planks in Belt B at the stern are the most difficult to fit (see figure 25 and P.O.B. plans). The planks must take a severe bend and twist, so you should steam bend the ends to fit. There is one variation in Belt A. From Bulkhead 10 aft, the plank immediately below the planksheer should not be tapered. It should remain a constant width until it meets the rabbet piece aft of Bulkhead D that forms the stern knuckle. Also, because of the knuckle, this plank, and the plank below it, must be edge cut and fitted. Edge cutting this particular plank is also required at the bow (see figure 26).

FIG. 24 - Spiling the Planks When Edge Bending Cannot Be Accomplished



8. Port & Starboard Planks

If your battens are the same port and starboard, and they should be, then when you cut a plank for one side, cut another the same size for the other side of the hull. Work both sides at once. This will save a great deal of time.

9. Plank Variations within a Belt

If you are working within a belt, and have six planks exactly the same width, and then find that the last plank in the belt needs to be made slightly wider to complete the belt ... should you worry? Certainly not. No planking job, even on real ships, is that precise. You are dealing with hand-cut planks. The important thing is to keep the flow of planks smooth. A variation in widths is of no great concern.

10. Bulwark Planks

Planking between the planksheer and main rail should be $1/32$ " thick. Assuming that all planks are the same, they should be about $1/16$ " wide amidships and increase forward and aft. Because of the flair forward, they will approach $3/32$ " wide. This is a lot of tapering. You also could use even-width planks from the planksheer nearly up to the main rail, and add some wider planks forward to make up the difference. The early shipbuilders may have used both approaches.

When doing the bulwarks, remember that from Bulkhead 2 to the poop deck, the inside of the plank is exposed inboard. So, as you plank, be careful to remove glue squeeze-out on the inside at the seams, and around the timberheads.

The bulwark planking may be difficult to bend and fit along the rounded portion of the stern. At this area you could fit vertical planking instead of horizontal planking as a model option.

11. Fastening the Planks

There are some fancy plank clamps on the market, but they are more trouble than they are worth. They must be screwed into the edge of the bulkheads, leaving a big hole to contend with when doing the next plank. Instead, you can hold the shorter planks in place, or position them with straight pins. Be careful not to split the plank when using straight pins. If necessary, drill a small pilot hole first. Glue each plank to the bulkheads, and edge glue them together. For the edges, use white or carpenter's glue so that setting will not occur too fast. At the bulkheads, it is good to use thin super glue to quickly secure the plank in place.

While glue alone will hold the planks, you may wish to use small brass brads or wooden treenails for additional holding power,

FIG. 25 - Steam Bending the Planks in Belt B

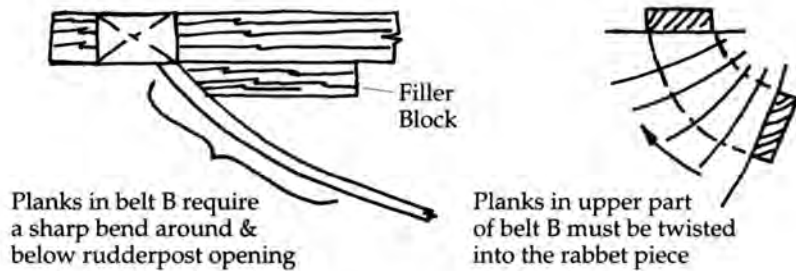
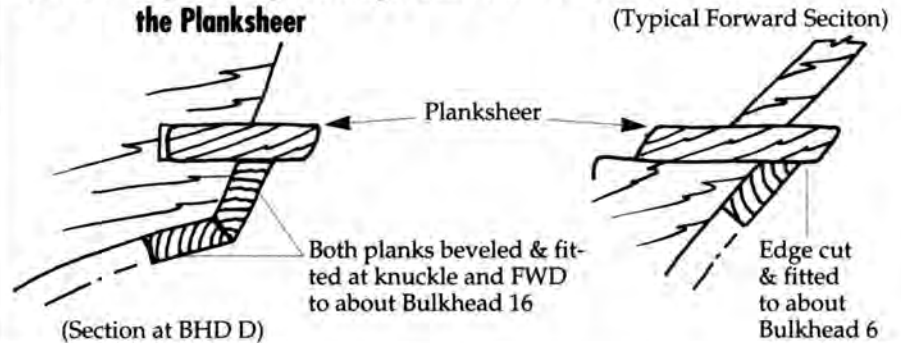


FIG. 26 - Edge-Cutting & Fitting Planks at the Knuckle & Below the Planksheer



or just for looks. Using fine brass brads, cut off and discard the heads, then hammer them into place. If treenails are desired, you can buy them commercially. Better yet, get some long bamboo skewer sticks, strip off small pieces, then pull them through a draw plate until you have very small dowels. Drill holes for the treenails, add a touch of glue and drive them into place.

12. Finishing the Hull

After all the planks are installed, look over the entire hull. If you find seams with starved glue joints, rub some carpenter's glue into the cracks and, if necessary, add some wood filler. When seams are filled, sand the entire hull plank until smooth.

Double-Planking Option: Most wooden ships have single-thickness planking, and the *Flying Fish* model is designed for this. Furthermore, the kit is intended to be painted the colors of the real ship. However, many modelers are familiar with the European double-planked kits, or want to have a natural wood tone finish on the hull. Also, after the planking job is completed, some modelers wish to try again to improve the looks of the job. If this is your desire, the model can be "double-planked" by adding another layer of wood planking over the basswood planking.

Thin wood strips in mahogany, walnut, and some other types of exotic hardwood can be purchased from Model Expo for the task. For the *Flying Fish*, you will need the following strips which are 20 inches long and 0.5 mm thick. The amounts specified

include a nearly 20-percent overage for waste and errors:

- 136 strips, 3 mm wide ($1/8$ ")
- 20 strips, 5 mm wide ($3/16$ ")

The natural wood planks will cover the existing planking, but you will still have a basswood planksheer, main rails, and upper rails exposed. You could substitute these initially with the wood of your choice, cap them with the strips, or simply stain them to look similar.

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

STAGE C

COMPLETING THE BASIC HULL STRUCTURES

1. Adding the Binding Strake

With the waterway already in place, the next step should be adding the continuous $3/32$ " square binding strake inboard alongside it. Round-off the upper inboard edge of the binding strake slightly.

2. Installing Margin Planks

On real ships, there were generally one or more continuous planks on the upper deck inboard of the binding strake to provide longitudinal strength for the ship (see figures 27, 28 and cross-section in figure 31). The most inboard plank is also the nibbing plank. Where planking intersects the margin plank at a sharp angle, the plank was usually nibbed into the margin plank. By eliminating the feathered edge, caulking the joint was easier and more effective. Only one margin-nibbing plank is used for poop (inside the covering board) and fore-castle (inside the main rail) decks. While not absolutely necessary for the model, nibbing added quite a bit to the decks' appearance. If you do not wish to add nibbing, cut the deck planks flush against the continuous strake.

3. Installing the Edge Planks

These are athwartship (across the ship) planks at the ends of the fore-castle and poop decks (see figures 28 and 29). Note the joint where the main rail is cut out and the covering board on the poop deck is substituted.

4. Laying the Deck Planks

The deck planks on main deck are $1/16$ " square. For the poop and fore-castle decks, use $1/32$ "-thick by $1/16$ "-wide strips. Prepare the strips by painting one edge black or dark brown. When they are glued together, the painted edges will simulate caulking in the seams. You could also use the dark colored carpenter's glue now available. This would show up the seams without painting the edges.

Before planking you must decide how you want to treat the hatch and deckhouse coamings. If you want them to be done like the real ship, a recommended approach is to install all coamings first. You can then plank around the coamings. On the underside of the coamings, insert some scrap wood for supporting the coaming so the deck plank has a support for gluing (see Figure 30).

Start planking from the centerline, securing each plank with white or carpenter's yellow or dark wood glue.

FIG. 27 - Installing Margin Planks on Forward Upper Deck

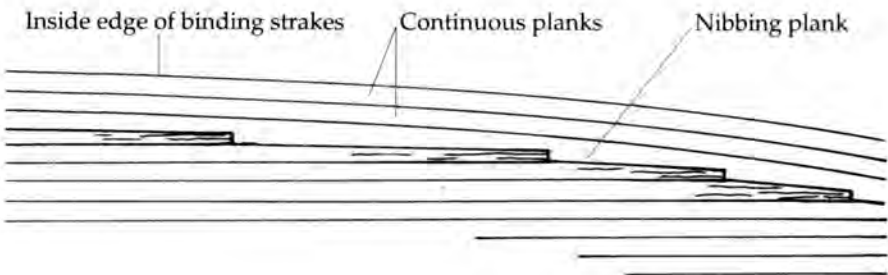


FIG. 28 - Installing Margin Planks on Fore-castle Deck

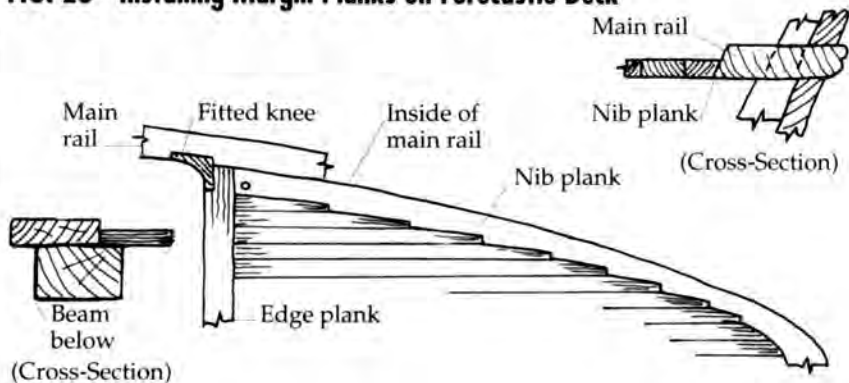


FIG. 29 - Installing Edge Planks

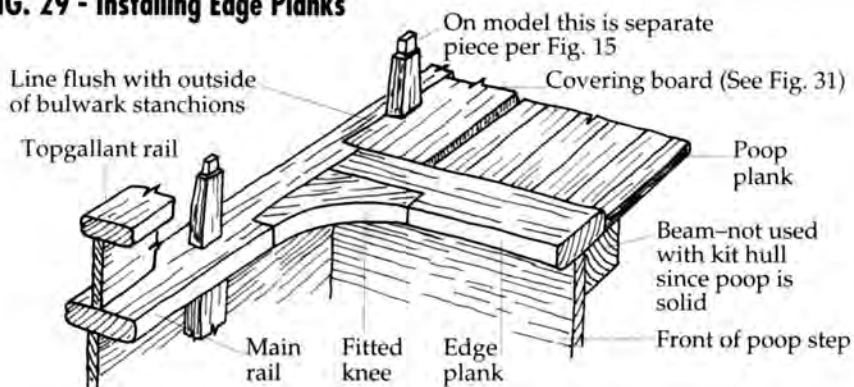


FIG. 30 - Installing the Hatch & Deckhouse Coamings

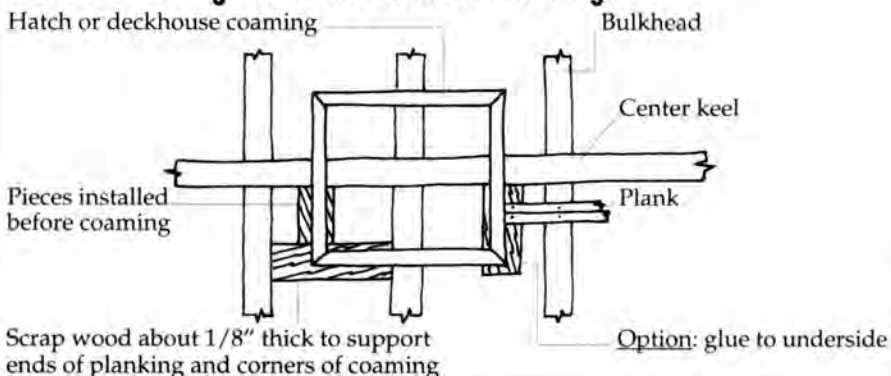
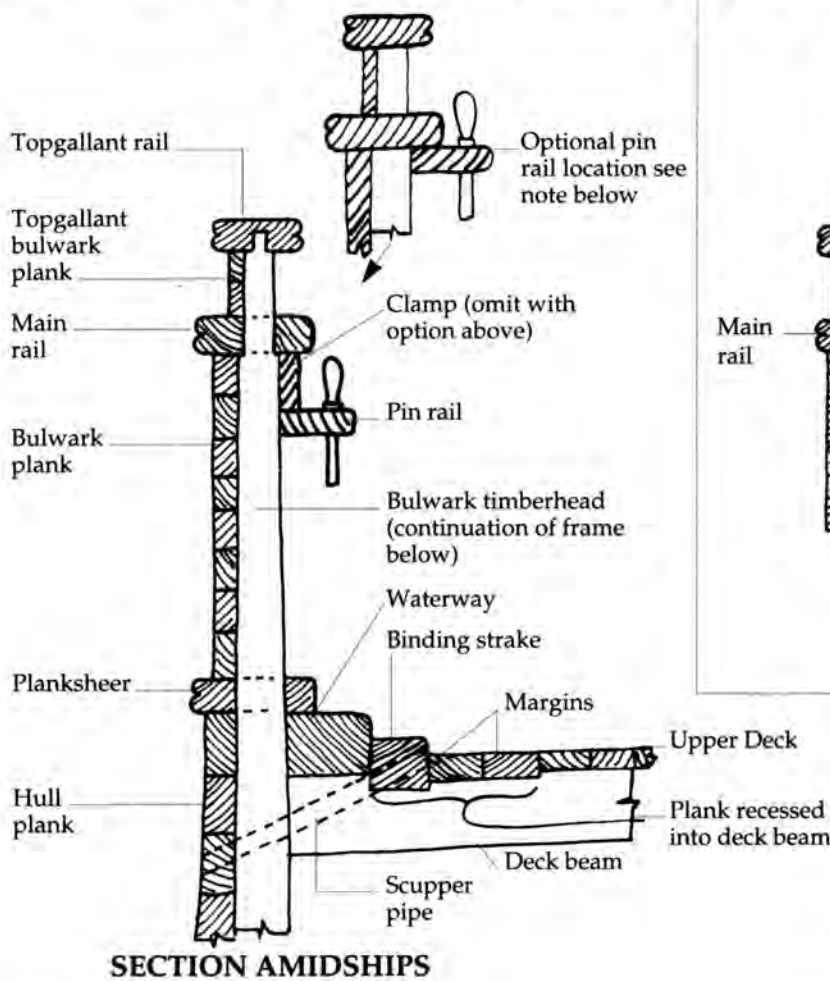
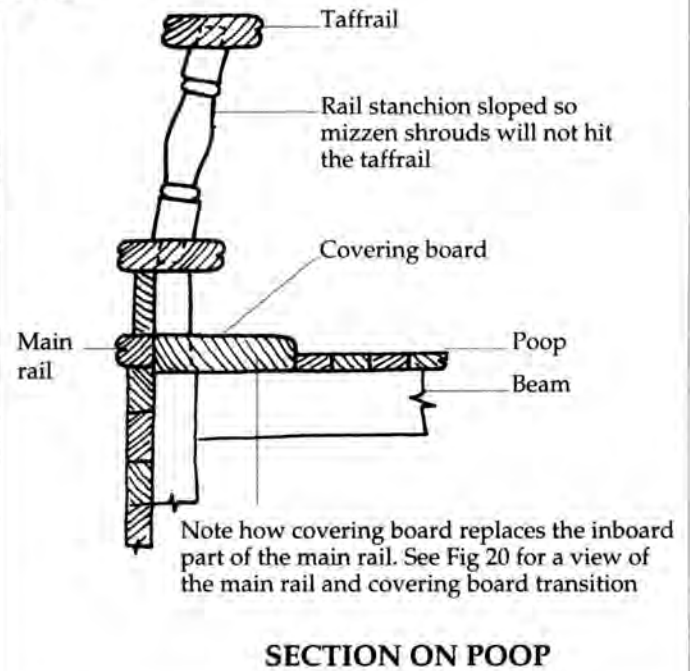


FIG. 31 - Completing the Bulwarks & Other Rails Near the Main Rail



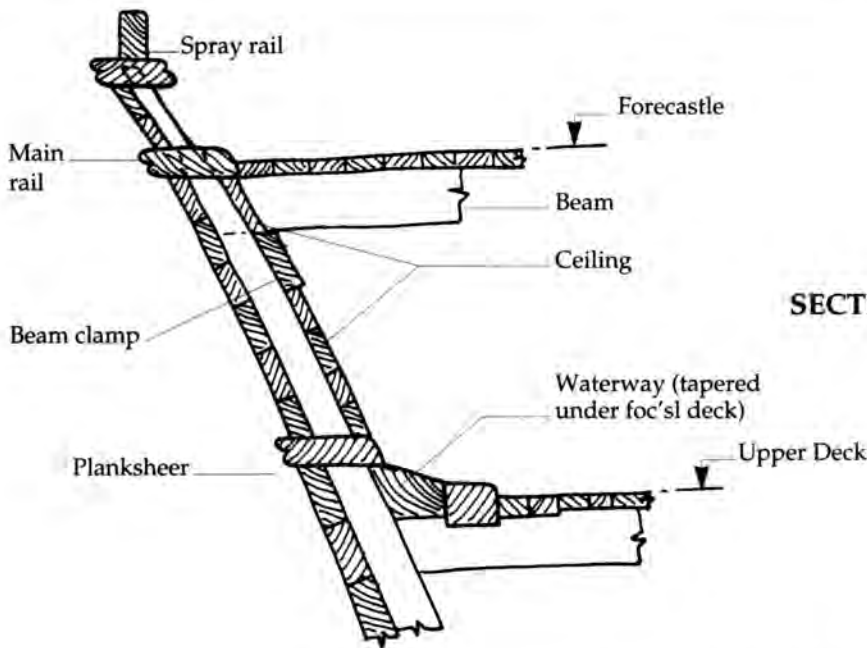
SECTION AMIDSHIPS



SECTION ON POOP

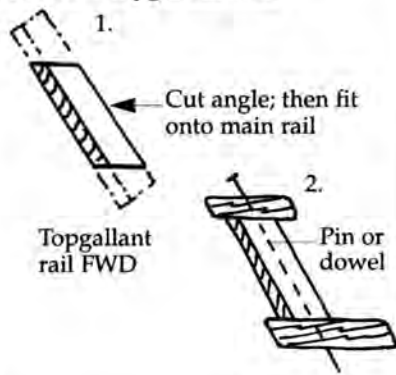
PIN RAIL LOCATION:

There are optional locations for the pin rail as shown. While the low rail option is more convenient, some McKay ships had the rail at a higher position. (Perhaps to provide more clear space under pins for spare spar stowage on deck.)



SECTION AT FORECASTLE

BULWARK SECTIONS: For actual dimensions see plans

FIG. 32 - Topgallant Rail

All planks, except the margin planks, should be parallel to the centerline. Scrape off any glue squeeze-out before going to the next plank. Planking butts can be used, as was for the outer hull, or they can be omitted. On a real ship, they do not show up as readily as the seams. You can also scribe butts after the plank is laid. Since there are no curves or cutting involved, as was the case with the hull planking, using long deck strips is no problem. Use brads or treenails, if you like, working in the same manner as was discussed in the hull planking section.

If you decided to use a nibbing strake, fit the plank running into the strake and mark the cut for the nib. Cut the nib and glue the plank in place. You probably do not need to add scrap wood under the joint for support, but this would be a good idea to assure that the plank and nibbing strake are flush. When the deck is completed, sand the deck and apply a stain and flat varnish.

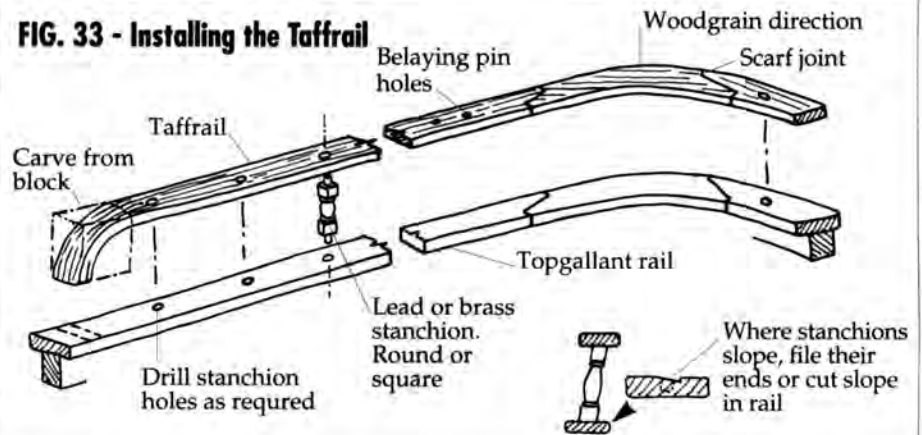
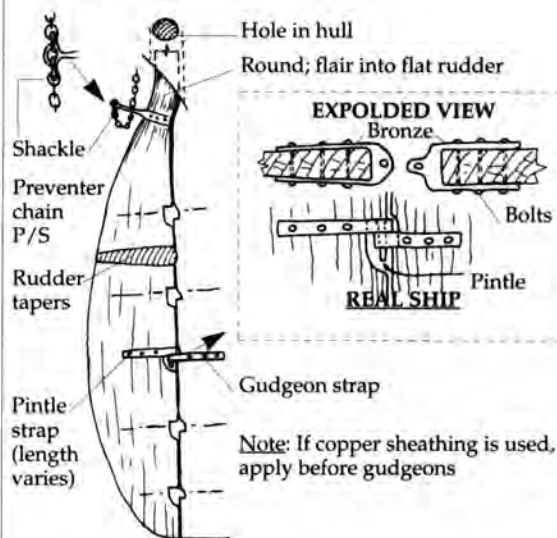
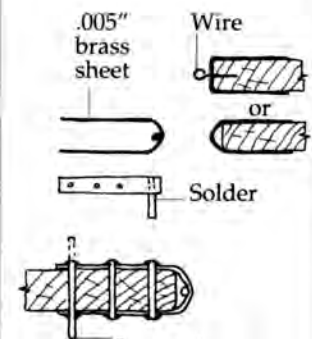
5. Inserting the Deck Pads

Notice the heavier planking at the five rails and capstans on the plans. These can be inserted prior to laying the 1/16" decking, or simply added as a doubler over the deck.

6. Installing the Topgallant Rail

You started the deck planking after the main rail was installed. It is now time to complete the bulwarks and other rails above the main rail (see Figure 31 for some real ship sections through the bulwarks amidships and near the poop and forecastle decks and 1980 Plan Sheet 1 for dimensions).

The topgallant rail will be a little tedious to do, especially at the bow where the hull flairs. The sections of timberhead above the main rail can be added first and planked over. Or, you could glue the timberheads to the plank and glue the whole unit atop the main rail. This is probably the easiest approach. At the bow, make the plank a little wider and the timberheads a little longer, then cut the angle on the bottom so it sits flush on top of the main rail. Use straight pins to align and help hold the rail in place (see figure 32).

FIG. 33 - Installing the Taffrail**FIG. 34 - Constructing the Rudder****RUDDER DETAILS****MODEL TECHNIQUES**

7. Installing the Spray Rail

This is an easy rail to fit. If you cannot cold bend it in place, steam bend it, or cut it out of sheet basswood.

8. Installing the Taffrail

To install the taffrail, mark the holes for the stanchions and drill (see figure 33). Notice that the stanchions slope inboard. This is necessary, so that the mizzen shrouds will not hit the taffrail.

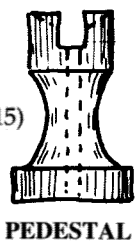
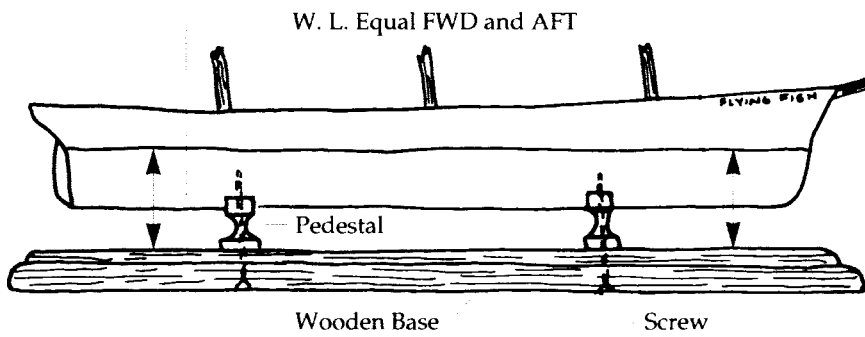
9. Installing the Pin Rail

The pin rail can be added last. The taffrail is used as a pin rail on the poop deck (see figure 33).

10. Constructing the Rudder

The rudder can be made at any time (see figure 34). In the event you want to copper plate the bottom, as described earlier, the copper plates should be installed before the gudgeons are added to the hull and rudder. Notice the chain that was used for emergency steering and for checking the swing of the rudder, in the event the rudderhead became broken; it runs port and starboard to eyebolts (see plan).

FIG. 35 - Mounting the Hull using a Mounting Board & Two Pedestals



Bevel to fit hull

(Locate pedestals at Stations 5 and 15)

STAGE D

MOUNTING THE HULL

Before proceeding with additional work it is best to mount the hull. This step will help prevent details from becoming damaged during handling and will allow you to make any alignments that require a true waterline. Proper mounting of the hull is very important and will allow the accurate building and aligning of the remainder of the model. While any modeler can devise his own mounting, you may also purchase one pre-finished. A second option, called the launching ways, may be made by hand or purchased commercially, as well.

1. Mounting Board with Two Pedestals

You can round the top edges of the baseboard, or cut a simple chamfer (taking the edge off or beveling). If you own a router, or can borrow one, you will be able to cut a nice fancy edge on the baseboard. Finish the base with a dark stain or paint.

If you decided to use a mounting board and pedestals and have already correctly drilled the pilot holes for the pedestals, the model should sit with the waterline

parallel to the baseboard (see figure 35). If something went awry and the balance is off, you can add a brass shim under one pedestal to correct it.

2. Launching Ways

The second type of mounting that can be employed is the launching ways, which is mostly suitable for models without sails. You can make the launching ways from scratch, or purchase materials for construction in kit form with instructions. Drilling of the keel is still required to apply the rods that anchor the model to the ways. The launching ways is easily assembled and should be mounted on a minimal board size of 24" x 6". (Expanding the size of the board will allow you to create a mini-diorama comprised of boat yard ground activity.) Follow the directions supplied with the ways to achieve the proper waterline level.

Note: It is recommended that either choice mounting piece be finished before mounting the Hull Assembly into place.

STAGE E

ADDING THE HULL DETAILS

Before beginning with the details, outline all topside items on the deck by marking their locations with a pencil. Take all measurements from the plans using tick strips. Proper location should be measured from some firm "bench mark" such as a mast hole or a station line marked on the deck. Add all equipment on or near the bulwarks first, before adding those near the centerline.

1. Figurehead & Knightheads

The *Flying Fish* figurehead can be attached by gluing both sides of the split tail to the port and starboard sides of the ship's stem (see figure 36-A).

Before installing the two knightheads, first insert eyebolts into each and make the pin rail from wood (see figure 36-B).

2. Catheads & Anchors

Make the two catheads from wood and cut slots in the bulwarks, into which the catheads will be positioned (see figure 36-C). The anchor release shown in the figure is only one type invented and if too difficult, you may try the simpler one (see figure 37).

Use the anchors supplied in the kit or make them from wood stock (see figure 38). American clippers often carried both wooden and iron stock anchors, although two wooden stock anchors, as shown on the plans, seem to be favored by McKay.

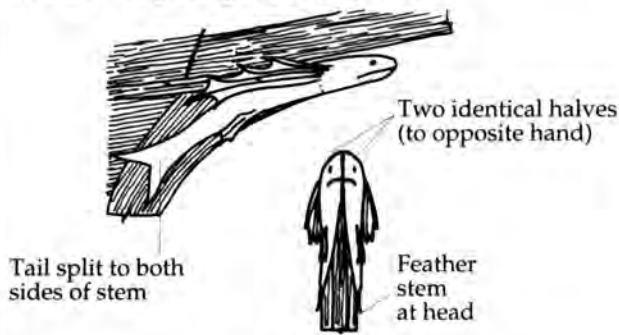
Many ships have a billboard, which is a heavy chafing board on the hull where the anchor is rested and lashed. Apparently, McKay did not use them, since none are shown in the photographs of his clippers.

3. Windlass, Capstan, Chain Navels & Chain

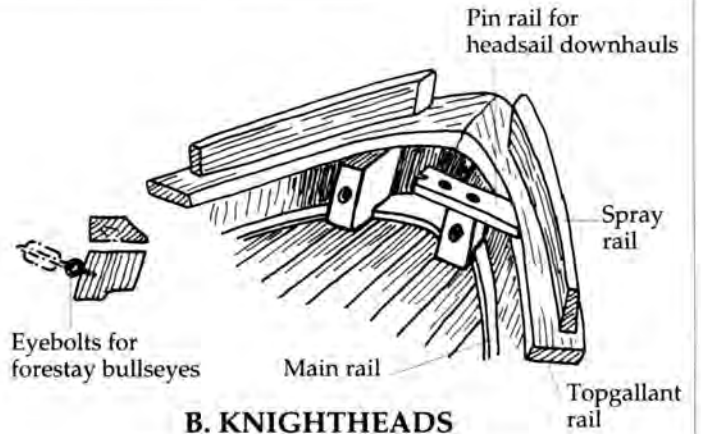
To complete the anchor installation, add the chain navels, the windlass, capstan and chain (see figure 39). Paint the chain black.

Chain Stoppers: If the forecandle is built up, you may also add the chain stoppers as shown on the plan. Although they are not viewable if installed, doing so may provide that feeling of contentment a modeler can have just knowing that they are there; that the job is complete!

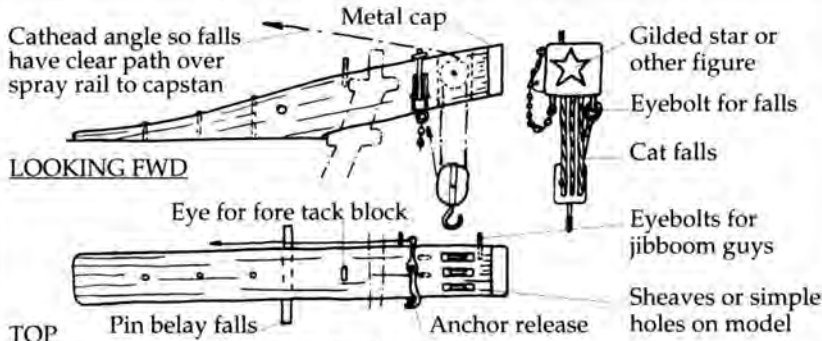
FIG. 36 - Beginning the Hull Details



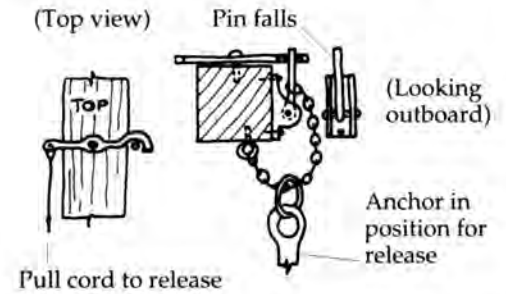
A. FIGUREHEAD



B. KNIGHTHEADS

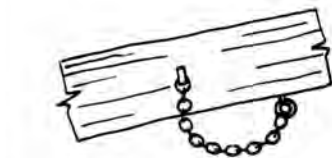
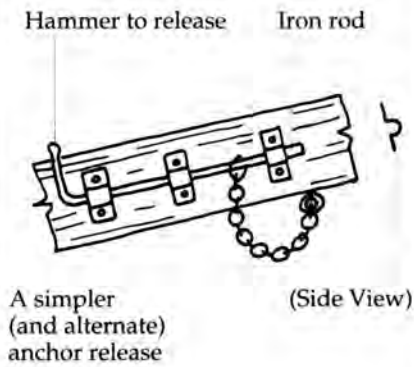


C. CATHEAD DETAILS



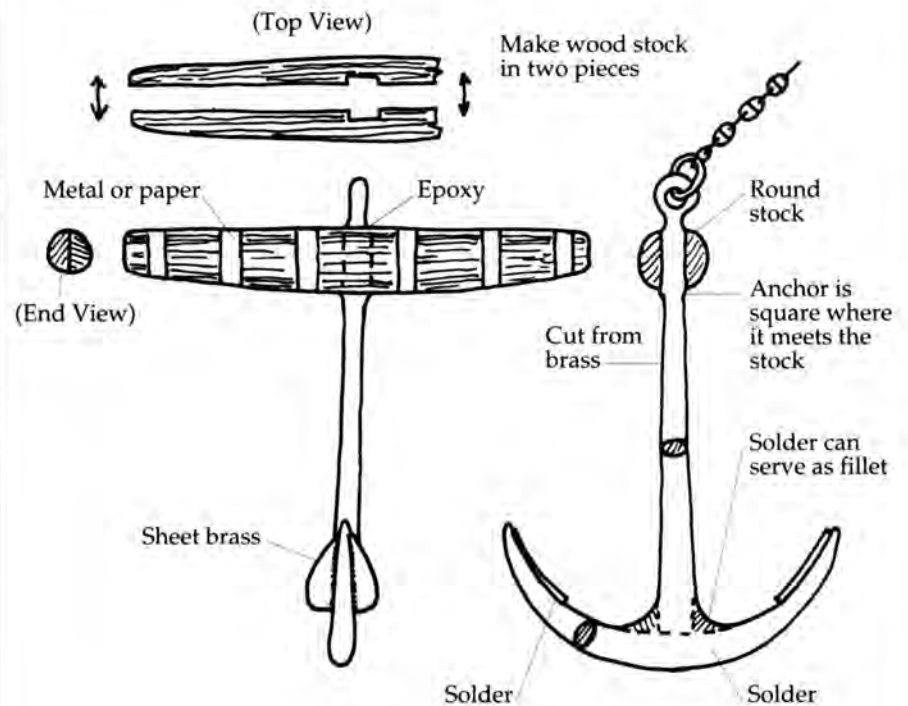
D. DETAIL OF ANCHOR RELEASE

FIG. 37 - A Simple Anchor Release



If either type release is too difficult to make at 1/8 scale, fake it per above

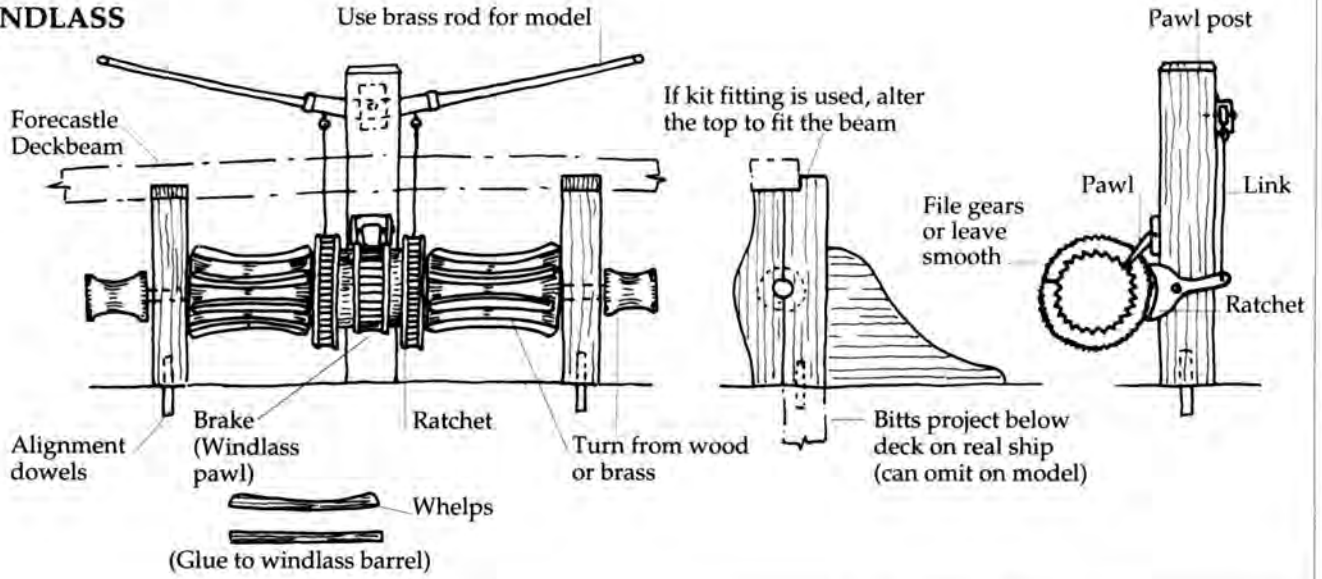
FIG. 38 - Anchor Details for Scratch Building



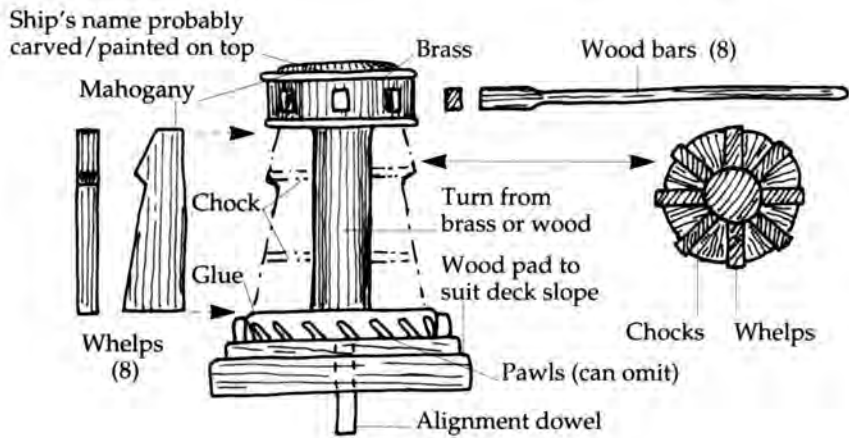
McKAY ANCHOR

FIG. 39 - More Real Ship Hull Details

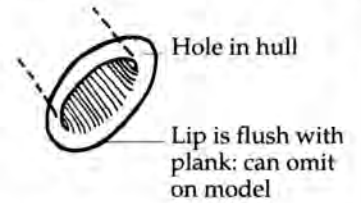
1. WINDLASS



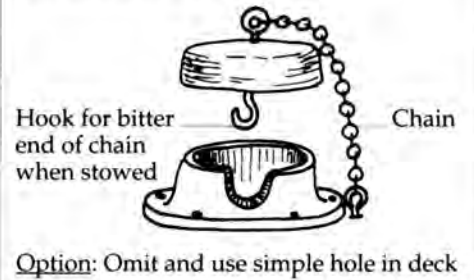
2. CAPSTAN



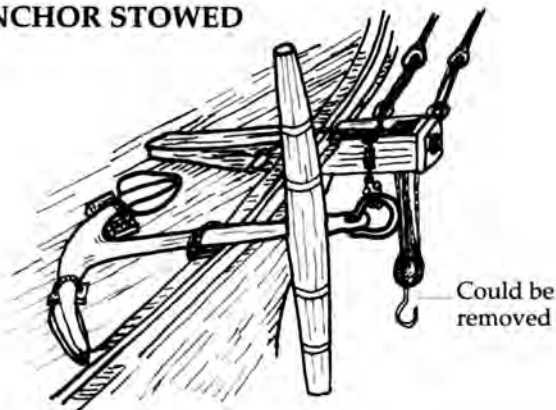
4. HAWSE PIPE



5. CHAIN NAVAL



3. ANCHOR STOWED



6. CHAIN STOPPER

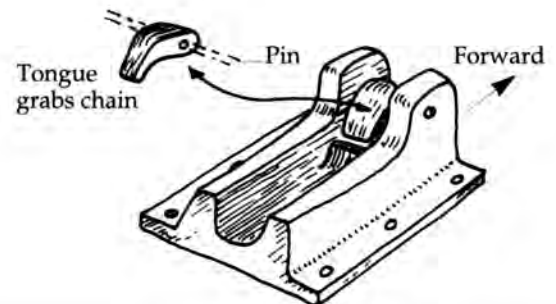


FIG. 40 - Channels

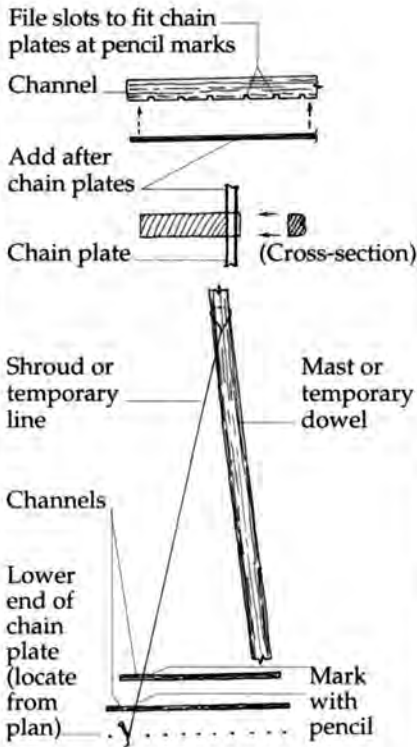
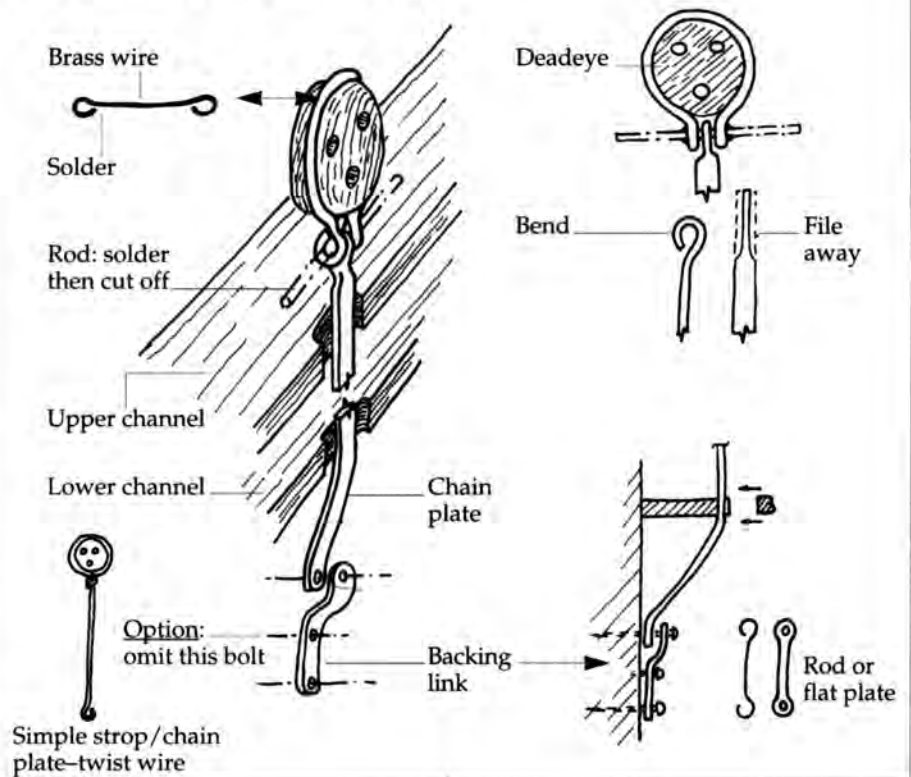


FIG. 41 - Chain Plates & Deadeyes



4. Channels, Chain Plates & Bumkins

Next, set up the channels (see figure 40). Locate the holes at the bottom of the chain plates according to the plans. Insert the masts (or temporary dowels) and align the chain plate slots as shown. Chain plates and deadeyes may be installed at this time (see figure 41). Install the bumkins and their chain supports as shown on 1980 Plan Sheets 1 and 2. Bumkins are spars projecting from the stern on both sides of the ship for supporting the brace blocks. Installing them will require cutting a hole in the bulwark.

5. Sheaves for Course Sheets

A simple hole can be substituted for the sheaves in the bulwark (see figure 42).

6. Cavils & Mooring Chocks

Install the cavils and mooring chocks (see figure 43). If the chock is too difficult to make, simply cut a correct shape opening in the bulwark and cavil (or cleat) and omit the actual chock pipe. The mooring cavil itself is not usually used for belaying mooring lines as these are secured to the mooring bits on deck. The cavil is used to belay almost any small line.

7. Freeing Ports

These ports were required to quickly drain sea water from the deck in bad weather (see figure 44).

FIG. 42 - Sheaves For Course Sheets

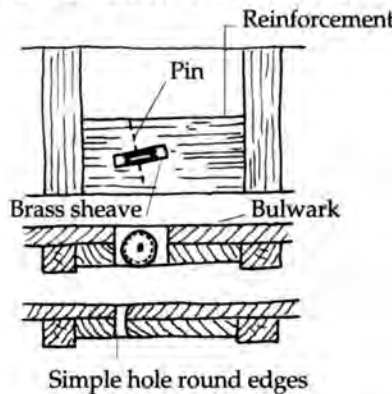


FIG. 43 - Cavils & Mooring Chocks

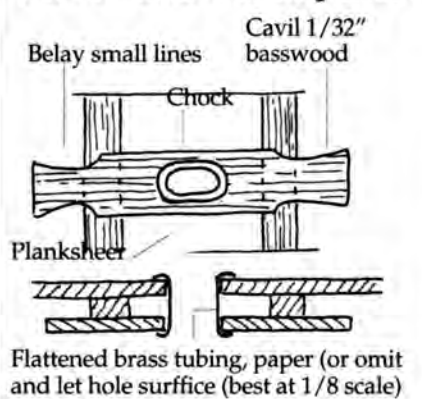


FIG. 44 - Freeing Ports

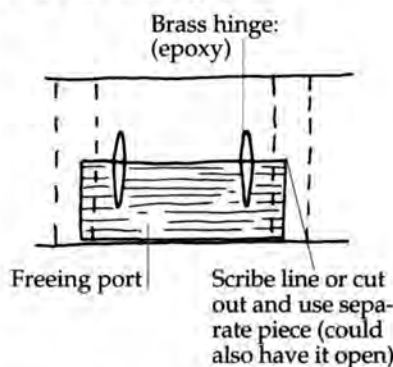
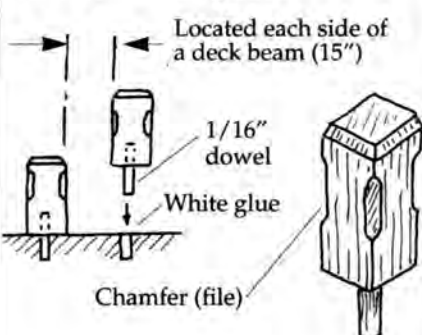


FIG. 45 - Mooring Bitts



8. Mooring Bitts

The mooring bitts shown were used typically by Americans, the use of wood being more economical (see figure 45). Iron bollards (older term for the same type of post) were used more by the British during the 1850's. The wood bitts actually extended to the deck below and were bolted to deck beams.

9. Belaying Pins & Eyebolts

It is perhaps best to wait until rigging runs have been worked out before drilling holes in the pin rail for the belaying pins. Likewise, eyebolts in the deck and caprails should not be installed until you are absolutely sure of their location. The belaying pin plan (1980 Plan Sheet 4) is only a guide to follow. A pin or eyebolt may need to be relocated slightly, so the rigging will run clear. Consult the rigging discussions for belaying practices and eyebolt installation.

10. Vents

The small gooseneck pipe vents between the bulwark stanchions in the planksheer, as shown on the 1980 Plan Sheet 1, appear between every double frame (two between each bulwark stanchion). These were used primarily to ventilate the spaces between frames which were also packed with salt to prevent rot. These small vents, or a similar type fitting, were apparently used on most American clippers. For *Flying Fish*, the Boston Atlas states, "she is seasoned with salt, has airports below, ventilators along the line of her planksheer." The *airports*, referred to in the article, were small holes descending through the ceiling (planking on the inside of frames below deck) that allowed air to pass up through the frame space and out the gooseneck vents.

The vents, which were actually made of brass, can be duplicated to scale from brass rod, or omitted altogether, if such small detail is not desired or is difficult to accomplish (see figure 46).

The patent vents on centerline are used to ventilate cargo and passenger areas below decks (see figure 47). The type of vents shown are the *Emerson Patent Vents* described in the Boston Atlas Articles.

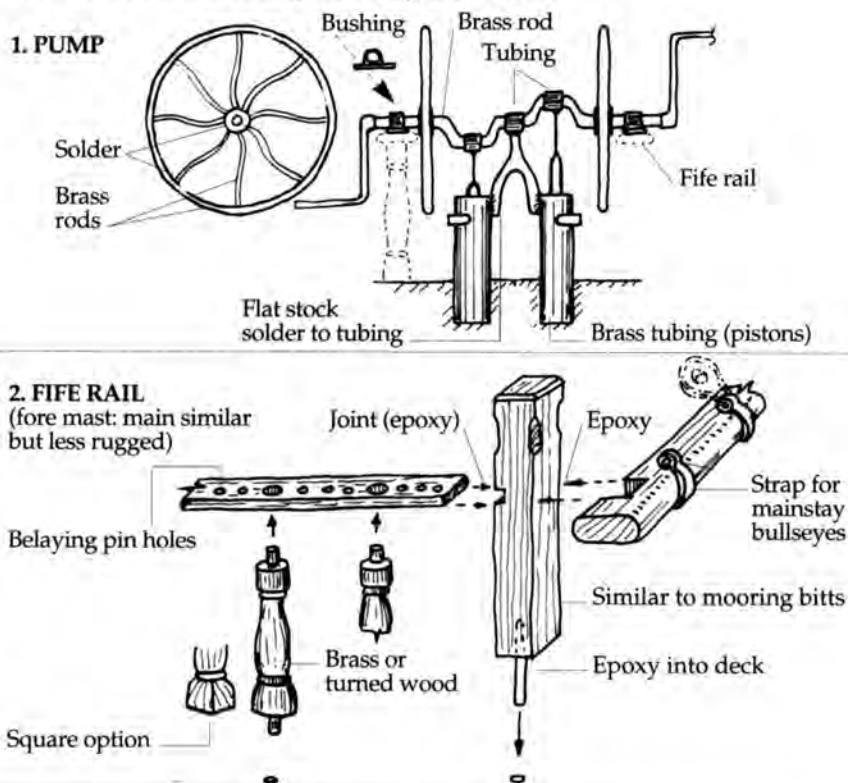
11. Fife Rails & Pump

Use the kit fittings or build them from scratch as shown in figure 48. Make sure the fitting is aligned properly to permit installation of the masts. There also must be enough space between the front of the masts and the fife rail bitt bar, so that the topsail sheet and other tackle can be secured to the eyebolts on deck (see the rigging plan).

12. Ladders

The forecastle deck, poop deck and gangway ladders also can be made from scratch if desired (see figure 49). The lad-

FIG. 48 - Scratch Building the Pump & Fife Rails



der on the aft side of the midship house should be attached to and installed with the house.

13. Capstans

See anchor discussion for detail of capstans. The capstan bars (8 bars per capstan) are six-foot long wooden poles and stowed in racks on the booby hatch and the forward water closet house side.

14. Binnacle

The plans and figure 50 illustrate an old-style box-type mahogany binnacle, the sides of which contained oil lamps for lighting the compass at night. Although a brass-type binnacle was evolving in the late 1850's, the box-type was most likely used on *Flying Fish*.

15. Bowsprit Bitts

Similar to mooring bitts. Except in the case where the forecastle deck is completely built up, the bitts will project below the forecastle to the upper deck as shown on the plans. The bowsprit bitts were used for securing forward mooring lines and the forecourse tacks.

16. Bow Chocks

These are metal chocks fitted into the wooden spray rail. For the model, simply cut or file out of the spray rail.

FIG. 46 - Gooseneck Vents

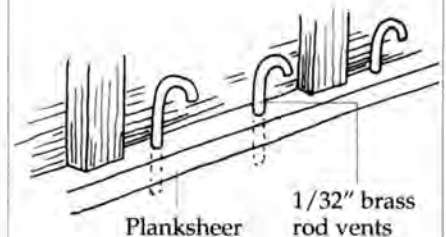


FIG. 47 - Patent Vent

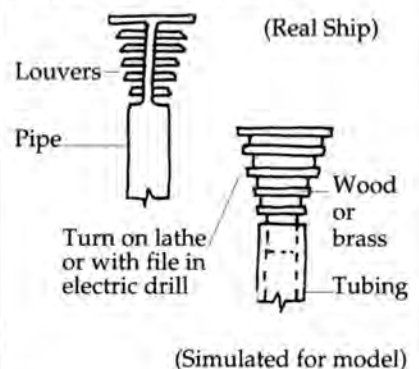
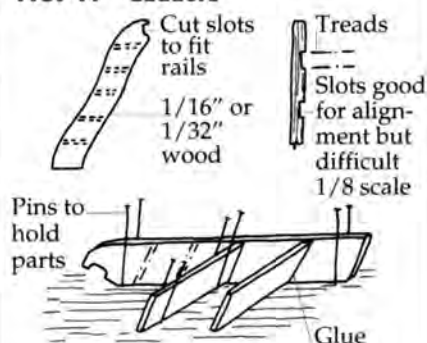
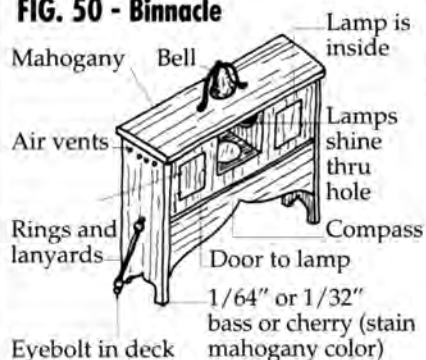
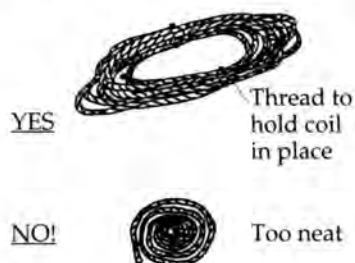
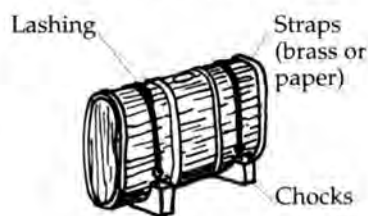
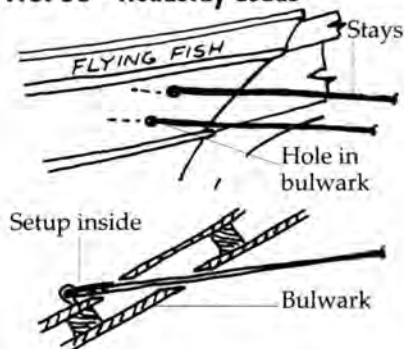
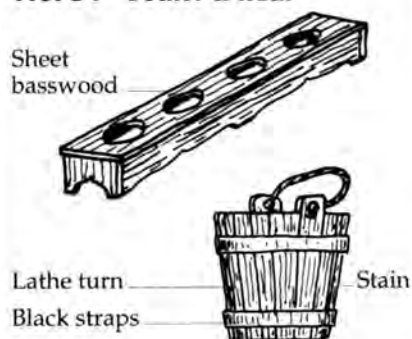


FIG. 49 - Ladders**FIG. 50 - Binnacle****FIG. 51 - Rope Coils****FIG. 52 - Water Cask**

Cask: Use fitting or carve from wood

FIG. 53 - Headstay Leads**FIG. 54 - Bucket & Rack**

17. Mooring & Other Lines

For that "salty" look, add a few coils of line at various locations on deck. Coil them loosely and secure them to the deck with a touch of white glue (see figure 51).

18. Water Cask

The cylindrical water cask, which was used for dispensing rations of water to the crew, should be positioned atop deck, stowed against the deckhouse (see figure 52). The cask received its fresh quantities of water from a 5,000 gallon holding tank below deck abaft (behind) the main mast via a portable pump (see plans).

19. Loading Ports

The ports in the side of the hull lead to the middle deck to load cargo and supplies dockside. These ports are found in many photographs of McKay clippers. On the model, scribe a line to represent the port. The ports are secured from inside the ship, so no outboard hardware is necessary.

20. Foremast Head Stay Leads

The Boston Atlas article says that the stays lead "through the bows and set up in-board." This is different from most clippers which have these stays set up to eye-bolts on the outside of the hull (see figure 53). You can do it this way or simply glue the line in a hole drilled into the hull.

21. Pig Pen, Chicken Coop & Vegetable Lockers

These little extras are not shown on the plans and were generally stowed under the forecabin deck, so they would not be seen on the model. They are mentioned simply to let you know they exist. Refer to the book, *China Tea Clippers* (see Bibliography) if you are interested in details.

22. Deck Buckets

Use the kit fittings or make wooden buckets and racks (see figure 54).

23. Boats & Stowage

Per the Boston Atlas article, *Flying Fish* carried five boats, which was typical for American clippers transporting passengers. British tea clippers usually carried only three boats. Since there were no set rules, boats varied in type and length. The sizes for *Flying Fish* have been based on available space for stowage. As shown on the plans, three small cutters, a launch or longboat and a Captain's gig were selected. The cutters, having a transom stern, were selected over a double-ended lifeboat because they could be used as a combination life/work boat. Either transom or double-ended boats should be considered correct.

Fit the davits and boat racks atop the deckhouse (see figure 55). Interior details for the cutters in davits (known as quarter boats) can be added (see figure 56). If you do not feel capable of fitting out these

boats, they can be covered with a cotton cloth to represent a canvas cover.

24. Deck Lights

To provide daylight to the crew quarters forward, two deck lights are shown on the plans in the upper deck. These lights are heavy pieces of glass. For the model, insert a piece of glass or plastic in the deck. Paint the underside black.

Locations and shapes of deck lights on clipper ships is somewhat questionable. They were used in various places. Boston Atlas articles note their use on many ships for state-rooms. For *Flying Fish*, the article states that the crew quarters were well lighted. Hence, deck lights were selected to satisfy this statement. Airports in the side hull are not used, as they were not typical of McKay clippers.

25. Deckhouses, Hatches, Skylights, Companionways & Water Closets

These items are built-up from sheet basswood supplied in the kit, or can be made from solid blocks as an option. When installing the decking, you may have elected to place all the coamings (raised frames for hatchways and deckhouses) first. Consequently, you will now complete the hatches and deck houses on the installed coamings. Great Fun! The sketches will illustrate various procedures typical of real construction, as well as model simplifications. If blocks are used, make sure that you fill end grain

with wood filler and sand smooth. The finished product should look built-up. There is nothing more distracting than ugly end grain showing through the paint. Most of these items will be painted white per the painting scheme, although some deckhouse corner posts, side mouldings and coamings could be natural, if desired. Be careful when sanding the chamfer edges as they are easily rounded. Sharp edges give the model that real scale look.

26. Hatches

The hatches are quite typical (see figure 57). The alignment dowels are very important for hatches and other deck structures, if the hatches are added on top of the planked deck. After applying glue, place the item in the exact spot intended, so glue will not be smeared on the deck, and the furniture misaligned.

Apply glue (white preferred) to the dowels, and very lightly along the hatch edge.

27. Wheel Box, Steering Wheel & Grating

Building a steering wheel is a project unto itself. It is easier to use the kit fitting or purchase a commercial wood wheel. Likewise with gratings. However, a scratch construction approach is provided (see figure 58).

28. Forward Companionways & Water Closets

The port and starboard combined companionway leading to crew quarters below, and the Water Closet forward abaft the forecastle deck is somewhat unusual for a clipper, but the arrangement was developed from the Boston Atlas article description. Usually, clippers had only water closets along the bulwarks with a single companionway on centerline (see figure 59).

29. Skylights & Booby Hatches

Plastic, glass or light blue paint can be used to represent the glass (see figure 60).

30. Upper Deck & Poop Deck Houses

As with skylights, windows can be painted in if desired. If houses are built up, the windows can be cut out and a plastic sheet installed on the inside. Paint the entire inside of the house black so you cannot see bare wood through the windows.

The plans show an enlarged detail of deckhouse mouldings, coamings, side and corner posts. If the moulding cannot be detailed precisely, a simple moulding will suffice (see figure 61).

FIG. 55 - Fitting the Davits & Boat Racks

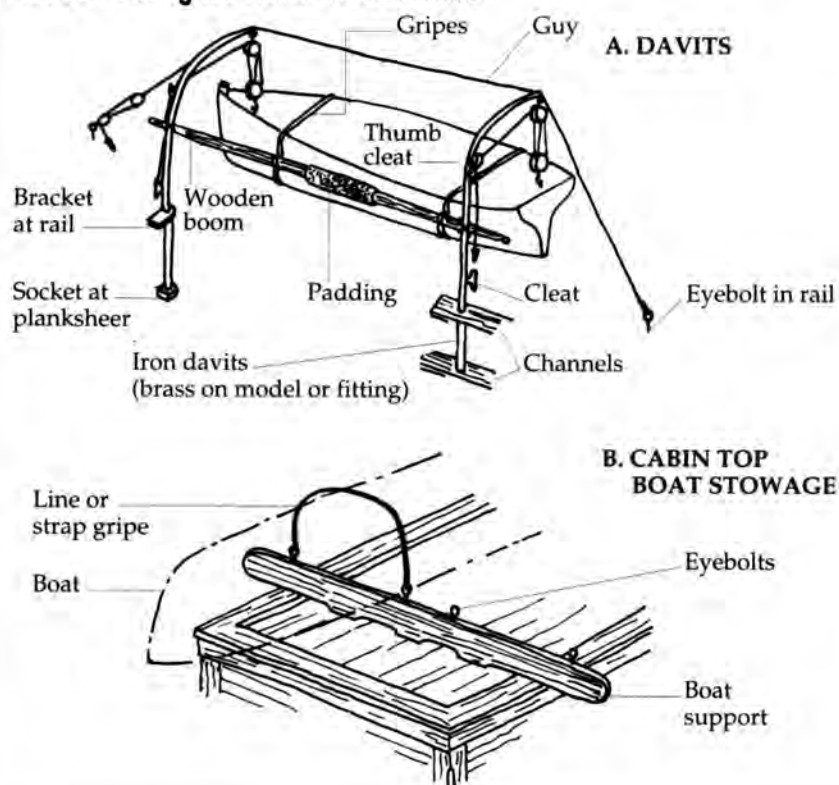


FIG. 56 - Fitting Out the Boat Interiors

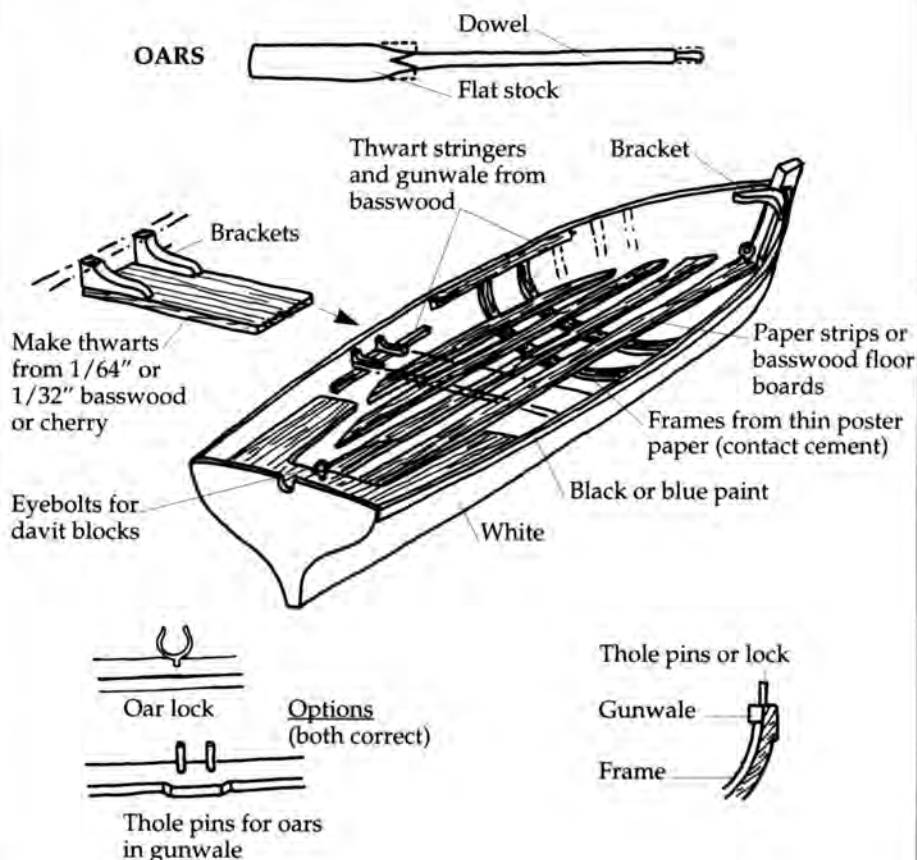
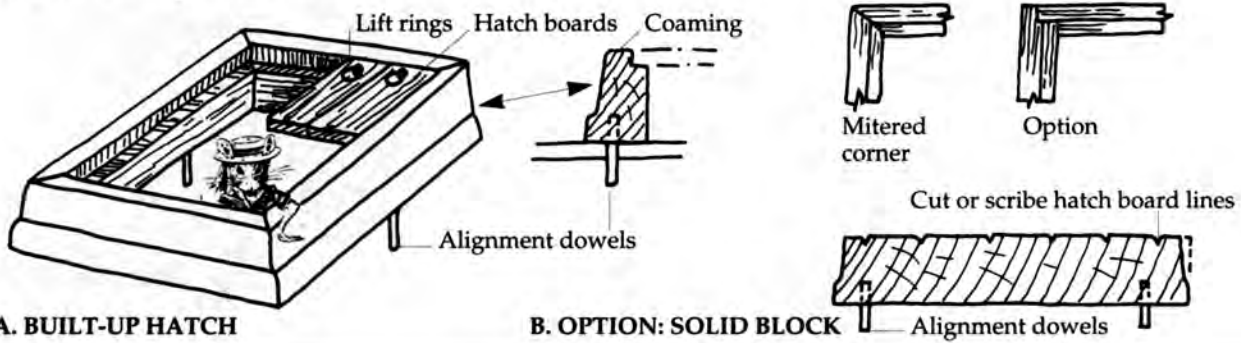


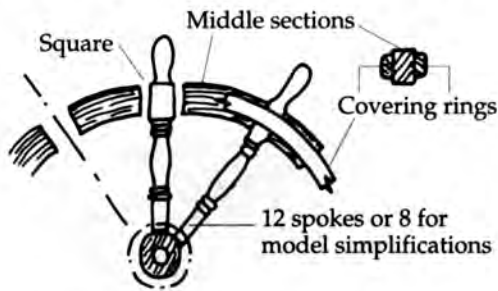
FIG. 57 - Building the Hatches



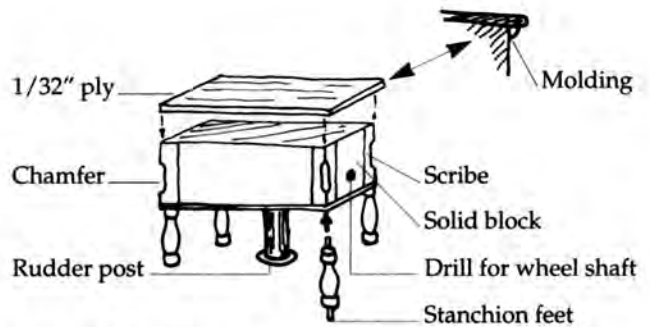
A. BUILT-UP HATCH

B. OPTION: SOLID BLOCK

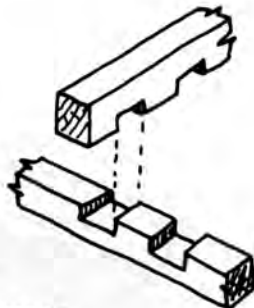
FIG. 58 - Steering Wheel, Grating & Wheel Box



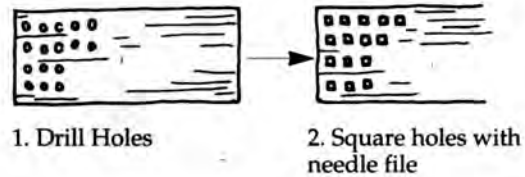
A. STEERING WHEEL
(make from cherry and stain)



B. SOLID BLOCK WHEEL BOX
(Option: build up per fig. 61)



C. PROPER GRATING
(difficult at 1/8 scale)



D. SIMPLIFIED GRATING

FIG. 59 - Forward Companionways & Water Closet

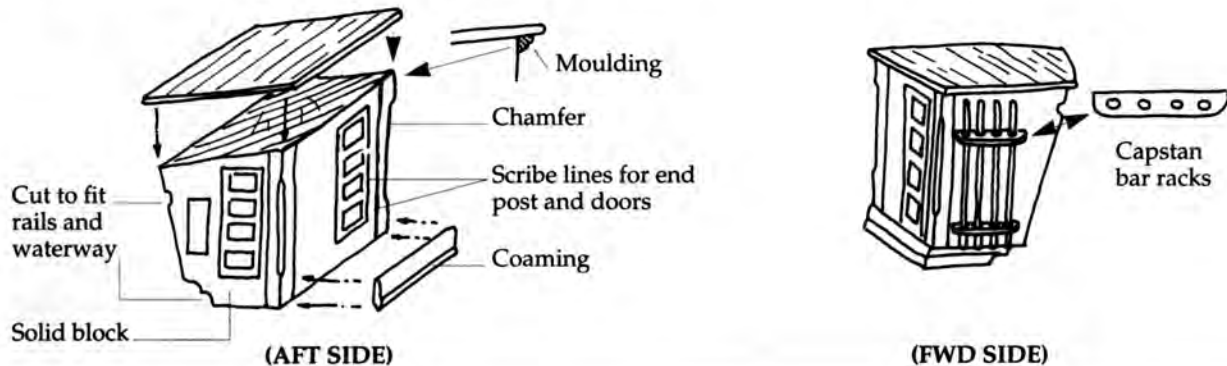
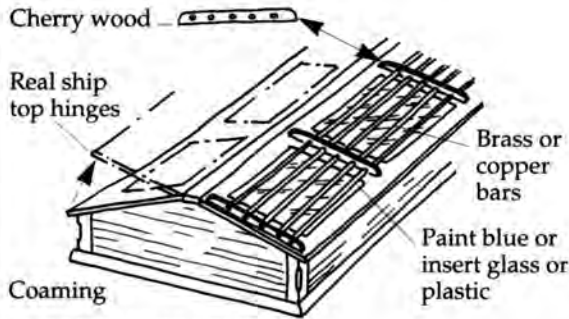
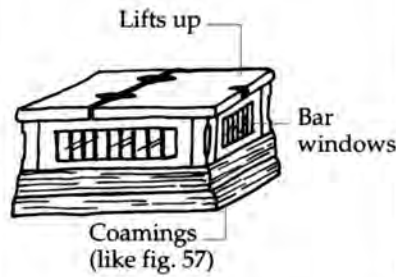


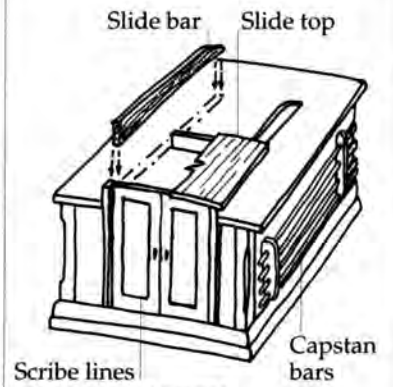
FIG. 60 - Skylights & Booby Hatches



A. CABIN SKYLIGHT

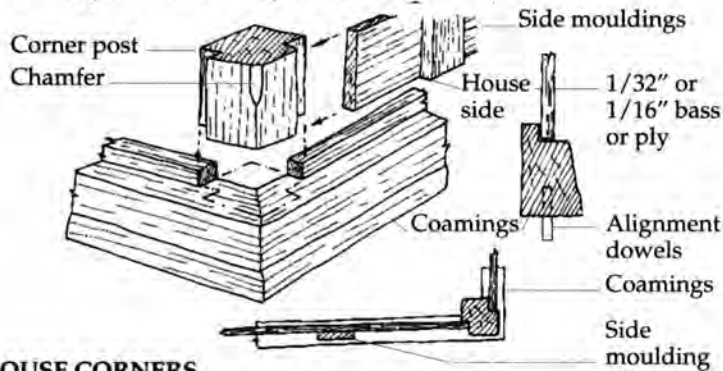


C. AFT STOREROOM HATCH/SKYLIGHT

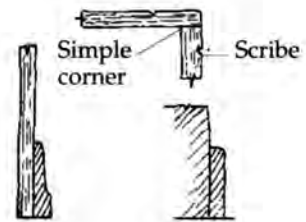


C. BOOBY HATCH

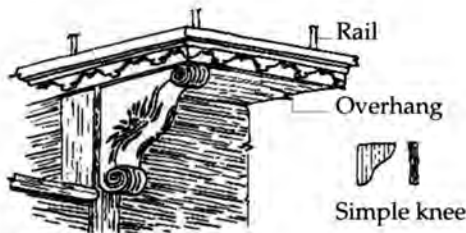
FIG. 61 - Upper Deck & Poop Deck Houses



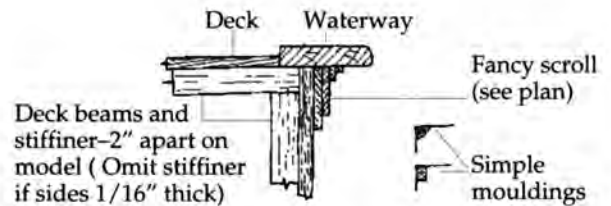
A. HOUSE CORNERS



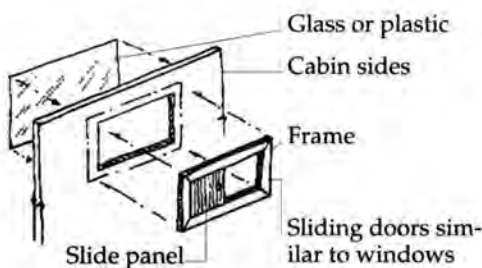
B. SIMPLE COAMINGS



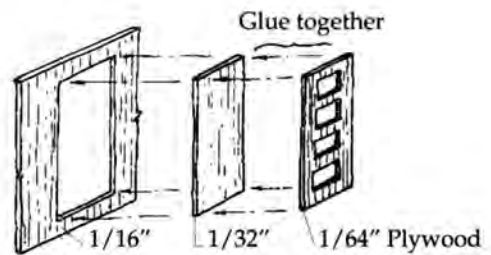
C. KNEES FOR AFT CABIN



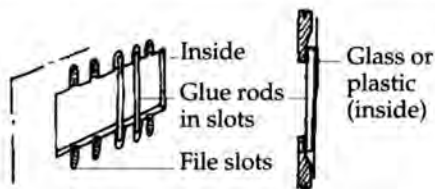
D. HOUSE CORNER TOP



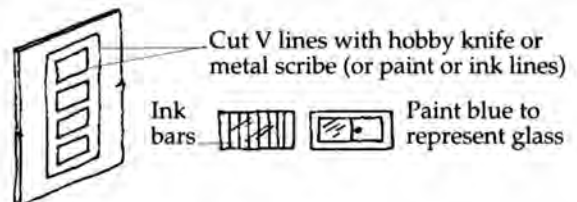
E. SLIDING WINDOW COVER



F. DOORS-PANEL MOULDING (Option: Carve Panels)



G. BAR WINDOWS (For Built-up House)



H. SIMPLE DOORS/WINDOWS

31. Deckhouse Internal Arrangements

As a matter of interest, the plans list the deckhouse and poop cabin living spaces on *Flying Fish* as they are described in the Boston Atlas article. You will find this listing on the inboard profile below each cabin shown on Plan Sheet 1. It was this interior arrangement that led to the shape of the cabins and the placement of doors and windows as shown on the plans. This is a very interesting part of the reconstruction. You'll find that there were a lot of spaces included in a very small area, indicating that life at sea in those days was cramped and could not have been that great. One compensating factor, however, was the fact that people were smaller then.

STAGE F

MAST & SPAR CONSTRUCTION

1. Getting Started

Hull Detail Plan Sheet 2 shows all masts and spars to scale. Sizes can be taken directly from this drawing. Sheet 4 illustrates the spars in more detail. Note, however, that while the main mast and spars are shown on this sheet, only dimensions are given for the fore and mizzen. The most useful dimensions are diameters, since these are the most difficult dimensions to determine accurately from a drawing.

The dimensions are given at the center or point of maximum diameter and at the ends. The taper in between these given dimensions should be parabolic, not a straight line (see figure 62). The yard arm diameter at the step would be about one inch less; or in the case of the model, the thickness of the material used for the block bands. From the step, the yard arm tapers slightly to the end.

The Importance of Scale: While the scale of masts is also important, the yards are probably the most critical spar to consider in regard to proper scale. Stubby, fat-ended yards stick out like sore thumbs, giving a model that unprofessional look. Care should be taken to assure that yards are tapered properly and to correct scale. It is sometimes difficult to taper a small yard, because breaking the yardarm is always a risk. However, taking time to remake a yard is worth it, so that the overall appearance is pleasing and scale-like.

Tapering Masts & Spars: The kit provides either round or slightly tapered dowels for masts and spars, but final tapering to plan dimensions is still required. A dowel is difficult to taper since it is already round. The best approach is to slice the dowel from a round shape at maximum diameter to a square shape at the ends, then to an eight-sided shape, then sixteen-sided shape. Final rounding is achieved by sanding. This approach prevents turning a round dowel into an oval (see figure 62).

FIG. 62 - Tapering Masts With Supplied Dow-

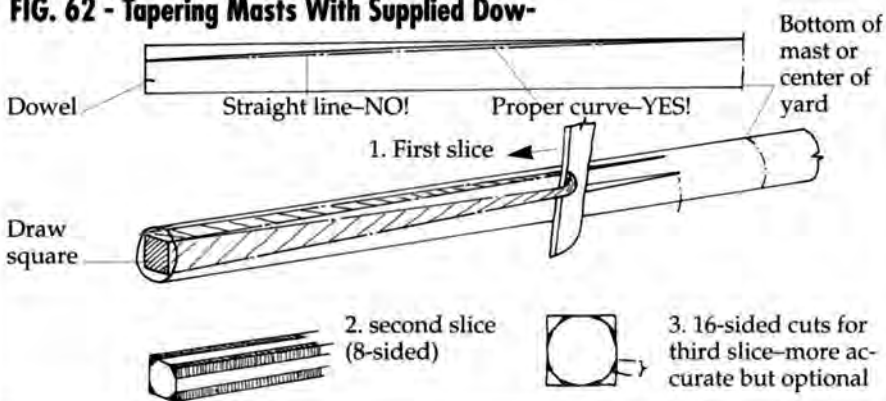
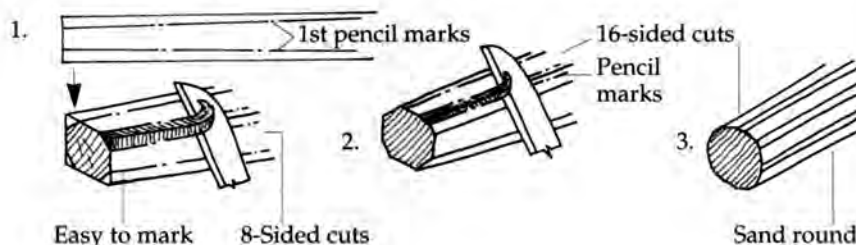


FIG. 63 - Tapering Masts With Square Stock



Tapering a spar from square stock is easier because the cutting lines can be marked more easily and precisely (see figure 63). If this is desirable, select a good straight-grained, warp-free piece of white pine or basswood (hardwoods tend to warp).

2. Fished Masts

The *Flying Fish* had two types of lower masts. The mizzen is a one-piece spar with no iron bands. The fore and main masts are made in several pieces called "fishes" (see figure 64). The "V" shaped slots formed on four corners were filled with small wedges between the metal bands.

After tapering the fished masts, cut the slots in each mast (see figure 65). Notice that the "V" tapers with the mast, so the slots get progressively smaller toward the top of the mast. If the masts are left natural, varnish them (these slots were often painted white for decoration. Note, however, that *Flying Fish* masts were originally white).

3. Mast Heads & Heels

Mast heads can be squared simply by using a razor saw and slicing away the round edge with a hobby blade (see figures 66 and 67). After squaring, cut the tenon (or tongue) at the top and chamfer the edges. The heel must be built up (assuming you started with a dowel). Drill a small hole for the fid and square it with a file, or use a round dowel for a fid.

FIG. 64 - Fished Mast (actual practice)

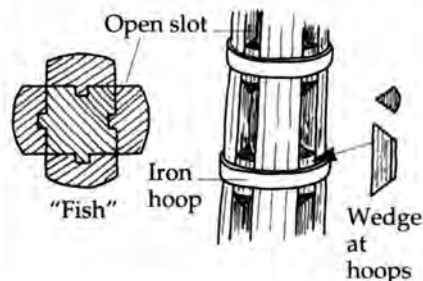


FIG. 65 - Simulated Fished Mast (for the model)

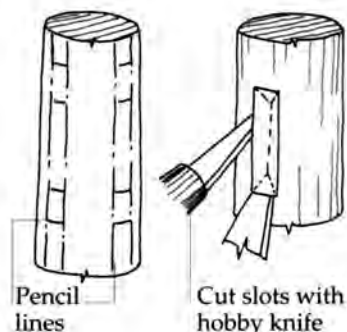


FIG. 66 - Mastheads

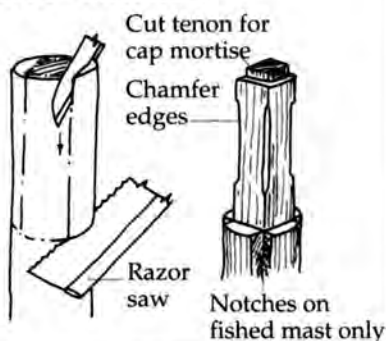


FIG. 67 - Heels

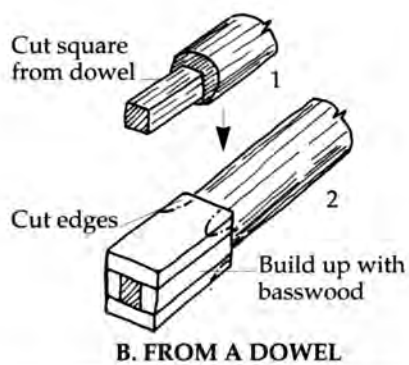
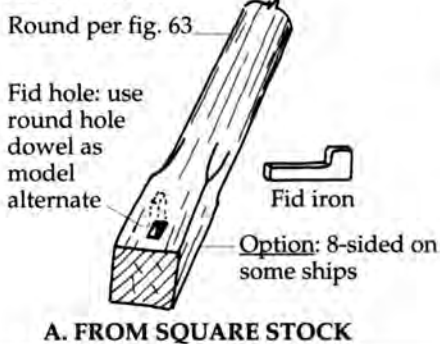


FIG. 68 - Scratch Building Caps & Tops

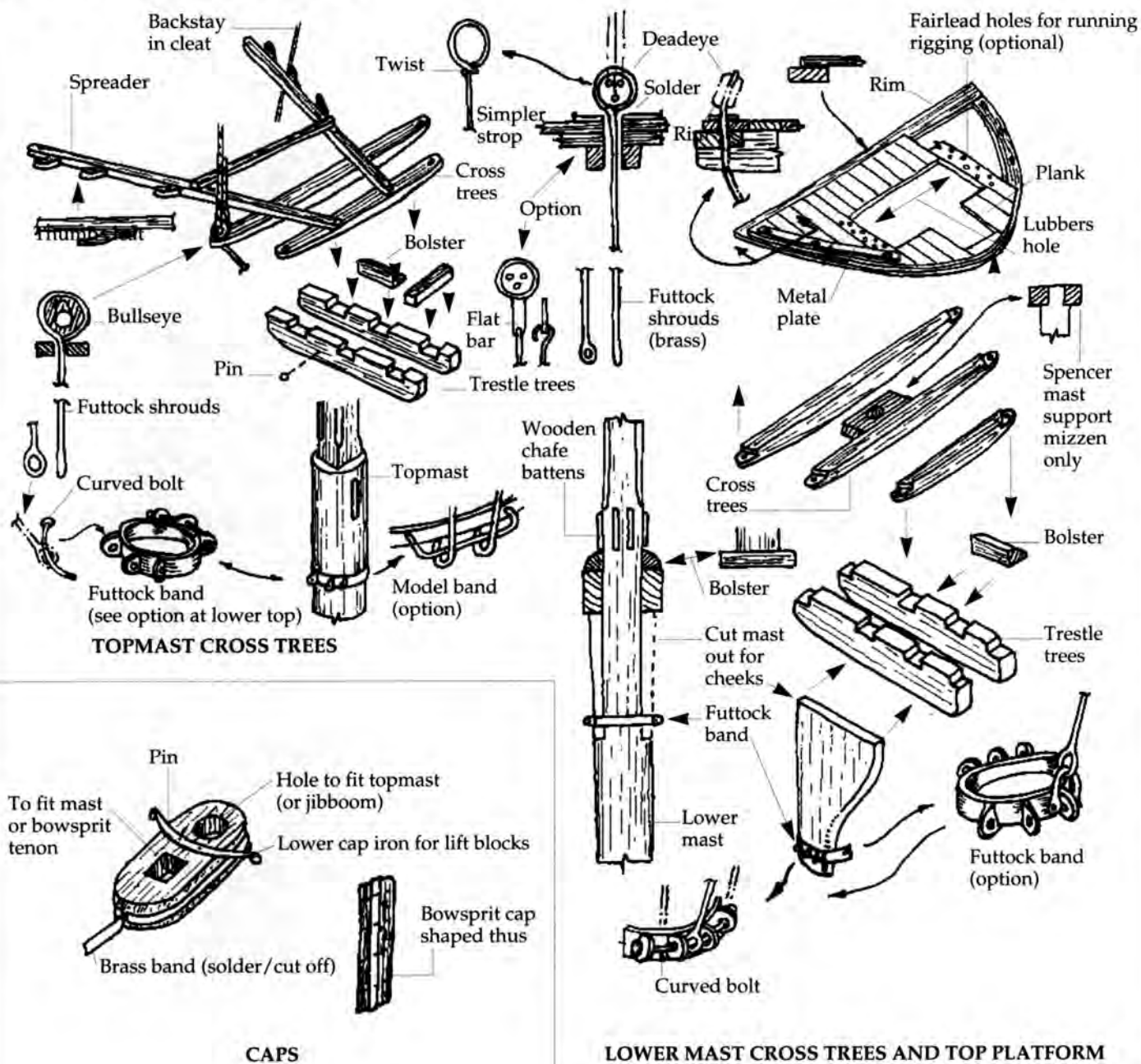


FIG. 69 - Mastballs & Spires

Make ball from wood, brass or moulded plastic or epoxy glue. Spire could be a pin with epoxy fillets

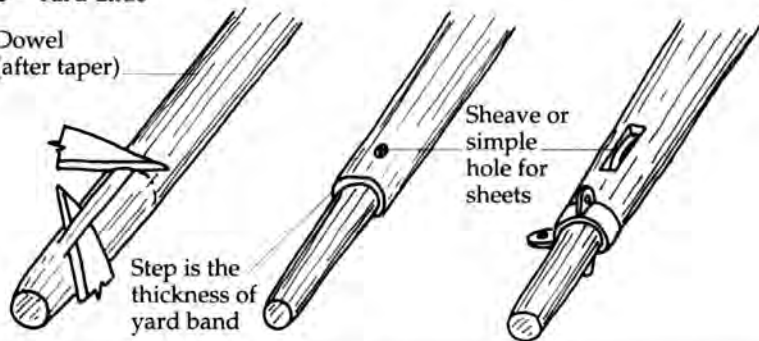


Small sheave for flag halliards (for model use simple hole)

Spire was most likely a lightning rod (copper wire to water-omit)

FIG. 70 - Yard Ends

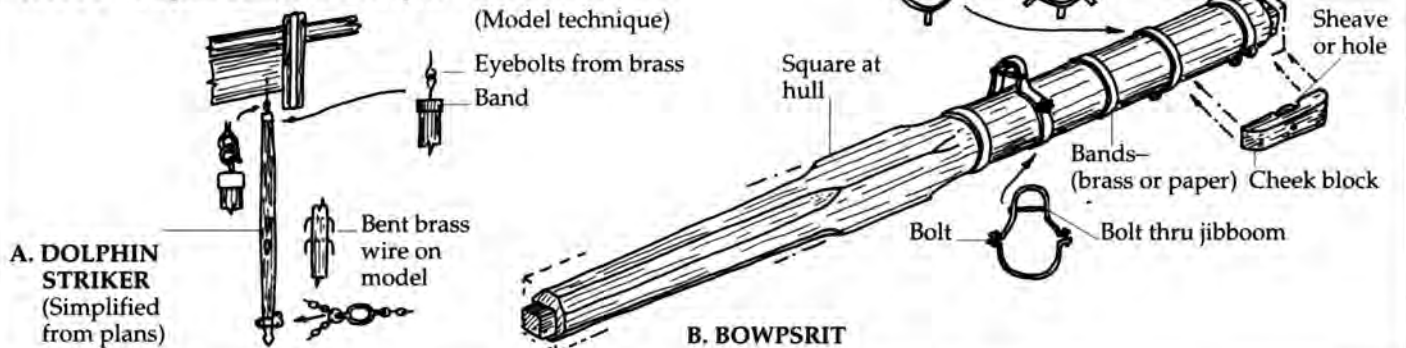
Dowel (after taper)



Sheave or simple hole for sheets

Step is the thickness of yard band

FIG. 71 - Dolphin Striker & Bowsprit



(Model technique)

Eyebolts from brass
Band

Square at hull

Tenon to fit cap mortise

Sheave or hole

Bands—(brass or paper)
Cheek block

Bolt
Bolt thru jibboom

A. DOLPHIN STRIKER
(Simplified from plans)

Bent brass wire on model

B. BOWSPRIT

4. Caps & Tops

Use the kit fittings or make them from scratch. A lower top is fun to make and is suggested as a beginner's scratch building project (see figure 68). The figure also shows the iron futtock shrouds and some variations on how they might be secured to the masts. Make sure the tenons on the mast heads fit tightly inside cap mortises.

5. Mast Balls & Spires

Notice the small sheave for flag halliards (see figure 69). Use a simple hole for the model, or simply tie the halliard under the ball. For what it's worth, a big guess regarding the function of the spire is that it may have been a lightning rod. These spires have been found on many old ships, and although they can be omitted on small models, they are interesting to note.

6. Yards

Next, cut the yard ends (see figure 70). If the sheet sheave is to be installed, drill a hole at each end of the sheave hole, then cut it out with a No. 11 hobby knife. Small commercial brass sheaves can be used, or an easier approach is to simply use a hole without a sheave. Make the yard band so that it fits snugly over the end of the yardarm.

7. Bowsprit

The bowsprit is next (see figure 71). The inboard end could be left as a square. Fit and glue the bowsprit onto the top of the center keel area provided in the laser cut keel. The fittings are also shown. The bands may be made of brass or paper strips. The dolphin striker is shown made from a small dowel or square stock.

8. Creating the Ironwork

Certain bands, such as those for the skysail yardarm, will be difficult to make at 1/8 scale. As an alternative, you can omit the bands and simply wrap the lines around the yardarm (see figure 72). Such a simplified technique, while not correct, is still better than having a metal band that is too large and bulky looking. Use bands when the yards get larger and proper scale can be achieved.

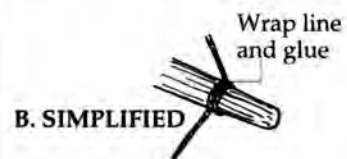
Some bands, such as mast hoops and yard bands, can be made of paper strips and painted black (see figure 73).

Other iron fittings and details are required (see figure 74). You should understand that goosenecks, yard parrals, trusses and other ironwork varied considerably on different ships, depending on the whims of the blacksmith. The types shown are simple and typical of the mid 1850's, but not necessarily the exact type used on *Flying Fish*. Like the deck areas, ironwork and rigging are reconstructions.

FIG. 72 - Ironwork

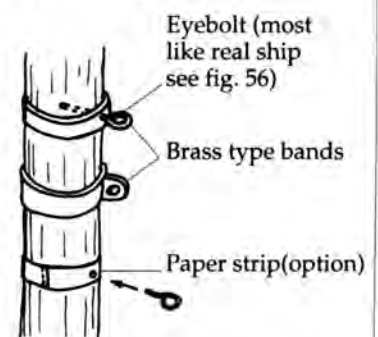


A. CORRECT BUT DIFFICULT



B. SIMPLIFIED

FIG. 73 - Mast or Yard Bands



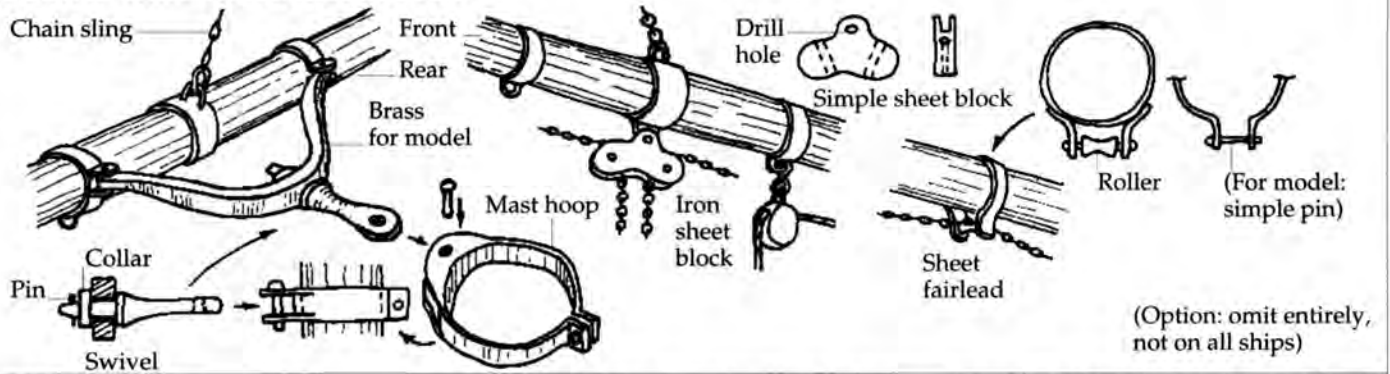
Eyebolt (most like real ship see fig. 56)

Brass type bands

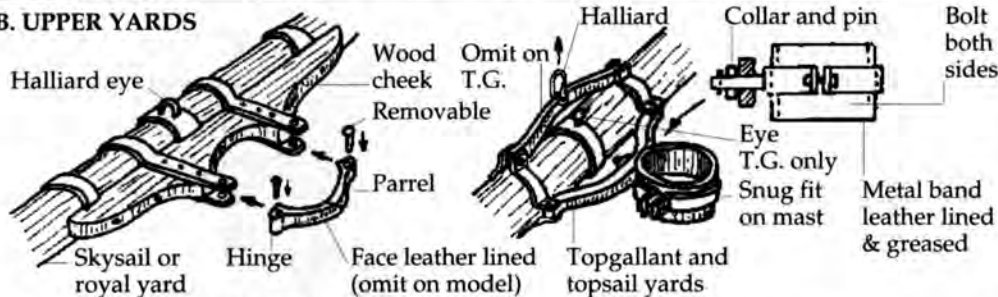
Paper strip(option)

FIG. 74 - Details of Other Iron Fittings

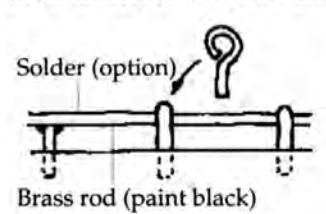
A. LOWER YARD TRUSS/SHEET BLOCK



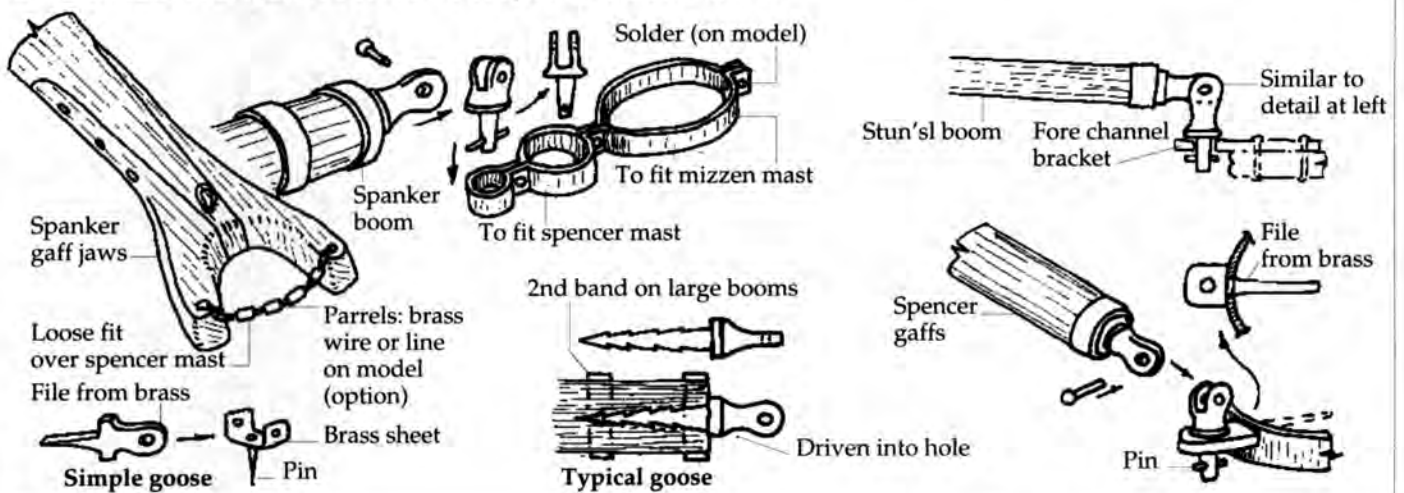
B. UPPER YARDS



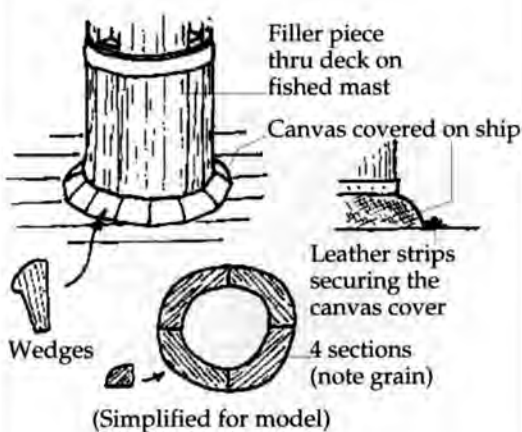
C. JACKSTAYS (Yard or Mast)



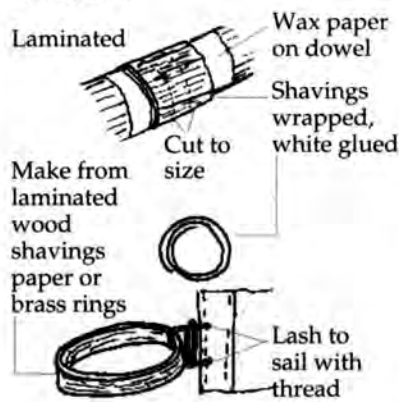
D. SPANKER / SPENCER / STUN'SL BOOM JAWS / GOOSENECKS



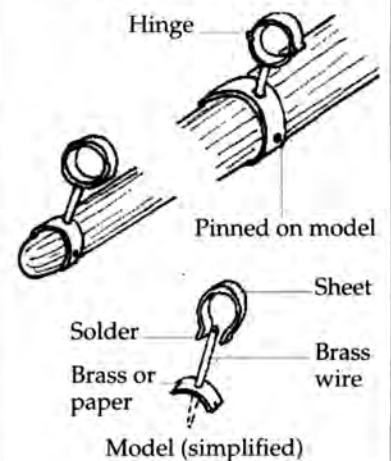
E. MAST COAT



F. HOOPS



G. STUN'SL IRONS



An interesting point is that texts such as Lever-Blunt's *The Young Sea Officer's Sheet Anchor* have been used as more typical of the mid 1850's. The information contained in Underhill publications (see Bibliography) must be taken with caution, as the details shown are more sophisticated, and date from the late 19th century. The simpler *Flying Fish* ironwork is considered derived from the early 19th century.

9. Mast Assembly

Paint or stain all masts and spars as required, and add all ironwork and blocks. Add tops, futtock shrouds and deadeyes. Secure the lower caps to the topmasts, and topmast caps to the topgallants, using glue and a pin. As you glue the caps, temporarily assemble the upper and lower masts, so they can be aligned properly. Final assembly takes place after the shrouds are installed (see figure 75).

Before adding yards to the masts, install the footropes. Before you install the masts on the model, add the yard lifts (see Rigging discussion and plans). It is easier to do some of the rigging with masts and yards in hand. At this point, you are ready to install the lower masts. Insert the pre-cut slots into the laser-cut center keel, but **DO NOT GLUE**. Align the masts and simply **WEDGE THEM INTO PLACE**—you may want to remove the masts for moving, or for restoration in years to come.

10. One Final Caution

Before you install the spencer mast aft of the mizzen, along with the spencer gaffs, make sure the sail hoops are in place. Even if no sails are installed, the hoops should be stacked on the mast and gaffs. With the lower masts in place, you can start the rigging process.

After the lower shrouds and stays are in place, install the topmast and rig, then install the topgallant, royal, skysail and rig. The cap and heel need not be glued, since the cap is fitted over a square tenon and the heel is square. Nothing will move anyway. Also, the standing rigging (shrouds and stays) will hold everything in place.

FIG. 75 - Assembling the Masts

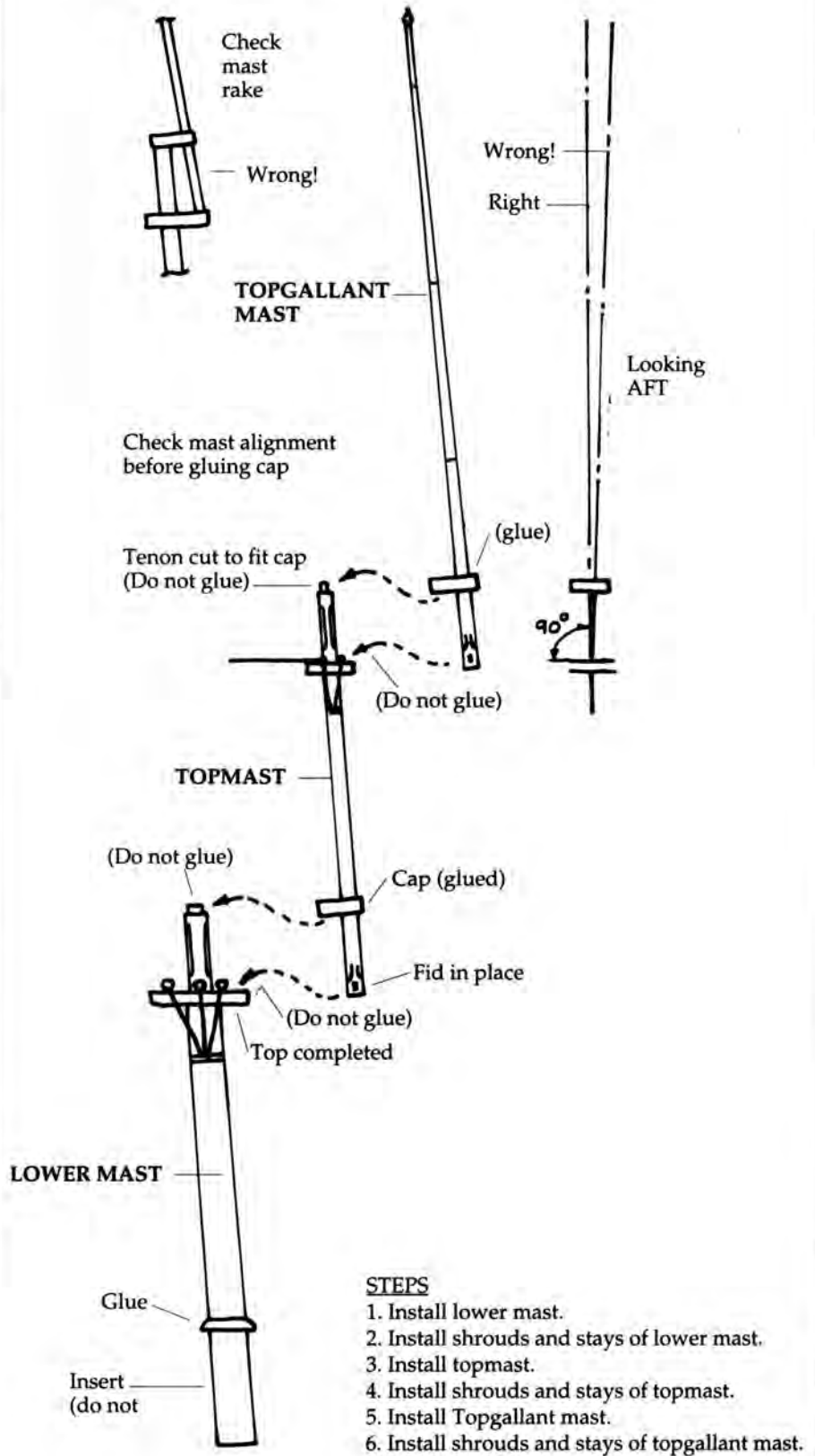


FIG. 76 - Belaying Pins & Their Lines

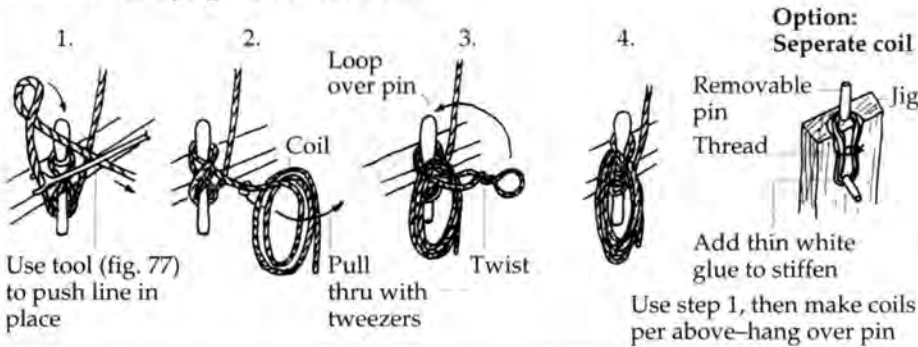


FIG. 77 - Rigging Tools

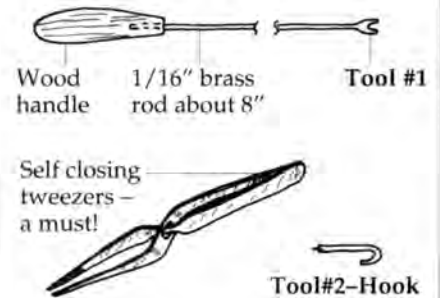
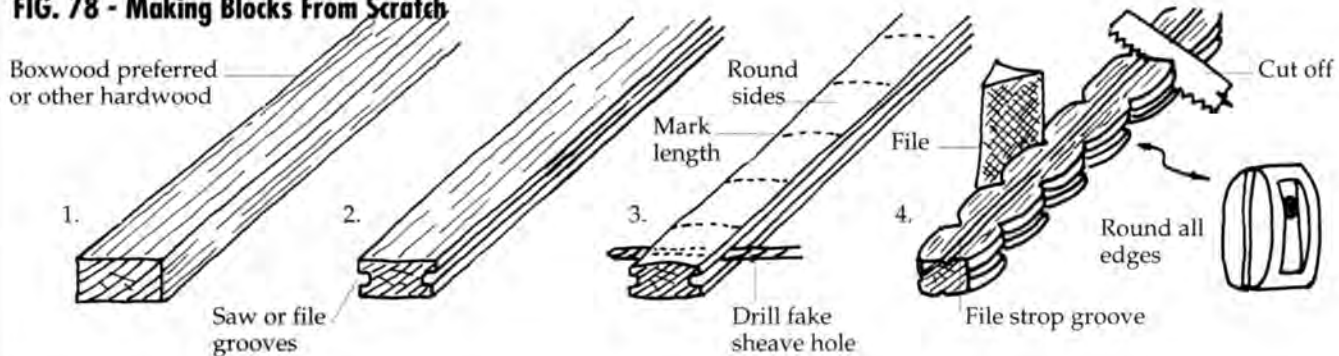


FIG. 78 - Making Blocks From Scratch



STAGE G

GENERAL RIGGING & SAILMAKING INFORMATION

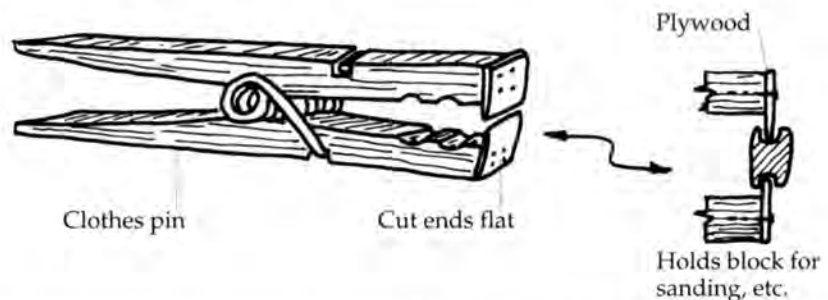
Rigging plans are often confusing because of the numerous lines involved, and the fact that overlapping and concealing of some of the detail occurs. Every effort, however, has been made to make the *Flying Fish* rigging procedure as clear as possible. Modelers should have little trouble, if the plans are reviewed thoroughly and the instructions are followed.

The rigging lines provided in the kit will not cover all the exact sizes shown on the plans. For a more accurate representation, additional lines should be purchased. Linen line is best, especially for standing rigging. If you cannot find all sizes, use the smallest size in a group; it is better to have lines under rather than over scale for the sake of appearance.

1. Using the Rigging Plans

Rigging Profile Sheet 2 shows a typical profile view of the ship rigged without sails. Most modelers will probably rig the model according to this plan, in addition to using the details (without sails) found on Rigging Sections Sheet 3. The yards are shown full length and displaced sideways for clarity. Obviously, on a real ship, the yards would not be braced to this extreme. Sheet 2 shows some sizes, primarily the standing rigging

FIG. 79 - Making a Simple Jig



and fore and aft lines. Lines not dimensioned are covered on Sheet 3. A conversion table is located on Sheet 4 that allows you to easily convert sizes to the 1/8 scale required for the model.

Sheet 3 illustrates the main mast and yards, with notes and rigging sizes given for the fore and mizzen. Several transverse views are shown in an effort to make the rigging clear. Shrouds, stays and backstays have been omitted from these views, since they are adequately illustrated on the profile. In addition, one view shows yards lowered with no sails installed. Another view illustrates yard locations with sails installed. The next view separately illustrates the studding sails for clarity. The yard halliards have been omitted from these views, and also are shown separately to avoid confusion.

Sheet 3 also shows details of the spanker, spencers, typical fore and aft sails, and a

typical furled sail. For sails not drawn to full model size, refer to the small scale sail plan on Sheet 4. You can sketch the other sails on Sheet 2 as a starter, or lay out each sail on a separate sheet of drawing paper.

2. Belaying Pins & Their Lines

While not all pins are used if you omit sails, the pins can, and should be, installed on the model. You'll find a belaying pin plan on Sheet 4. The belaying of a line to a pin is illustrated (see figure 76).

3. Rigging Tools

Some useful tools essential for the rigging process are also illustrated (see figure 77).

4. Blocks

Rigging Plan Sheets 2 and 3 show all blocks and sizes required for a model with or without sails. Using the conversion tables on Sheet 4 of the plans, you can determine the approximate model size to use. You will note, however, that some blocks, when converted to 1/8 scale, are very small and nearly impossible to make. A 1/16" block is about the smallest practical size for handling, so these, or even 3/32" blocks, can be substituted for the smaller sizes.

The kit does not contain all the blocks necessary for a completely sail-rigged model. Purchase additional blocks, or have some fun and make them from scratch (see figure 78). The blocks need to be sanded and the holes reamed larger, so it will be easy to reeve lines. An indispensable tool for holding small blocks is a "jig". Make one for yourself (see figure 79). Stopping the blocks like the real ones is almost impossible at 1/8 scale. Some suggested modeling alternatives are shown (see figure 80).

5. Attaching Blocks

Blocks are attached to lines or stations with shackles and hooks (see figure 81). At 1/8 scale, the simple link is a good substitute for a shackle. Although not necessary, the link should be soldered after installation to prevent it from coming loose.

6. Treating the Lines

Worming, Parceling & Serving: Lines on ships were wormed, parceled and served (a method of protecting parts of a rope where they are likely to be chafed, such as the shrouds especially at the mast heads and ends of lines fitted with thimbles. For models, worming ("laying thin pieces of line (the worms) between the strands"), and parceling ("winding strips of canvas saturated with tar over the part wormed") is unnecessary. Only serving ("tightly binding the wormed and parceled area in the other direction with spun yarn") is required. Serving the lines should be done with fine silk or linen thread.

Avoid fuzzy cotton, if possible (see figure 82). Subsequent illustrations will show generally where serving is required. Also, refer to notes on the plans.

Seizing: Use sewing thread or silk to seize the lines. After securing each line, touch the bound-up leading end with a small amount of white glue to prevent it from loosening (see figure 83).

Splicing Option: Splicing is fun to do, but difficult when working on small lines. Shown is how to execute the real thing, as well as a simpler approach (see figure 84).

FIG. 80 - Stopping the Blocks

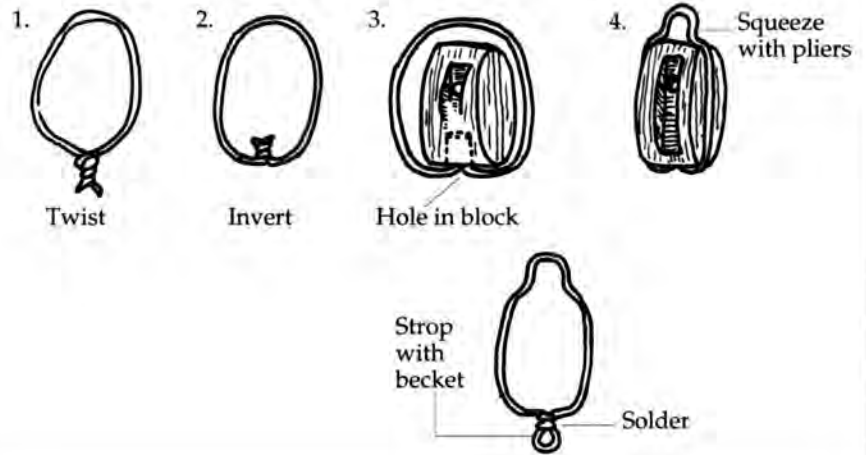


FIG. 81 - Making Shackles & Hooks

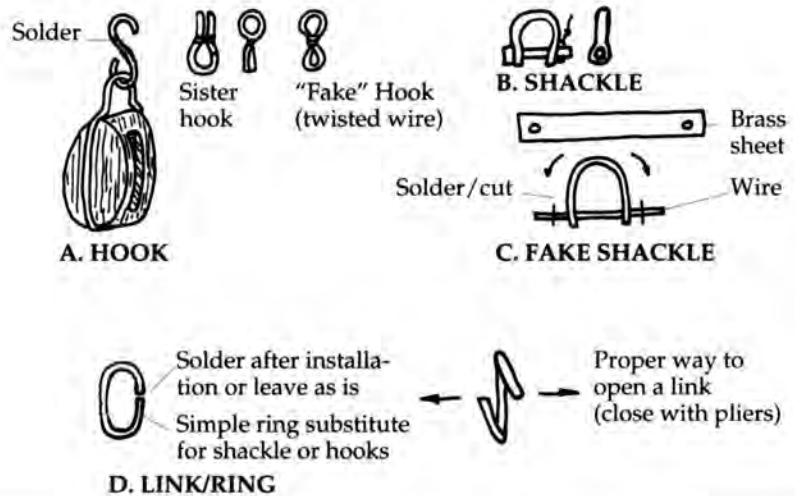


FIG. 82 - For the Model, Only Serving the Lines is Necessary

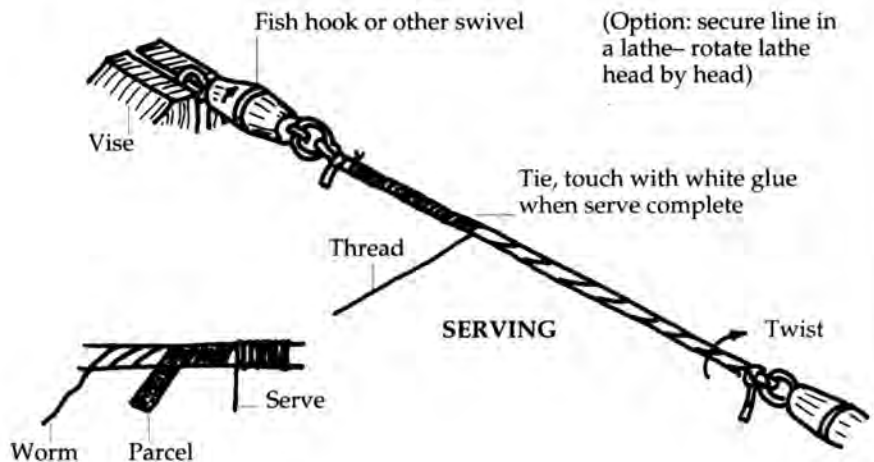
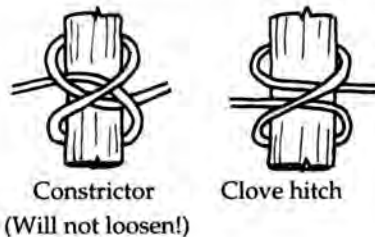
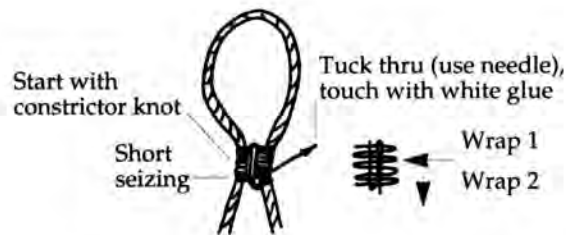


FIG. 83 - Seizing the Lines

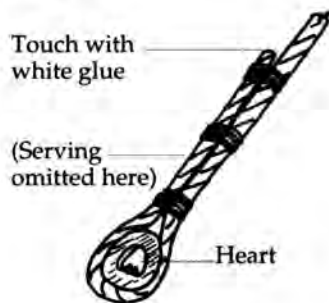
1. KNOTS



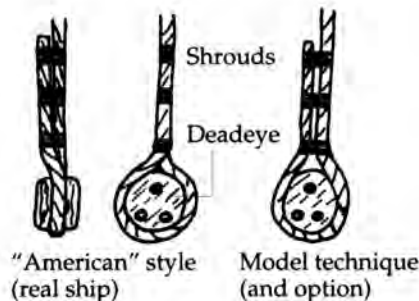
2. SHROUDS OR DOUBLE STAY



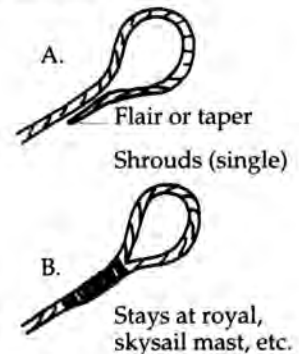
3. STAYS



4. SEIZINGS



5. EYE SEIZING



7. Differentiating Between the Lines

On the real ships, standing rigging was tarred, so the model's lines should be very dark brown or black. Black liquid shoe polish or Floquil paint will do the trick. Staining can be done before or after you've rigged the lines, and depends strongly on whether you choose to use beeswax or not.

Running rigging are untarred lines and should be light tan in color.

8. Using Beeswax

Beeswax protects the lines against moisture and helps to eliminate fuzz. If you plan to use it, lines that need "tarring" must be stained and dried first before running over a block of beeswax. Only then should they be rigged to the model.

9. Rigging the Model Without Sails

If you are modeling with the sails omitted, follow the general scheme shown on Sheet 2, along with the associated items on Sheet 3. With sails off, clew lines and sheets (for square sails), and halliards and downhauls (for fore and aft sails) are not removed, but simply shackled together. Most modelers do not install bunt and leech lines, or reef tackle and their blocks (reef tackle and blocks should not be installed). However, bunt and leech line blocks were most likely left in place when sails were removed, so you may install them. Also, the bunt and

leech lines may be installed with the ends knotted and simply stopped at the blocks. The option is yours.

10. Rigging the Model With Sails

Install sails all fully set, all furled, or a combination of both. You could also have some sails pulled up slightly at the clews and bunts, as if the sails were partially open for drying in dock. Look at some photos or museum models for ideas.

The following rigging is required in addition to that which is normally found on a model without sails:

- a. Square Sails: bunt lines, leech lines, reef tackle and the courses (tacks, sheets, and clew garnet; term is also applied to clew lines for lower sails).
- b. Staysails: sheets
- c. Spanker & Spencers: inhauls, outhauls and brails. Furled sails will have the same lines as with sails fully set. Furled sails on *Flying Fish* are clewed to the quarters (center of yard). On some other ships and those with double topsails, the sails are clewed to the yardarms.

11. Sailmaking

When making sails, it is important to choose the right type of material. Sail cloth for models must be light in weight, yet fairly opaque. A tight weave cotton cloth is acceptable. An excellent choice is Egyptian cotton spinnaker cloth referred to as "ballooner cloth". Linen is an ideal

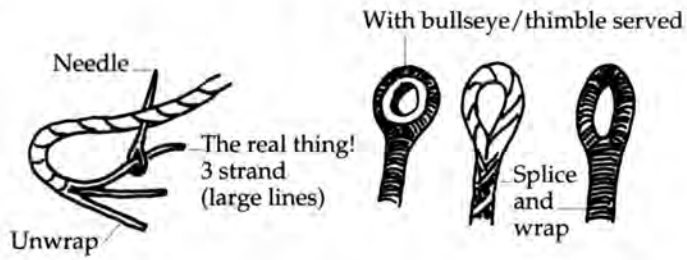
material, but probably too heavy for 1/8 scale models.

The cloth must be pre-shrunk, so wash it several times. When dry, iron the cloth, but be careful not to scorch it. Next, draw the seams and hem lines and other reinforcements in light pencil, then sew the seams. A sewing machine makes fast work of the project. Use light tan cotton thread so that the seams show up nicely. Make some trial passes on a piece of scrap cloth and set the tension so it does not make puckers in the stitch line. No actual reinforcement patches need be used. Instead, simply sew two stitch lines to represent reinforcements, such as the reef bands (see figure 85).

After the stitching is completed, you may iron the sails. Be careful not to burn them. Next, cut the sail shape using line "A" as shown. Then roll the hem per sketch, iron flat and sew (as close to line "B" as possible). Tuck the ends and hand sew the corners as shown. The sail is now ready for stretching.

Stretching the Sails: This step will assure that the sail shape is correct, since it may have been altered during sewing. Using the original pattern, draw the outline of the sail's shape on a piece of paper. Place the piece of paper down on a solid, but penetrable backing, such as a wooden board or cork. Now wash the entire sail again and lay it over the outline you've just drawn. Stretching the wet sail to the outline's shape, stick pins through its outer edges and into the backing to hold it

FIG. 84 - Using the Splicing Option



REAL SHIP

MODEL OPTIONS

FIG. 85 - Making the Set Sail

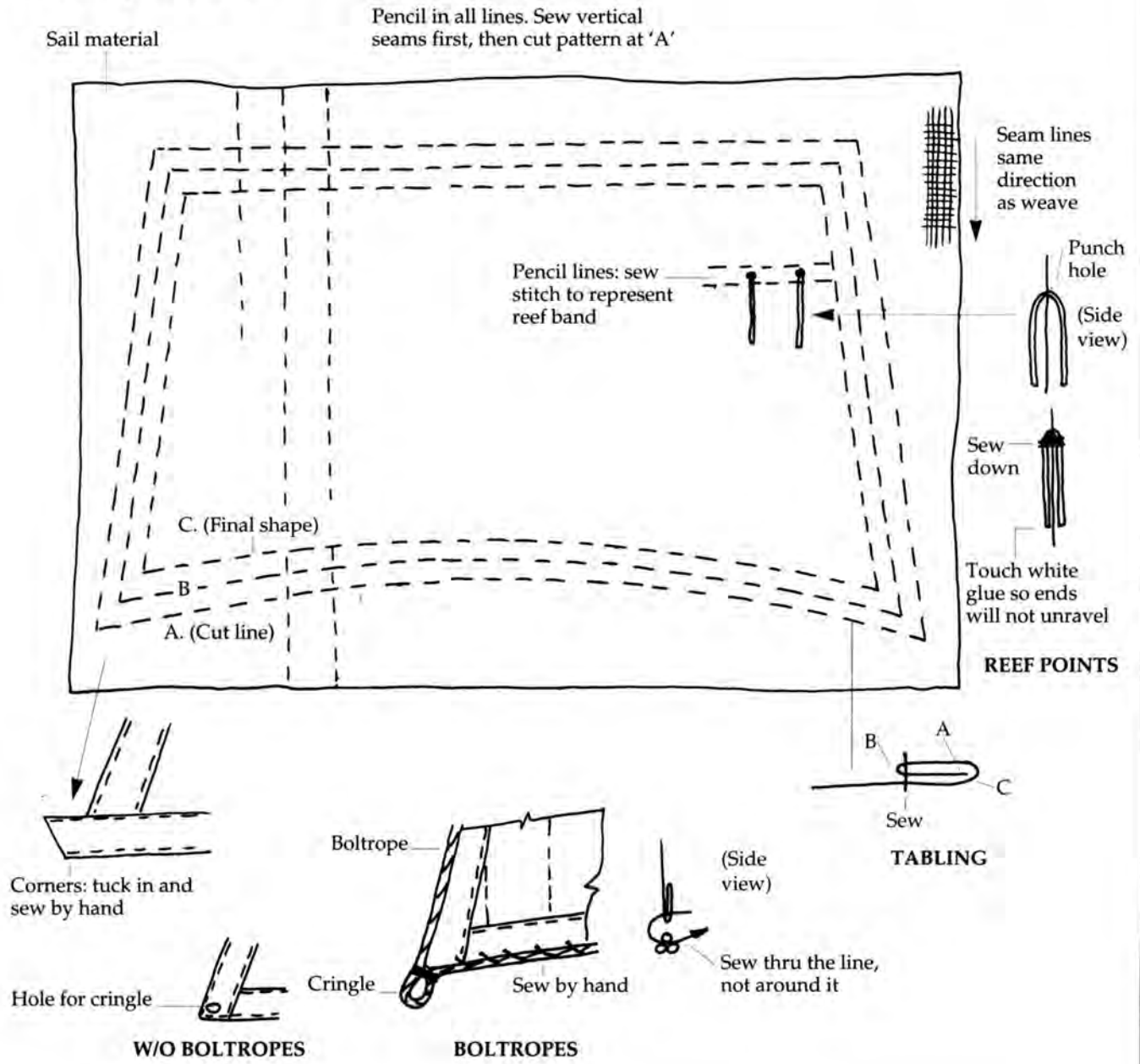
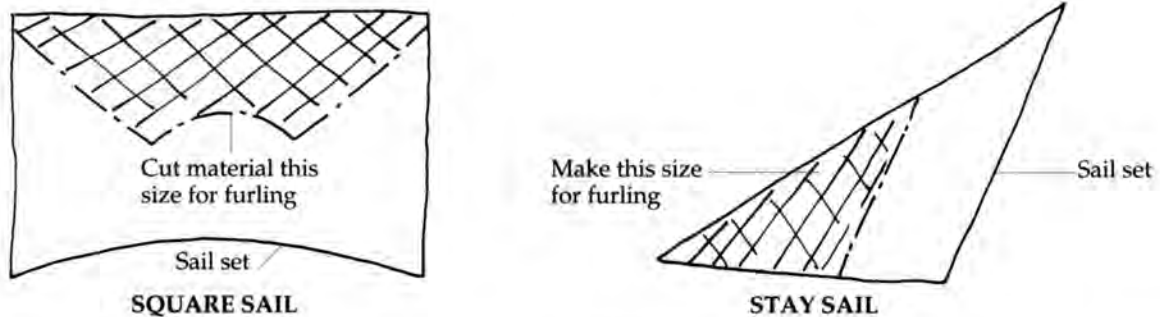


FIG. 86 - Making Sails for Furling



in place. When the sail is dry, it will have the proper shape. Iron it flat.

Edge Boltropes: Sewing edge boltropes onto the sail can be omitted since they appear so small in 1/8 scale. However, if you wish to include them you may follow the tedious method shown in figure 85.

Furled Sails: It is impossible to furl a sail made from the same material and of the same size used for the fully set sail. The cloth is usually too heavy, causing the sail to become too bulky looking. There are two solutions to this problem. First, you may use a lighter material such as Silkspan, which is a model airplane covering tissue; or second, you may elect to use the same cloth, but cut it to a proportion one-third the size of the original to reduce bulk (see figure 86). You must still add some seams and hems, though, since even with the sail furled, the detailing will show.

STAGE H

STANDING RIGGING

As mentioned in the discussion under General Rigging Information, all lines for the standing rigging should be black.

1. Shrouds, Stays & Backstays

Install shrouds, stays and backstays progressively from lower masts to the skysail mast (see figure 87). Make sure you do not pull masts out of line when setting up the deadeyes. When all shrouds are in place, you may install the ratlines, using one of the methods shown. Be careful not to draw the shrouds together in the process.

2. Footropes & Lifts

As noted earlier, footropes and yard lifts are more easily installed while the masts are still in hand (see figures 88 and 89). Make sure the lifts are even on both sides so that the yard is level. The lower lifts also can be considered running rigging since they contain a tackle. Bowsprit and spanker boom footropes are similarly fitted as yard footropes. Details of these can be seen on other sketches provided for the boom and bowsprit (see figures 90 and 92).

3. Bowsprit Rigging

To pull all the bowsprit rigging chain taut, use connecting links. They are comprised of two hearts connected with a lanyard as shown in upper left area of figure 90. Solder the links once they are in place. Notice that some of the stays lead in through the bulwarks. Refer to figure 53 for more detail inboard. See the conversion table on Plan Sheet 4 of 4 for suggested 1/8 scale chain sizes.

4. Spanker & Spencers

The spanker boom and spencer gaffs may be installed, along with their topping lifts and yards, before the masts are actually installed on the model. Such procedures are optional (see figures 91 and 92 which show standing and running rigging, and sails). This completes the standing rigging. Recheck alignment of masts, levelness of yards, angles of gaffs and booms, and proper rake of masts. Correct any errors before proceeding to the running rigging. All standing rigging should be rather taut, not slack.

STAGE I

RUNNING RIGGING

The running rigging lines are all beige in color. If you are going to apply beeswax to the lines, it is best to do it before rigging them. Especially in the case of the standing ends of running lines and those attached to blocks. Again, it is important to think about procedures well in advance of installing any parts.

Where to Begin: While the many rigging plans show the rigging through the blocks at the mast, the leads from that point are often confusing. Does the line go directly to a belaying pin, or does it feed through something? It could go either way. However, the *Flying Fish* plans were developed with a particular run in mind. While the sketches should suffice, some general comments are in order.

All clew lines, bunt lines, sheets, reef tackle, staysail halliards and downhauls, and most braces leading to the fife rails or pin rails, should follow down the masts and go

through the lubber's hole in the lower tops (See figure 93 for staysail, halliard and downhauls). Bunt, leech and clew lines could go through fairlead holes drilled through the top planking adjacent to the lubber's hole. Once through the lubber's hole, they should go directly to the pins in the fife rails, or in the case of loose lines such as clew, bunt, and leech lines, and reef tackle leading to the port and starboard rails, they should feed through fairleads or trucks seized to the shrouds and backstays. A truck is similar to a bullseye or deadeye, having separate holes for each bunt and leech line. See details on the plan sheets. If you prefer, you could use commercial dead-eyes on the model.

The yard halliards, after passing through the sheave in the mast, should go directly to pins in the rails (via the tackle, of course).

You may lead most of the braces directly to pins in the main rail. The mizzen topsail yard brace leads through the lubber's hole to the fife rail. Otherwise, it would chafe on the top.

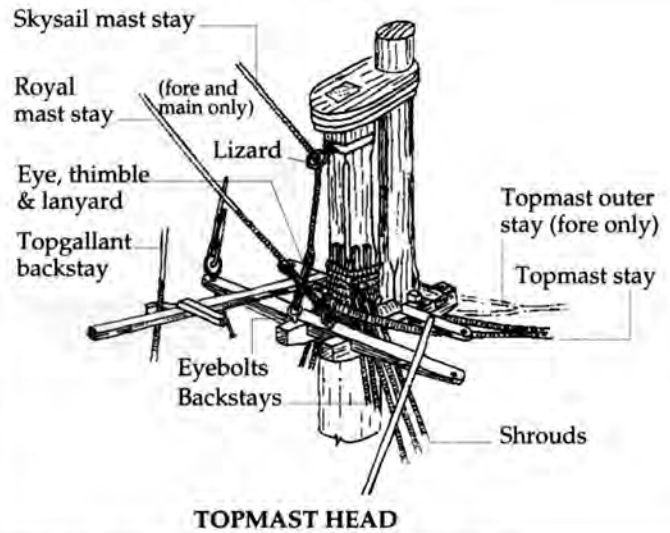
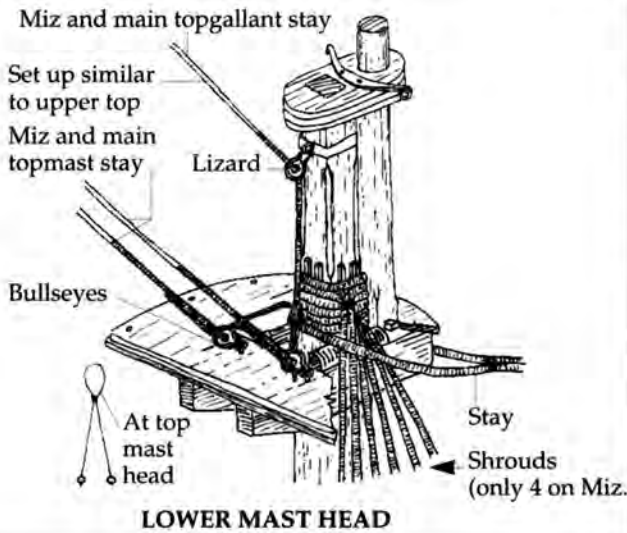
There are a number of spare pins shown on the plans. These can be used for some of the studding sail lines and bowlines that lead to the deck. As shown in the stuns'l figure, however, many of the stuns'l lines are simply tied to shrouds. Use your own judgment and belay them to convenient points.

Before you begin, determine the length of the line you need and allow an additional spare length of at least 12 to 18 inches. The extra line will give you something to hold onto while pushing the line under the belaying pin. After the line is belayed and the coil is in place, you may cut off the remaining line. Remember that running rigging should droop just a little for more realism.

1. Staysail Halliards & Downhauls

These lines are shown as they would appear without sails. (see Figure 93). Notice how the downhauls and halliards are shackled together near their lower ends where the sail gets removed.

FIG. 87 - Rigging: Shrouds, Stays & Backstays



SHROUD/STAY SEQUENCE

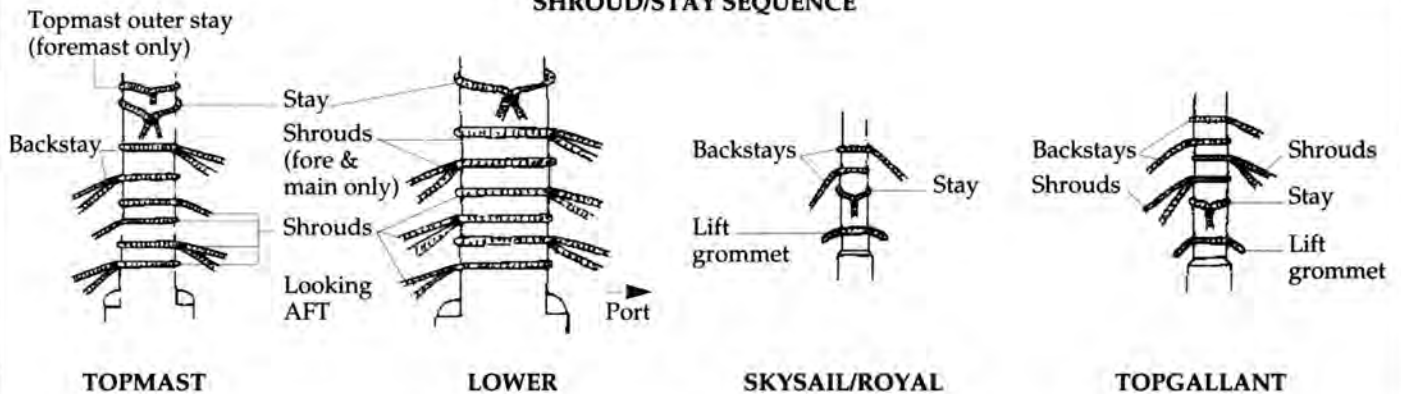


FIG. 88 - Installing Footropes

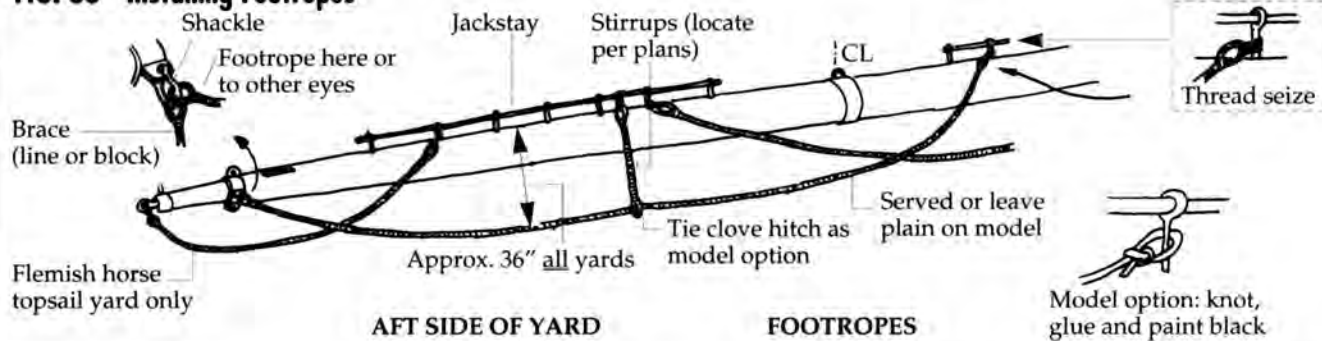


FIG. 89 - Installing Yard Lifts

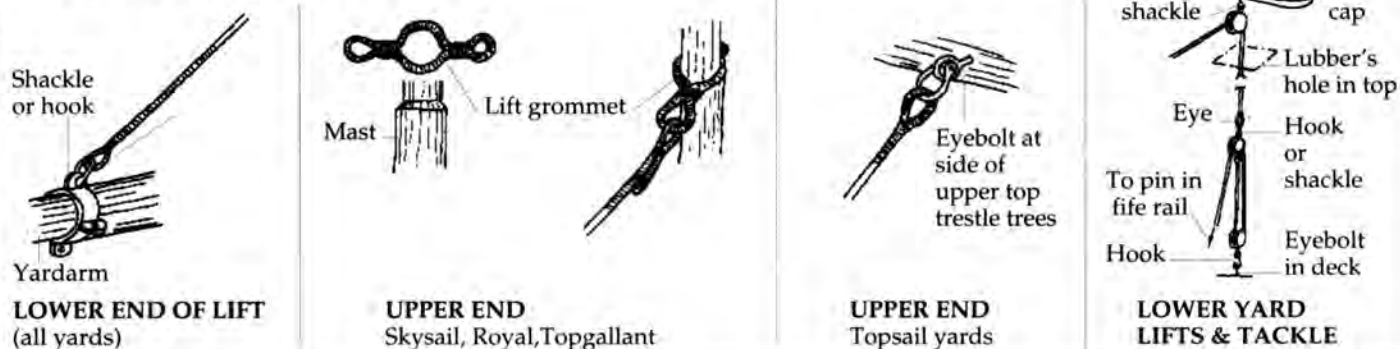


FIG. 90 - Rigging the Bowsprit

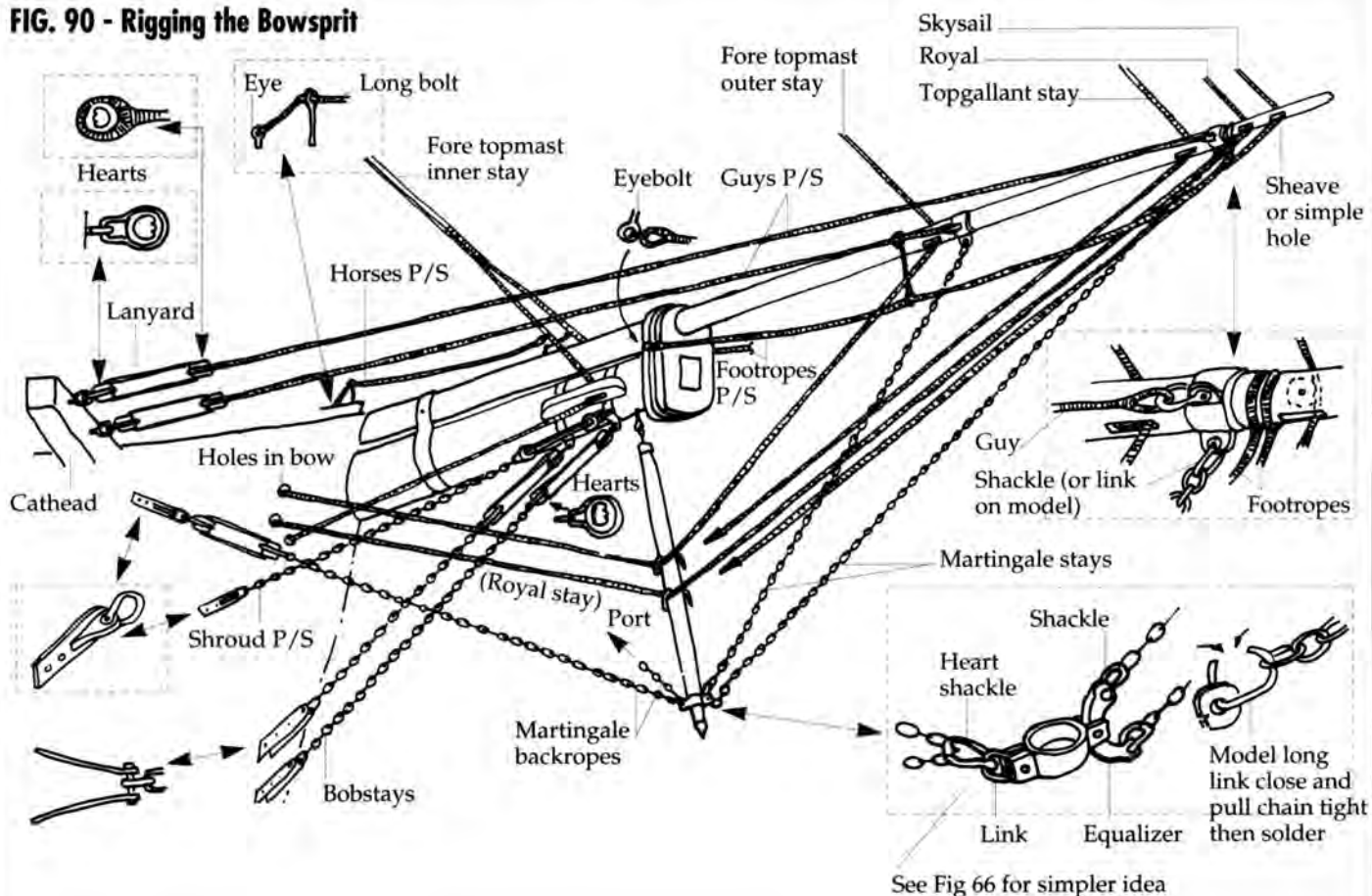


FIG. 91 - Standing & Running Rigging for Spencers

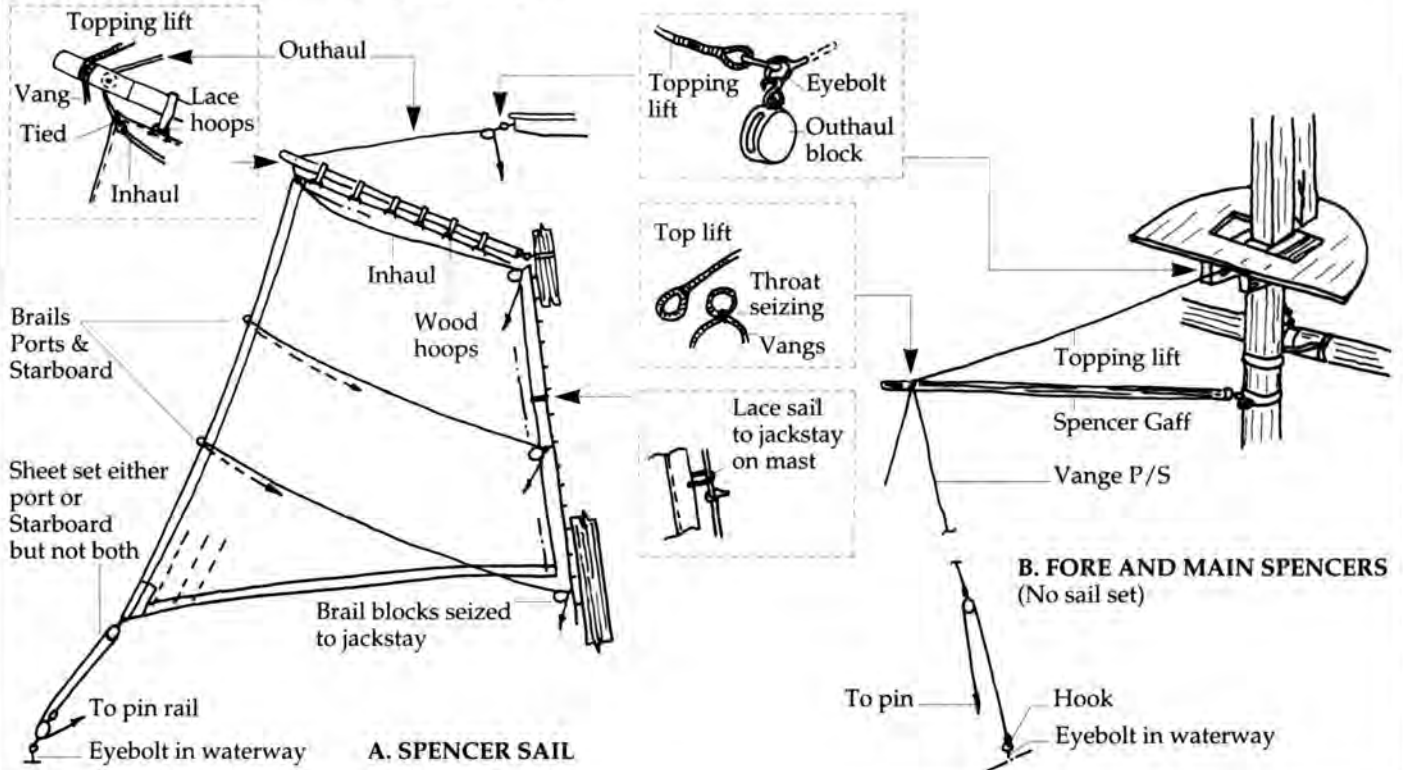


FIG. 92 - Standing & Running Rigging for the Spanker

D = Downhaul
S = Sheet

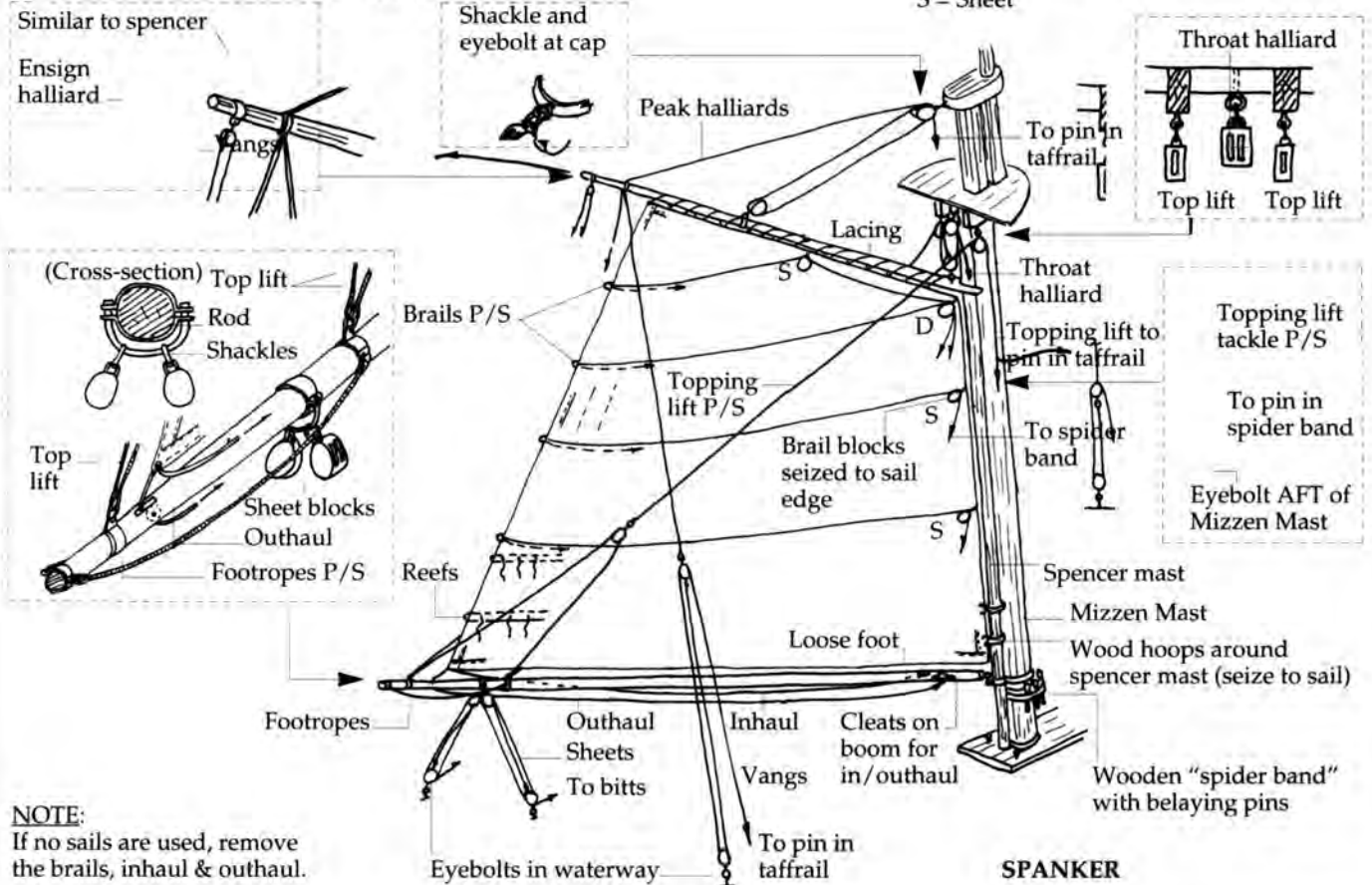
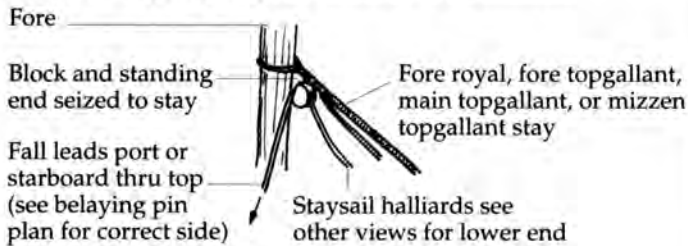
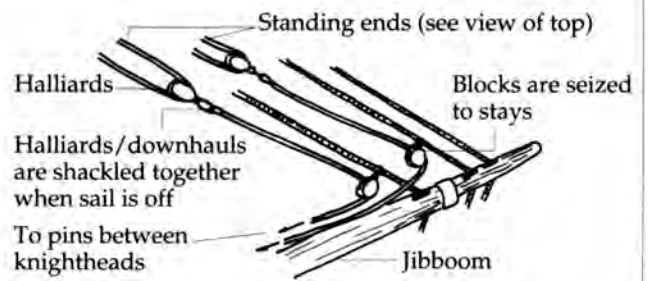


FIG. 93 - Rigging Staysail Halliards & Downhauls



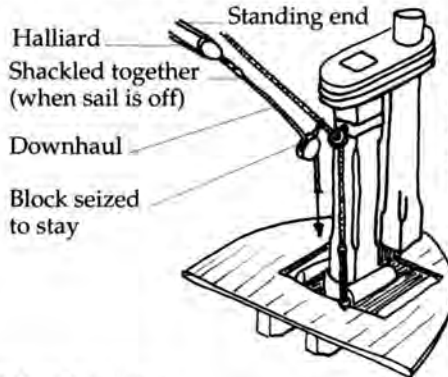
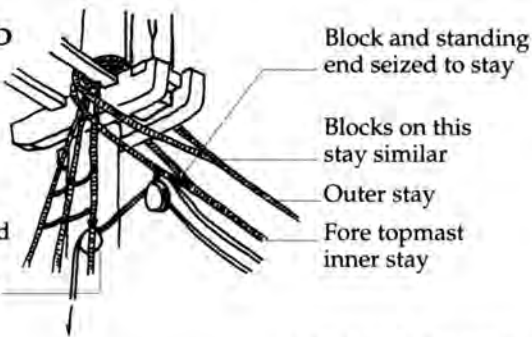
STAYSAIL HALLIARDS AT ROYAL/TOPGALLANT MASTS



LOWER END OF FORE STAYSAIL HALLIARDS AND DOWNHAULS (Jibs similar)

A. UPPER END
Fore mast at upper top

Lead block seized to shroud to prevent halliard chafe on yards



B. LOWER END
Mizzen or main topgallant staysail at lower top

STAYSAIL HALLIARDS/DOWNHAULS

2. Anchor Fish Tackle

Stow the tackle by seizing the hook end and fall (the rope used for pulling) to the forestay (see figure 94).

3. Square Sail Sheets & Clew Lines

The sail for these lines would be removed at the yard (see figure 95). Hence, the clew would be shackled to the sheet just below the yard. Notice that the clew line for course sails is called a clew garnet. The figure also shows an option that allows you to have two single quarter blocks in lieu of a double. The plans show the double, but either method is correct.

4. Braces

The braces are fairly simple to follow (see figure 96). Notice, however, how the standing end of some braces is seized to the stays. Also, notice the lead blocks that prevent lines from being chafed against the yards. For the skysail braces, make sure the blocks are secured close to the mast. Lead blocks also could be added here, attached to the backstays.

5. Yard Halliards

Make sure the upper tackle block is located according to plans (see figure 97). Remember that the yards should be in a lowered position when no sails are used. When the yard is raised to add sails, the block must be lowered.

6. Lower Yard Pendant

Ever wonder why lower yard lifts have tackles instead of being single fixed lines? The reason is that these yards are used as booms for hoisting boats or provisions (see figure 98). Rigging a pendant and tackle on the model to indicate that purpose is a nice detail, but could be omitted.

7. Spencers & Spanker

Refer to figures 91 and 92. Both standing and running rigging are shown for the spanker and spencers. If you're not installing sails, then omit the brails, spencer sheets and outhaul. Install blocks only. The spanker gaff can be displayed in its raised position if desired. Don't forget to install hoops on the gaffs and mast.

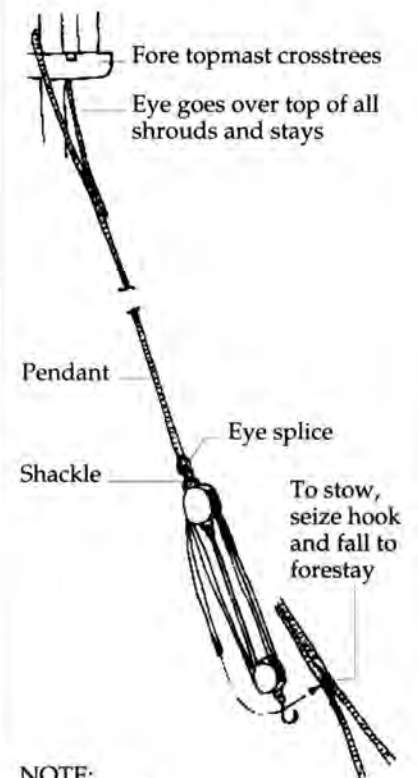
8. Staysails

A guide is provided if you plan to install the staysails (see figure 99). At this point, you already have included halliards and downhauls, so only the sheets are new. When spencers were used, very few staysails were used; hence, the plans show only topgallant staysails.

9. Lower Yard Sheets & Tacks

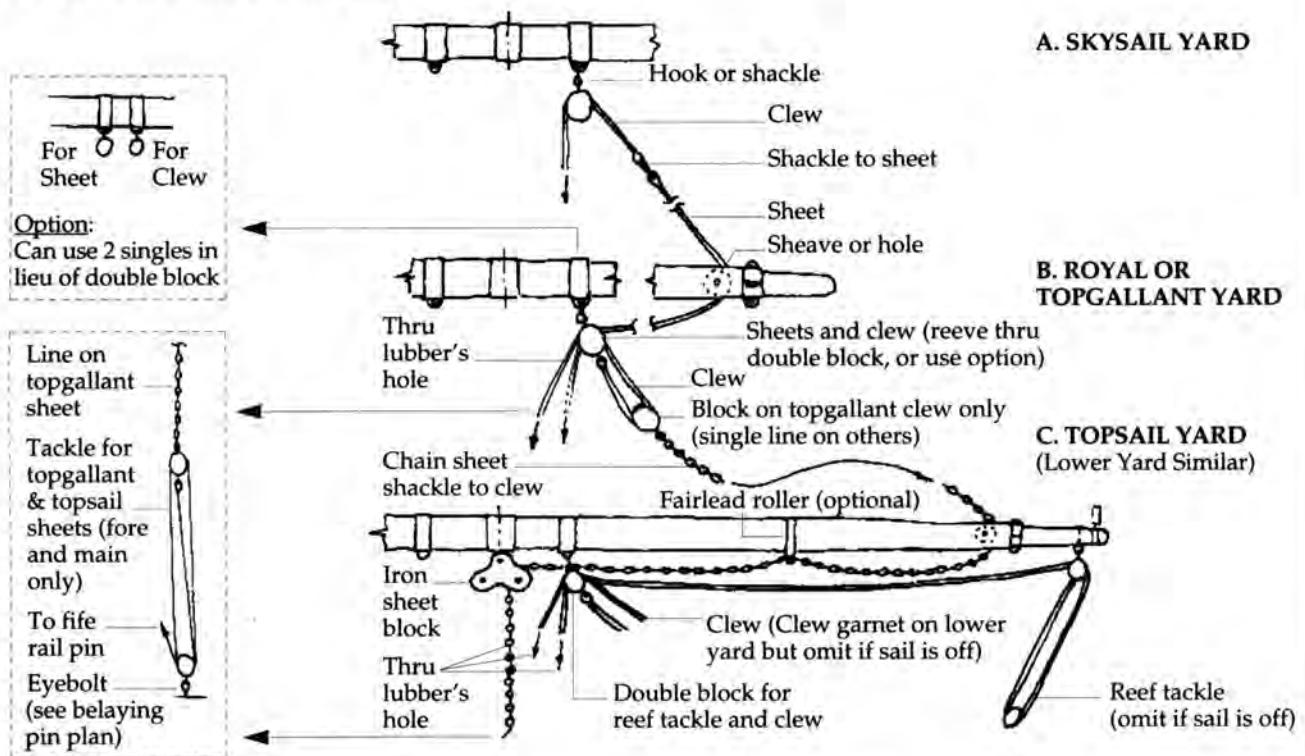
These should be used only if courses are bent (see figure 100). Even if not installed, the sheaves and eyebolts should be put in place. Modelers tend to omit these, but obviously, sheaves do not get removed

FIG. 94 - Anchor Fish Tackle



NOTE:
Tackle is used to raise anchor or other items

FIG. 95 - Square Sail Sheets & Clew Lines



along with the sails when they are removed on the real ship.

10. Bending the Sails

Bending is a general sea term that refers to the fastening of anything. Before securing the sail to the jackstays or boom, attach all lines to the sail (see figures 101, 102 and 103 showing sails in the various stages: set, furled, and partially pulled up with clew, bunt and leech lines).

11. Studding (Stuns'l) Sails

Artists delight in depicting another ship, *Flying Cloud*, in all her glory with stuns'ls unfurled rushing through heavy seas! Actually, studding (or stuns'l) sails were used only during light weather to "exert considerable force on the ship's movements from the leverage which their considerable distance from the mast, as center, gives them" (see figure 104). If you omit these sails, at least install the stuns'l booms on the yards in their stowed position as shown on the plans.

Notice that the boom at the topgallant yard runs through a Stuns'l iron at the yardarm only. No inboard iron is necessary because of the size of the boom. The boom end is simply lashed with line. Also notice that in the case of stowage, all booms are secured to the slings or halliard ties and are removed from the inboard stuns'l iron. The reason for this is to get the booms out of the way for furling sail. Such stowage is clearly shown in old photographs of clipper ships. It is emphasized here because most clipper models

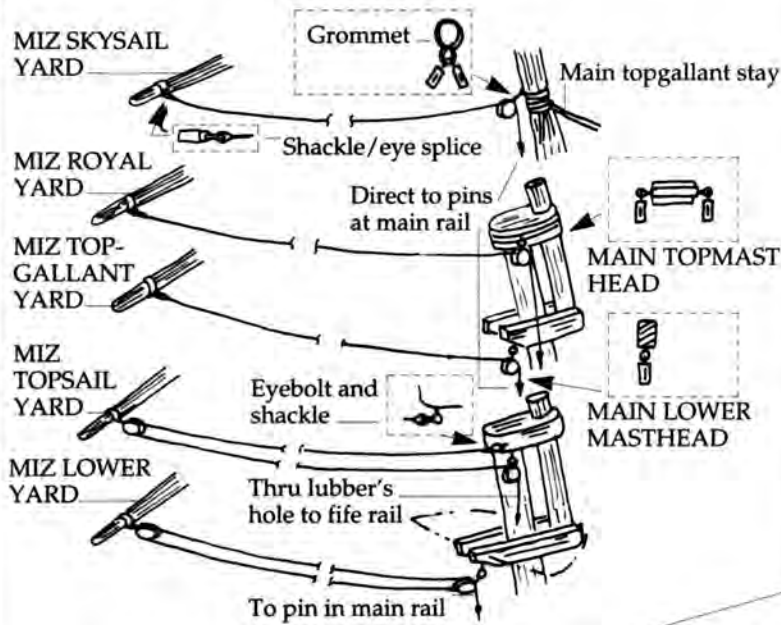
are fitted with the booms stowed in the iron. The lower fore boom is stowed along the channel as shown in the sketch. The stuns'ls yards come off with the sails, along with all rigging. The stuns'ls were very temporary fair weather spreads. As shown, many of the tacks and sheets were simply belayed to almost anywhere on shrouds or to extra pins. The stuns'ls are used only on the fore and main masts. Notice, however, the use of a ringtail sail on the spanker, similarly a light weather addition.

Finishing Touches

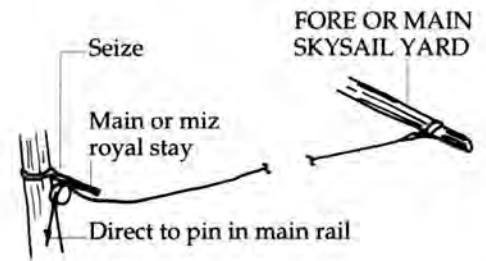
Your *Flying Fish* model is now ready for final mounting to your base and pedestals. This is a simple task, since the holes for the pedestals have already been drilled up through the keel. After mounting the model, look it over entirely for any rigging errors or missing lines and make corrections. Check all paint work and touch up where necessary. Before painting, however, try to wash off any dirt with a moist cloth on the end of a small stick or cotton Q-tip. Look to see if there is paint spattered on any brightwork. If so, scrape or sand it off lightly and touch up with a low sheen varnish. The model is now ready for a glass or plastic case, which is a must if you want to protect the model from dust or possible damage.

Congratulations—your model is complete! Don't hesitate to call Model Expo when you are ready to begin your next modeling endeavor.

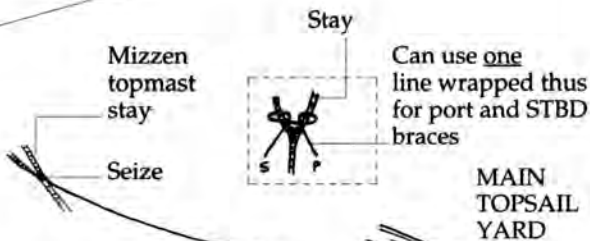
FIG. 96 - Rigging the Braces



MIZZEN YARD

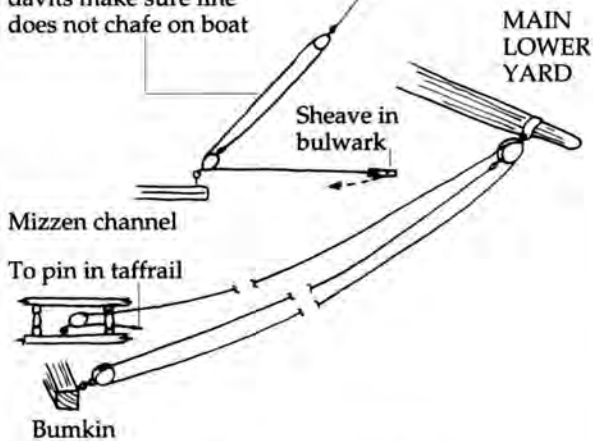


FORE & MAIN SKYSAIL YARD

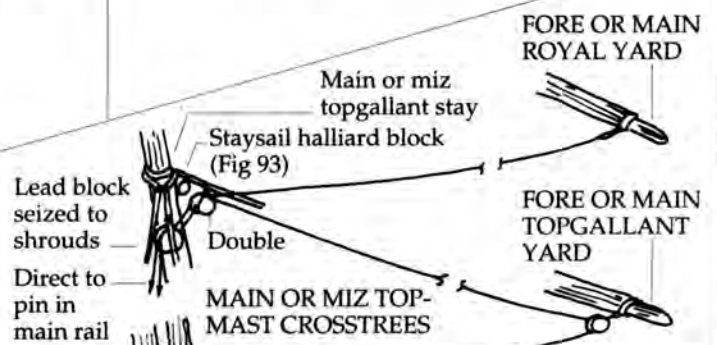


MAIN TOPSAIL YARD

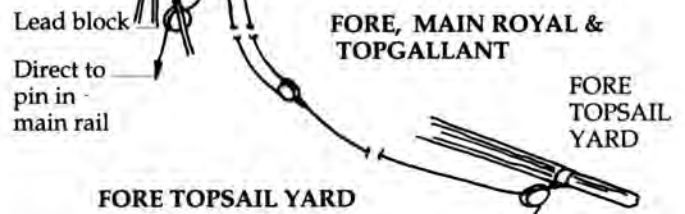
Brace leads inboard of quarter boats on davits make sure line does not chafe on boat



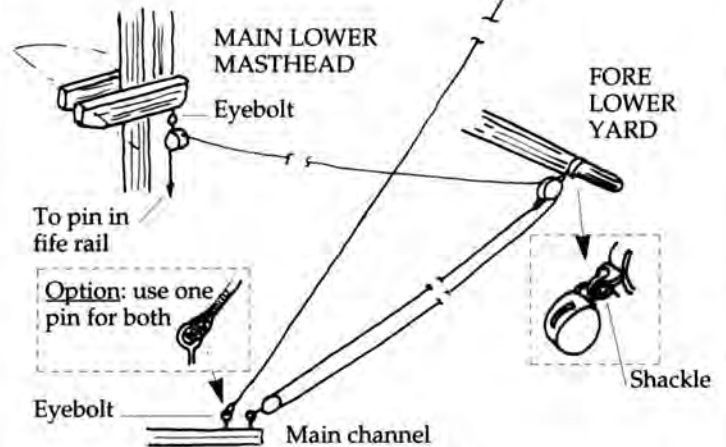
MAIN LOWER YARD



FORE, MAIN ROYAL & TOPGALLANT



FORE TOPSAIL YARD



FORE LOWER YARD
 (One side is shown but lines and blocks are same P/S)

FIG. 97 - Rigging the Yard Halliards

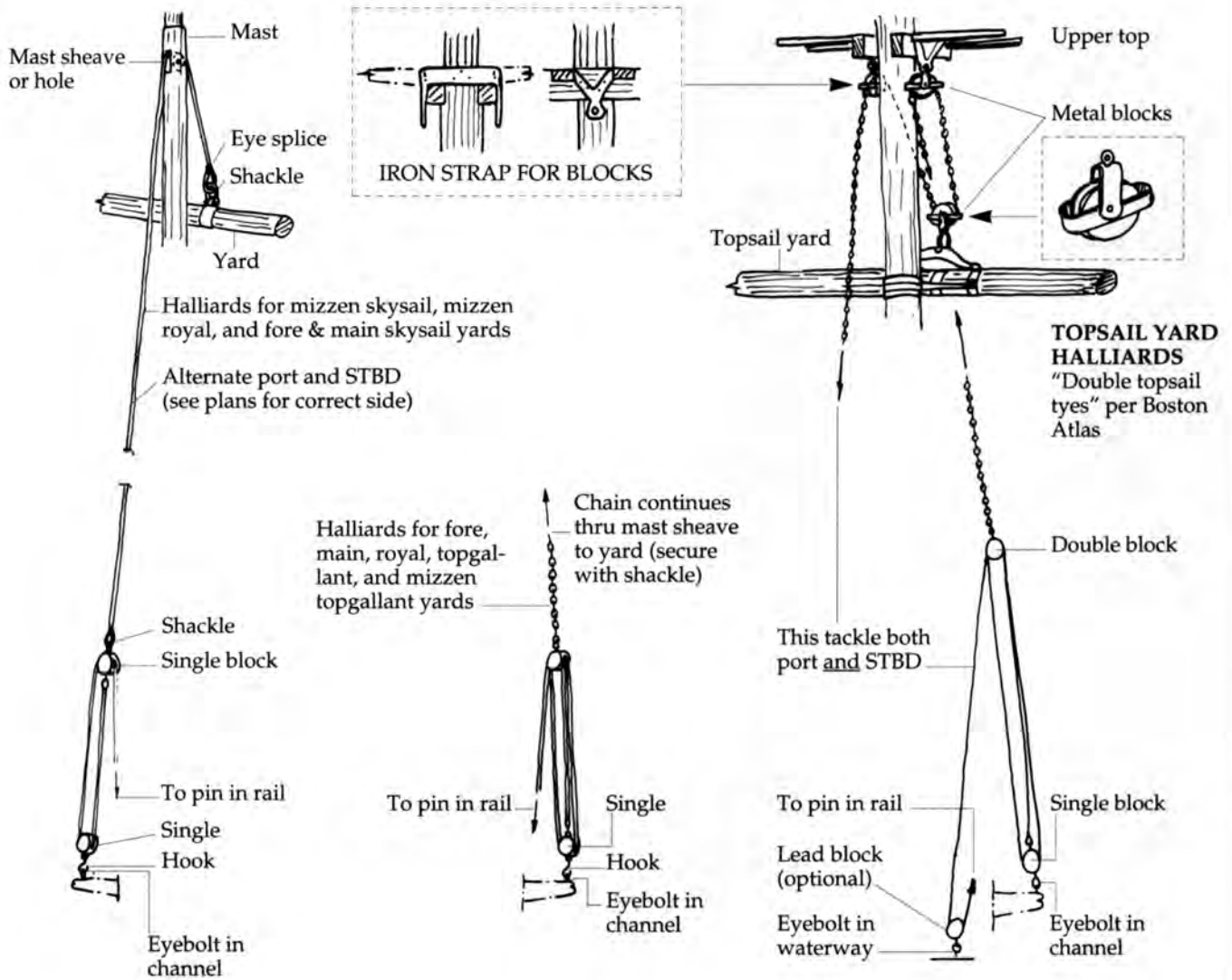
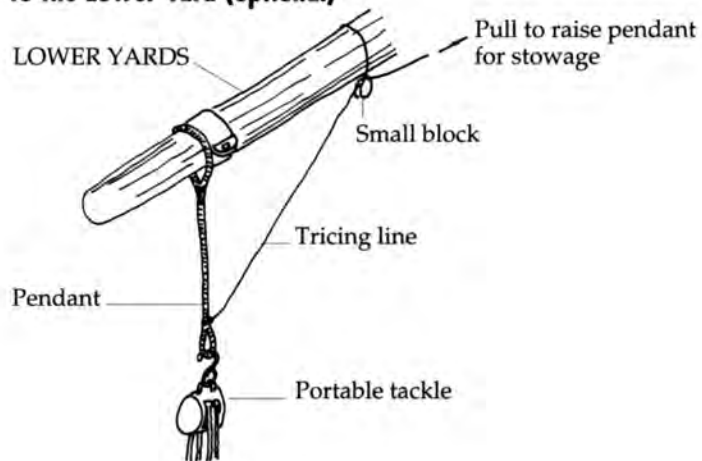


FIG. 98 - Rigging a Pendant & Tackle to the Lower Yard (optional)



NOTE:
Tackle for hoisting boats or provisions on board using lower yards as a boom

FIG. 99 - Installing the Staysails

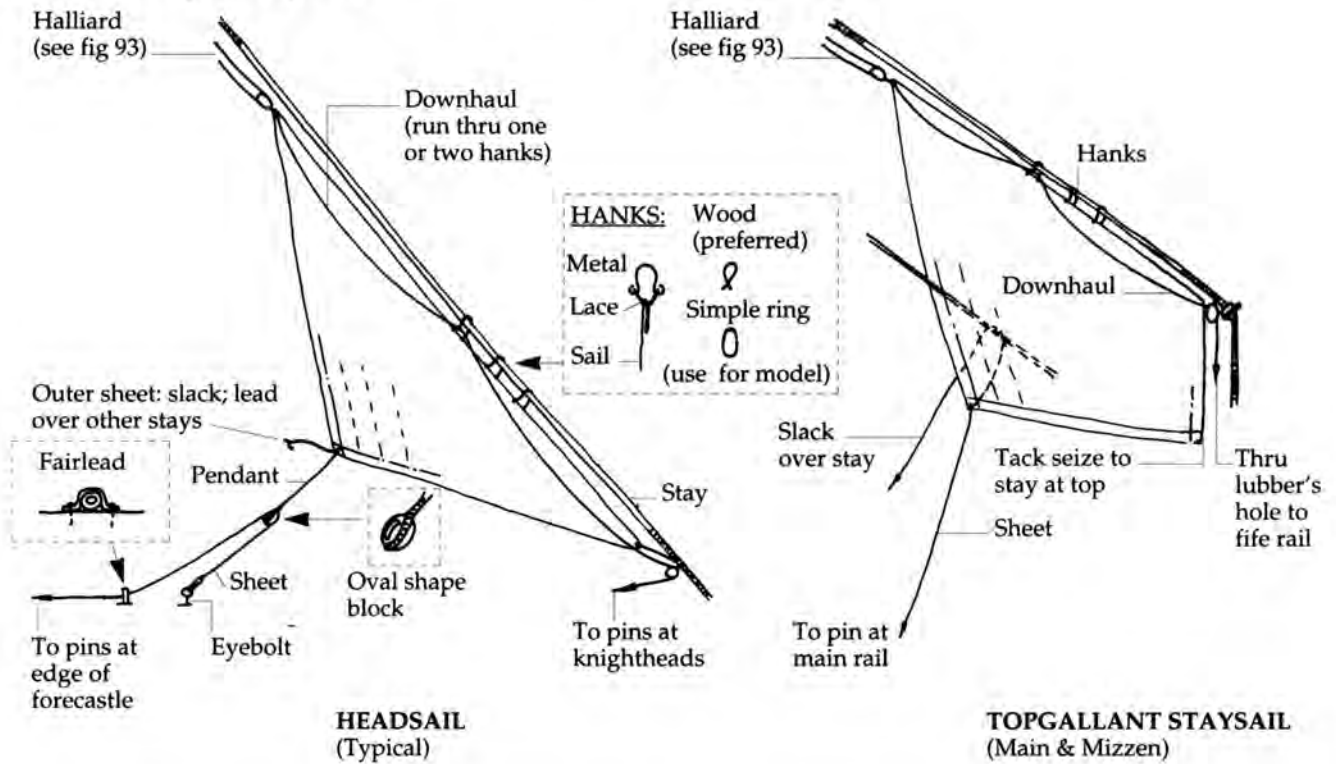
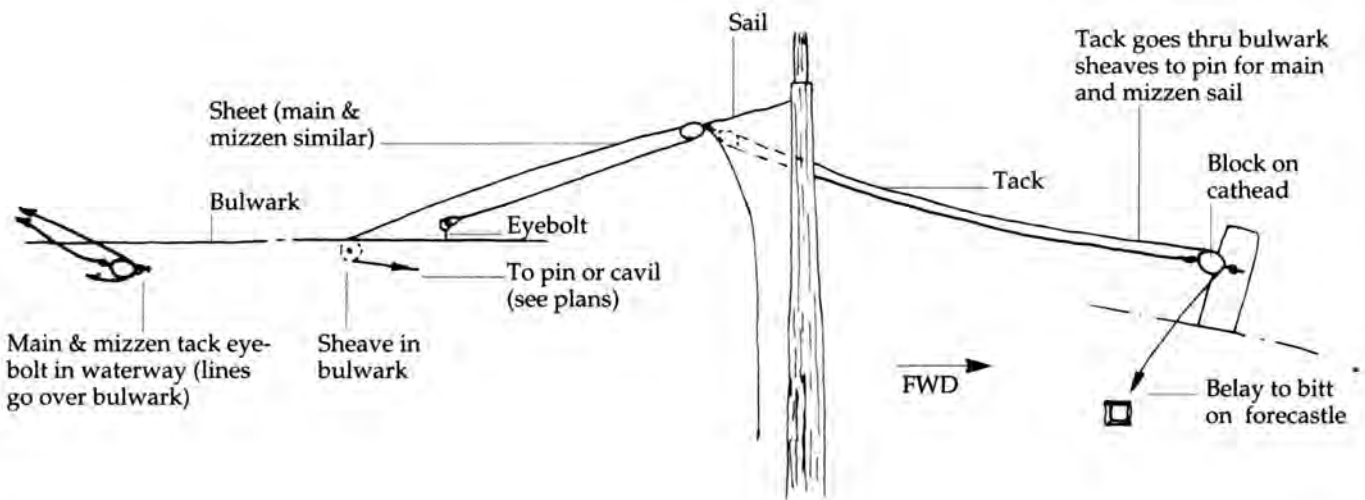


FIG. 100 - Installing Lower Sail Sheets & Tacks if Courses Are Going To Be Bent (Attached)



NOTE:
This rig applicable only if sails are installed

FORE YARD SHOWN
(View looking down)

FIG. 101 - Bending (Fastening) the Sails

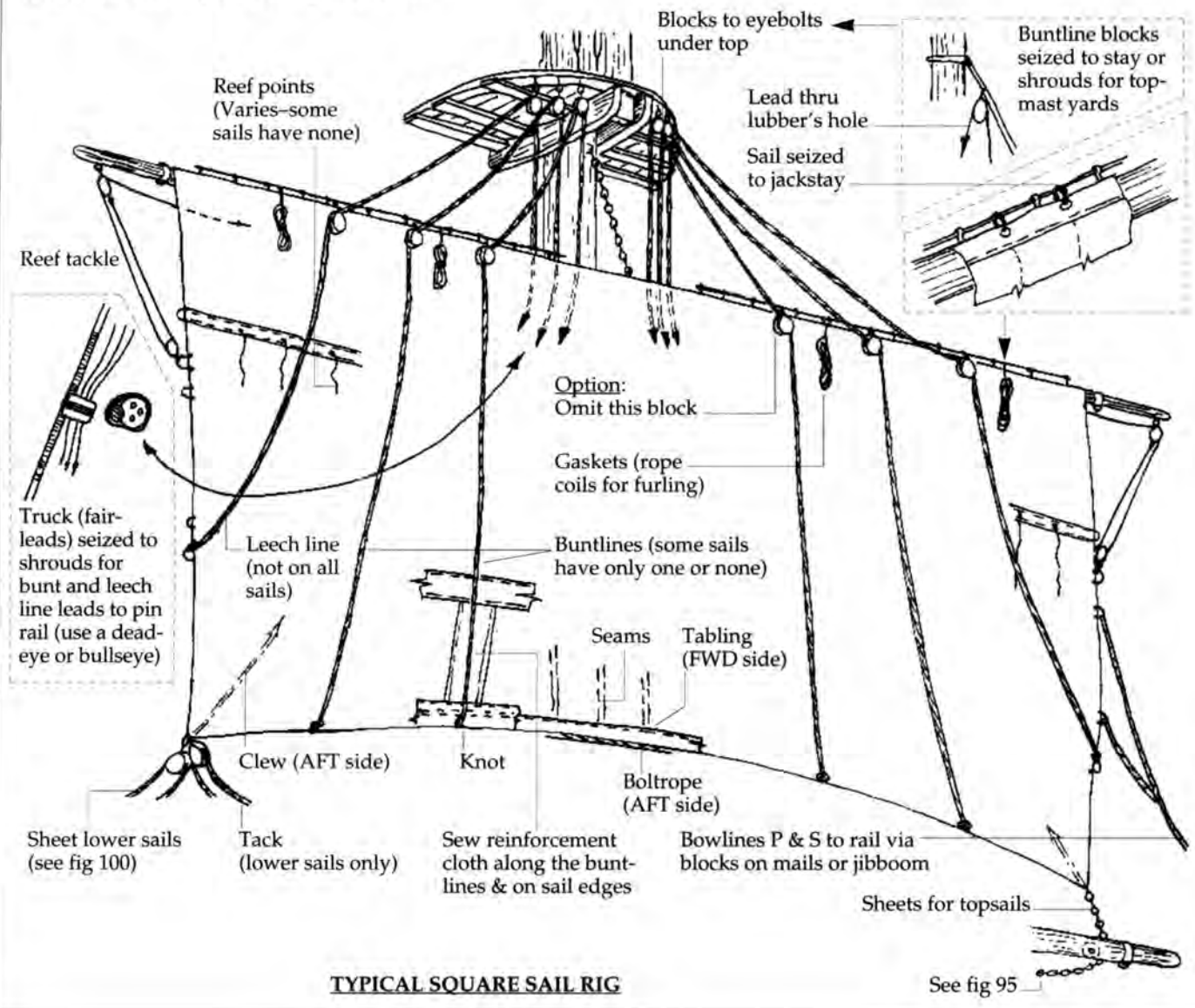


FIG. 102 - Bending a Furled Sail



FIG. 103 - Bending a Partially Furled Sail

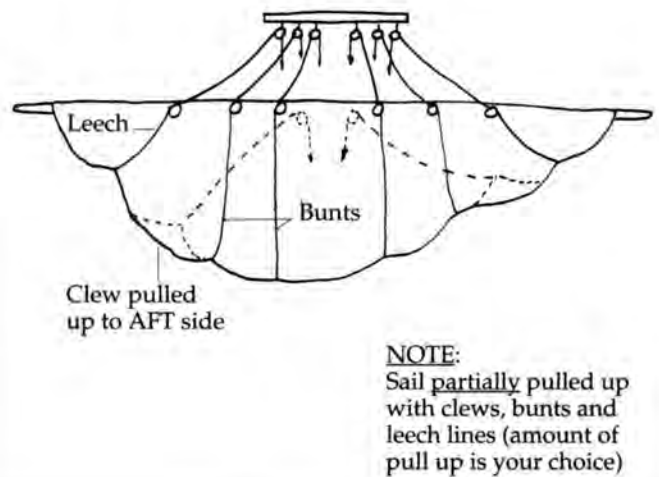
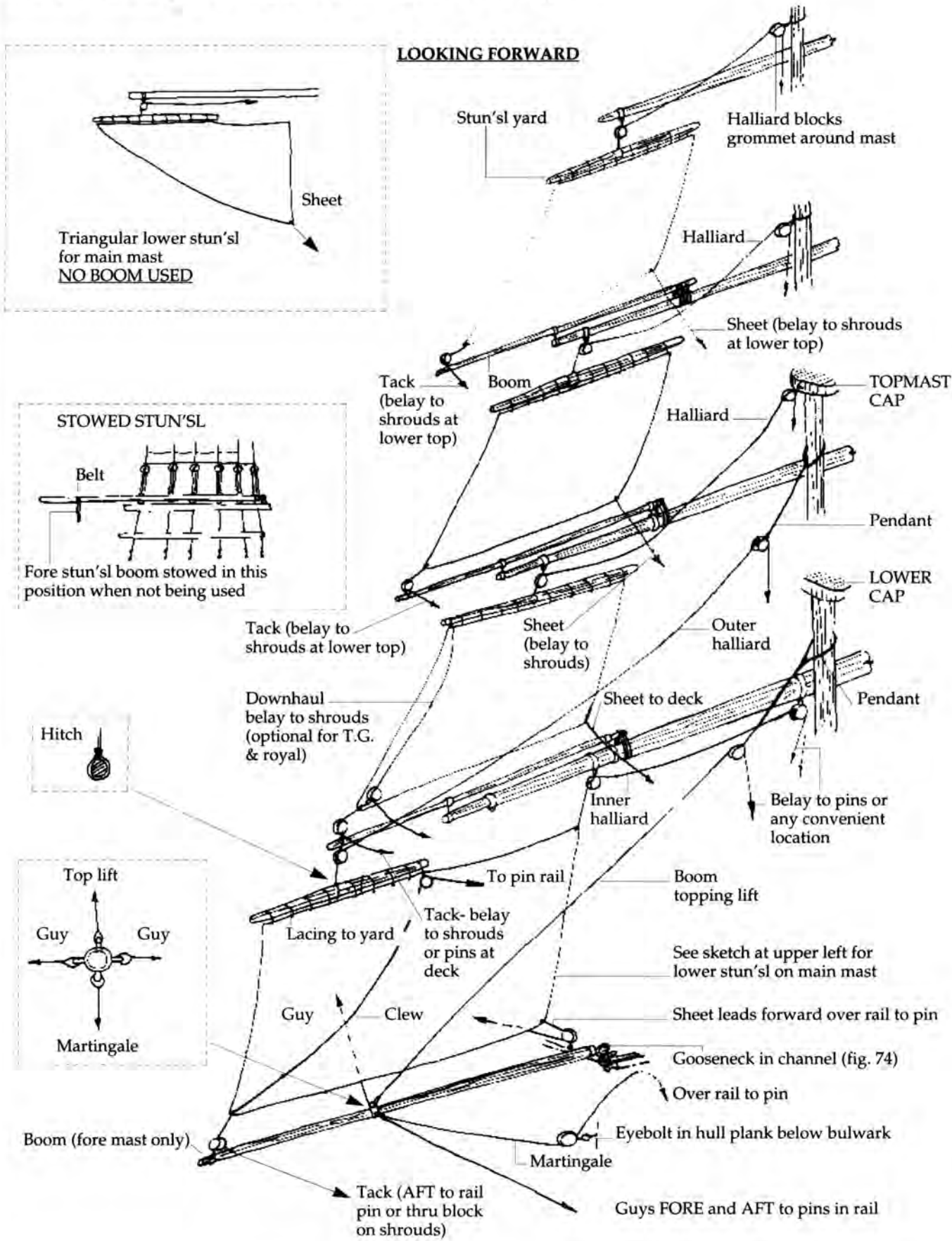


FIG. 104 - Installing the Studding (Stun'sl) Sails (Fore & Main Only)



RIGGING LINE DIAMETERS

.10mm (.004")

.20mm (.008")

.25mm (.010")

.40mm (.016")

.50mm (.020")

.60mm (.024")

.75mm (.030")

.80mm (.032")

.90mm (.035")

.95mm (.037")

1.00mm (.039")

1.20mm (.047")

1.25mm (.049")

1.30mm (.051")

1.50mm (.059")

1.60mm (.063")

1.70mm (.067")

1.75mm (.069")

2.00mm (.079")

2.50mm (.098")

ACKNOWLEDGMENTS

As mentioned at the beginning of this manual, I am indebted to Erik Ronnberg, Jr. for his deep interest, research and extremely valuable advice toward the development of the text, drawings, reconstruction of *Flying Fish* and the plank-on-bulkhead revision.

In addition, I would like to acknowledge the following individuals for the assistance they provided Mr. Ronnberg during the 1980 *Flying Fish* reconstruction:

1. **Erik Ronnberg, Sr.**, Rockport, Mass.
2. **William Baker**, Curator, Hart Nautical Museum, Cambridge, Mass.
3. **Barbara Edkins**, Librarian, Peabody Museum, Salem, Mass.
4. **Markham Seton**, Staff Photographer, Peabody Museum.
5. **Kathy Flynn**, Assistant Photographer, Peabody Museum.
6. **Paul Winfisky**, Curatorial Assist., Peabody Museum.
7. **Penobscot Marine Museum**, Searsport, Maine, for making available Henry Hall's notes.
8. **Merritt Edson**, former editor and secretary of Nautical Research Guild, for providing valuable historical data and comments on model building techniques.
9. **William Paul Neal**, for his research and comments on *Flying Fish* from a modeler's point of view.
10. **William N. Fenerin**, for his input on deck structure, and excellent photos of St. Paul and other ship deck areas and cabin joinery work.
11. **Charles Thomas**, for his assistance with lead fitting problems.
12. **Tara Green**, for her excellent typing and editing assistance.
13. **John Shedd** of Model Shipways who made the whole thing possible with his interest in providing ship modelers with the very best in authentic ship plans and model kits, as well as providing his comments on the text and sketches.

I'd like to express my appreciation to **Marc Mosko** of Model Expo, for giving me the opportunity to update the *Flying Fish* to a most interesting plank-on-bulkhead kit, and for his encouragement in improving the quality of model kits for the model builder.

And finally, I'd like to thank my wife, **Eugenie**, for allowing me twice, first in 1980 and again in 1993, to mess up the dining room table with piles of research; and for reminding me to take my vitamin pills so that I would have the strength to complete this endeavor.

FORMULAS FOR CONVERTING MILLIMETERS AND INCHES

1 mm = .03937 of an inch

To find tenths of an inch: $.03937" \times \text{mms} = \text{tenths of an inch}$

To find mms from tenths of an inch: $\text{Tenths of an inch} \div .03937" = \text{mms}$



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*** Note ***

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SCALE CONVERSION TABLE		
RIGGING		
Diameters for Lifesize Vessel	Diameters in Tenths of an Inch	Diameters Converted to 1/8" Scale
		.01 x Inches in 10ths:
5/16"	.3125"	.003" (.08mm)
3/8"	.375"	.004" (.10mm)
1/2"	.5"	.005" (.13mm)
5/8"	.625"	.006" (.15mm)
3/4"	.75"	.008" (.20mm)
7/8"	.875"	.009" (.23mm)
1"	1"	.010" (.25mm)
1 1/4"	1.25"	.013" (.33mm)
BLOCKS		
Lengths for Lifesize Vessel	Lengths Converted to 1/8" Scale	
4"	.04" (1.02mm or 1/32")	
5"	.05" (1.27mm or 3/64")	
6"	.06" (1.52mm or 1/16")	
7"	.07" (1.78mm or 5/64")	
8"	.08" (2.03mm or 5/64")	
10"	.09" (2.28mm or 3/32")	
12"	.13" (3.30mm or 1/8")	

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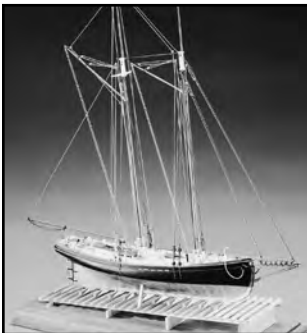
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