

Thermopylae

English Clipper 1868

Art. 791

ASSEMBLY INSTRUCTIONS

English Version

*Newly translated and improved by
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For the

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Thermopylae - English Clipper 1868

HISTORICAL BACKGROUND

It was characteristic of the composite clippers built for the nineteenth century tea and wool trades that although ship-rigged, they sported all manner of light weather sails, the rigging and handling of which called forth great skill and precision from their officers and men.

Light square sails ascended to heaven, with skysails and moon sails topping the conventional royals. Ringtails extended the spanker boom aft. 'Jimmy Greens' were suspended beneath the bowsprit and water sails hung beneath the lower studding sail booms. On gaffs abaft the fore and main masts, spencers or trysails were spread, and individual 'flying kites' were experimented with by masters and mates hell-bent on performance. Never before or since has the success of a trade rested so completely on the skill of a master and crew. Under a press of such canvas the appearance of these clippers must have been breathtaking.

Today, the best known are the *Thermopylae* of 1868 and the *Cutty Sark* of 1869. Both were built too late for the tea trade for which they were designed, but both did well in the Australian wool trade into which, many tea ships were transferred in the 1870's.

The *Thermopylae* was composite built in 1868 by Walter Hood of Aberdeen, and was of almost identical dimensions to the *Cutty Sark*, being six inches shorter, though her registered tonnage was greater at 947. Her lower main and foremasts together with their course yards, were of iron. In the 1870s she had double-topgallants fitted. *Thermopylae* seems to have possessed something of the combined virtues of being able to ghost in light airs as well as being able to stand up to a blow, though she was better at the former while her rival excelled at the latter.

Thermopylae was built for George Thompson's Aberdeen White Star Line and on her maiden voyage took only sixty three days from London to Melbourne, clipping two days off the record set by James Bain in 1855. *Thermopylae's* famous and skillful captain was Robert Kemball.

Thompson sold the *Thermopylae* in 1890 and like the *Cutty Sark*, she passed eventually to Portuguese ownership becoming the training ship *Pedro Nunes*. In 1907 she was towed out of the River Tagus and sunk by gunfire.

*Extracted from THE HISTORY OF THE SHIP by Richard Woodman
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ASSEMBLY INSTRUCTIONS

General notes:

- All dimensions given are in millimetres. The symbol \varnothing means diameter
- English translations of the Italian notes on the plans are given in these instructions.
- Component numbers (n.11, etc) refer to the numbered plywood parts on Plan 1.
- Figure numbers given below (Fig.1, etc) refer to the numbered figures on Plan 1.
- Part numbers (Part 23 etc.) refer to the detailed or exploded drawings on Plan 2.
- The sequence given here is the recommended order for completing the model.

PLAN NUMBER 1

Fig.14 – Ship's Cradle. It is useful to hold the keel in a vise or cradle while the superstructure is being assembled. If you do not have a suitable vise, make up a cradle from 4x4 Walnut strip as shown, so that the keel n.16-18-19 will slot in and be held between the two wooden runners. The material for the base of the cradle is not supplied.

Figs. 1, 2 and 3 – On the thick plywood panel, mark the part number on each laser-cut, plywood component with a soft lead pencil before removing the parts with a craft knife. Smooth all the edges of each piece with fine sandpaper, taking care not to damage the machined profiles of the pieces. Do the same for the thin plywood panel (shown on Plan 3). Using Figs 1, 2 and 3 as a guide, and without glue, test that the frames n.1-15 can be inserted correctly into the keel n.16-18-19, and that the false plate n.20 can be inserted fully to seat down onto the frames. Carefully trim the pieces where necessary to get a good sliding fit.

Before gluing, bevel frames n.1, 2, 12,13 as shown in Figs. 9 and 10, so that the planking strips will make a smooth curve from ribs to bow or stern, and to create a broader surface for adherence. Glue the frame n.1-15 into the keel n.16-18-19, and before the glue has set, glue and clamp the false deck plate n.20 down onto the frames to align the frames with the keel. Check the squareness and vertical alignment of each rib with the keel. Allow to dry.

Figs. 4, 5 and 6 – Fit the decks in the sequence n.23, n 24 and n.23, ensuring that the port and starboard (left and right) edges of the deck plates make contact with, and are glued to the curved top surfaces of the ribs. A close fit with the frames is necessary in order to achieve the desired deck curvature or 'sheer'.

Fig. 9 – Taper the frame n.14 and the stern-plates n.21 so that the aft ends of the planking will make a smooth line from the ribs to the stern, and then glue n.21 in position. *Note: The distinctive stern profile on this clipper presents the biggest challenge in the planking process that follows. Extra time spent achieving an accurate smooth stern profile will be well worth it in terms of the finished appearance of the boat.*

Planking the Hull. The first (inner) layer of planks will be 1x3 Lime; the second (outer) layer of planks will be 0.5x3 Walnut. The thick black line on **Fig. 7** shows the position of the first planking strip, which should be positioned horizontally in line with the bottom edge of the keel. Proceed with the planking in the sequence recommended in the specific instructions on planking provided in the last section of this booklet. Plank from the top of the hull to the bottom and then add more planks above the first plank to cover the ribs and bring the sides up to the levels shown in the four cross sections 2, 7,12 and 14 on Plan 1. **Fig. 12** shows how the first layer of planking is terminated halfway along rib n.15 so that the second layer of planks will finish flush with the front edge of the rib.

Fig. 11 indicates how to apply strips to the top portion of the stern. Starting from the middle of frame No.14, position segments of strips vertically until the section is completely covered. When the glue has dried thoroughly, trim away the excess planking at the edge of the stern transom. The diagram in **Figs. 8 and 13** provide a guide to the overall appearance and profile of the finished planking.

Fig. 8 – Deck preparation. After having completely covered the hull, trim the top edge of the planking above-deck to bring the parapet height level with the top of the ribs, and sand the top edges of the parapet walls to take the handrails. Use a small saw or craft knife to trim away the tips of the frames (ribs) which are still visible and which extend along the inner parapet walls. Sand the stumps flush with the surface of the deck. Only after this step has been completed can the decks be covered with deck planking.

PLAN NUMBER 2

The large plan-view and the side-view of the vessel are to the scale of the model, and can be used for checking dimensions. These show the various items of superstructure to be fitted to *Thermopylae*. The numbered items on the plan-view are belaying (terminating) points for the rigging. The number items on the side-view and the perspective-view refer out to the exploded views (Part 1 etc.) showing the detailed parts to be made up and fitted to the ship. **Caution: the detail drawings are not to scale.**

Deck planking. For the deck planks, cut 0.5x3 Lime strips into accurate 50mm lengths, ensuring a neat, square cut at both ends. Note that it may be useful to make up a cutting template, as over 100 of these planks will be needed to cover the entire deck area. Position the planks alternately using the scale plan-view on Plan 2 as a guide. Trim the planking around the holes in the deck, and fit shaped pieces of planking in corners so as to cover the entire deck surface. When the deck planking is completed, plank the insides of the parapet walls (bulwarks) with horizontal 0.5x3 walnut strips as shown in the cross sections on Plan 1. Cover the inside face of the transom with vertical 0.5x3 Walnut strips.

Rudder. Fit three of the black 'u'-shaped rudder shackles supplied to the keel as shown in the scale side view in Plan 2. Carefully cut a hole in the underside of the stern to take the top part of the rudder (plywood part P) and slide the rudder into position. Mark the position of the rudder shackles and fit three 'u'-shaped brackets to the rudder. Fit the rudder in position and glue the three rudder pins in place to hold the rudder onto the stern.

Part 2 – Handrails. Refer to the four cross sections 2, 7,12 and 14 on Plan 1, and the colour photograph on the outside of the kit's box. Make the handrail base from 2x3 Beech plank. To make the curved sections at the bow and stern, heat the individual strips in very hot water for a minute or two and carefully form the two handrails into the required shape by pinning the strips out on a flat board. Clamp in position until dry and stabilised. When the required curve has been achieved, glue the handrails in place on the parapets. If you experience difficulties with bending the handrails, cut trapezoidal pieces from the planks and alternate them to achieve the curve as shown in Part 41. When glued and smoothed, the joins will disappear. For the metal handrails, use Ø0.8 brass wire bent with round pliers or using a Ø2 cylindrical former. *Tip: The brass wire is provided as a rolled-up hank. To straighten it, clamp one end in a vice and with pliers, stretch the wire slightly.*

Belaying pin rails. Make these from 2x3 Walnut plank and fit along the inside faces of the parapets on each side of the ship as shown in the cross sections 2, 7,12 and 14 on Plan 1. Drill Ø1holes for the belaying pins.

Rubbing strakes are timbers fitted along the length of the hull to protect the sides of the ship from damage. Fit a strake to each side of *Thermopylae* made from 2x2 Beech plank. Before gluing the rubbing strakes to the sides of the hull, mark their positions using the cross-sections on Plan 1 and the scale side-view on Plan 2 as guides. Check that they are at the same height either side, so that the rubbing strake under the transom will line up with them and be horizontal (see Part 41). Glue and pin these strakes into position.

Part 5 –Scuppers and Portholes. Drill the scupper holes and port holes with a small drill and carefully open out the holes to Ø4 with a round file, and glue a Ø5 brass ring around each hole.

Painting the hull. Paint the transom and the hull areas between the railing and the water line with dark brown matt paint using the colour photograph on the kit's box and the scale side-view on Plan 2 as guides. Avoid painting the railings or rubbing strakes, which should be left their natural wood colour. Set aside to allow the paint to dry thoroughly. *Suggestion: we recommend the use of an airbrush and 3 coats of matt paint diluted to 3:1 with appropriate thinners. Alternatively, paint by hand using matt paint, a good quality sable brush and employing light longitudinal brush strokes.*

Fettle the brass castings supplied to remove any excess material and bring the parts to a polished finish. Paint the bowsprit supports and the ship's stern nameplate matt dark brown. When dry, sand the surface to expose the raised brass lettering and cast details.

Preparation of the photoengraved brass parts. Working on a flat surface, brush matt dark brown paint over the plate including the raised portions. When the paint is dry, lightly sand the surface with fine (600-grade) paper until the raised details of the plate become paint-free and polished, the paint remaining in the incised portions. Cut out the pieces with tin shears or strong scissors and finish the edges carefully with a file. Varnish the brass to keep it shiny. Use this process to prepare all the photoengraved components.

Bow Nameplates. Cut out the two ship's bow nameplates from the painted, photoengraved plate and fit in place on the bows.

Part 9 - Porthole Shutters. Cut the eight porthole shutters from the photoengraved plate. Glue the shutters in position along the ship's sides using instant glue.

Part 44 - Anchor Fenders. Make these from 2x6 Walnut plank and fit between the railing and rubbing strakes on each side of the ship, as shown in the scale side view.

Ship's Nameplate. *Fit the prepared nameplates to the bow and stern, carefully bending the brass parts as required so they fit snugly against the curve of the ship.*

Part 42 - Channels. Make these from 2x6 Walnut strip and fit into position on the handrails along the sides of the ship as shown in the two scale views on Plan 2. Take care to position these accurately in relation to the mast holes. Note that the channels should slope upwards slightly when viewed from the bow or stern of the ship.

Part 8 - Chainplate Group. Apply the ring to the deadeye, leaving an opening at the bottom and insert the chainplate bracket, securing this by squeezing the ring shut with pliers. Fit to the hull with brass nails. Note that the tinplates are angled according to their position, so that they align with the shroud lines. Use the scale side-view as a guide.

Part 32 – Companionway Davit. Make this from Ø2 brass rod 45 long. Turn the rod in a drill and use a file to shape the taper and the end cap. Carefully bend the rod into the required curve using round pliers. Drill a Ø0.8 hole in the cap to take the companionway lifting rope. Fit the davit into the inner belaying pin rail.

Part 13 - Lifeboat Davits. Four required. Cut four bars of Ø2 brass rod 45 long. Turn the rod in a drill and use a file to shape the taper and the end cap. Carefully bend the rods to shape using round pliers. Drill a Ø0.8 hole in each cap to take the lifeboat hauling rope. Drill a Ø1 hole through the shank and insert a Ø1 brass pin into the hull side. The protruding pin acts as the fastening bitt for the hauling cable. Fix the four davits to the ship's side using brass brackets and brass nails and rig them using thin thread.

Bowsprit rigging points. Drill Ø1 holes and fit 2 brass pintles to the underside of the bow and two on each side of the bow railings as shown on the side-view and plan-view.

Masts, Spars and Yards. Using the dowels provided in the kit, cut and taper all the masts and yards to the cutting and shaping dimensions in the table below. The **Identifier** is the circled part number on the scale side-view in Plan 2: **Length** = *finished length*; **ØMin** = *the smallest diameter*; **ØMax** = *the largest diameter*.

Make up several spare yards to lash on the front overhead supports as shown in the plan-view and perspective-view.

| Identifier (Plan 2) | Length | ØMin | ØMax | Name |
|------------------------|--------|------------------|------|---|
| Mainmast | | | | |
| m1 | 200 | 5 | 6 | Mainmast |
| m2 | 102 | 3 | 4 | Main top mast |
| m3 | 114 | 1.5 | 3 | Main topgallant mast |
| m4 | 69 | 1 | 1.5 | Main royal yard |
| m5 | 85 | 1.5 | 2 | Main upper topgallant yard |
| m6 | 50 | 1.5 | 2 | Main lower topgallant yard studding-sail boom |
| m7 | 100 | 2 | 2.5 | Main lower topgallant yard |
| m8 | 60 | 1.5 | 2 | Main upper topsail studding-sail boom |
| m9 | 120 | 1.5 | 2.5 | Main upper topsail yard |
| m10 | 140 | 1.5 | 3 | Main lower topsail yard |
| m11 | 167 | 2 | 3 | Mainsail yard |
| m12 | 80 | 1 | 1.5 | Mainsail studding-sail boom |
| m13 | 110 | 2x2 Walnut Strip | | Mainmast reinforcer |
| p1 | 76 | 1 | 2 | Main gaff |
| Foremast | | | | |
| t1 | 180 | 5 | 6 | Foremast |
| t2 | 95 | 3 | 4 | Fore upper mast |
| t3 | 93 | 1.5 | 3 | Fore topgallant mast |
| t4 | 80 | 1.5 | 2 | Fore upper topgallant yard |
| t5 | 100 | 1.5 | 2 | Fore lower topgallant yard |
| t6 | 67 | 1.5 | 2 | Fore upper topsail yard studding-sail boom |
| t7 | 130 | 2 | 3 | Fore upper topsail yard |
| t8 | 156 | 1.5 | 3 | Fore lower topsail yard |
| t9 | 77 | 1.5 | 2.5 | Foresail yard studding-sail boom |
| t10 | 192 | 2 | 3 | Foresail yard |
| t11 | 95 | 2x2 Walnut Strip | | Foremast reinforcer |
| Mizzen Mast | | | | |
| z1 | 180 | 4 | 5 | Mizzen mast |
| z2 | 82 | 3.5 | 4 | Mizzen top mast |
| z3 | 68 | 1.5 | 3 | Mizzen topgallant mast |
| z4 | 68 | 1 | 2 | Mizzen upper topgallant yard |
| z5 | 80 | 1.5 | 2 | Mizzen lower topgallant yard |
| z6 | 94 | 1.5 | 3 | Mizzen upper topsail yard |
| z7 | 108 | 2 | 3 | Mizzen lower topsail yard |
| z8 | 126 | 1.5 | 3 | Crojack or crossjack yard |
| z9 | 107 | 1 | 3 | Mizzen spanker boom |
| p2 | 60 | 1 | 1.5 | Mizzen gaff |
| Bowsprit | | | | |
| b1 | 140 | 2 | 4 | Upper bowsprit |
| b2 | 60 | 4 | 4 | Lower bowsprit |

Part 12 - Outboard Companionway. Make up the ladder from the side parts supplied and 1x4 Walnut strip cut into treads to make a 12mm-wide ladder. For the platform, use 2x6 Walnut strip. The two rotating pivots will be positioned inside the two bars of the ladder. Attach the ladder to the platform using a rotating pin made of Ø0.8 brass. Use the same brass material to make the raising bow. Fit to the side of the ship with two brass wire pins and glue. Rig the ladder to the lifting bow and davit using thin thread.

Part 7 - Mainsail Outrigger Group. One required on each side of the ship. The rotating support is made from 3x3 walnut plank fixed to the ship's side with a brass pin, and glued. Cut the brass bracket out of the photo-etched brass plate supplied in the kit. Fix this to the support with both glue and a brass nail. Make the outrigger boom from 117 long Ø3 dowel tapered to Ø2. The boom is hinged using a Ø1 brass pin. Make the support shoes from brass strip and fit in place with brass nails.

Bowsprit Assembly.

- **Part 26 – Bowsprit Cap.** Make the jointing cap from 2x6 Walnut plank and carefully drill two holes Ø4 to accept the bowsprit sections parts **b1** and **b2**. Open out the bowsprit support hole in the prow to Ø4 and glue the lower bowsprit section **b2** in place. Slide the upper bowsprit section **b1** into the bowsprit cap and glue in position on the lower section, ensuring that the heel of the **b1** sits down in the slot in the foredeck.
- **Part 32 – Bowsprit Outrigger.** Make from Ø2 Walnut dowel. Drill the end of the lower bowsprit section and fit the outrigger in place with glue and two brass nails.
- **Part 27 - Bow Brace.** Make this from Ø1 brass wire to fit the dimensions of the model. The sharp angle of the top will rest on the nape of the figurehead, and the two pins will be inserted in Ø1 holes drilled in the parapet walls.
- **Part 27 - Figurehead and Bowsprit Supports.** Fettle and fit the brass figurehead in position on the prow. Nail the two cast bowsprit supports on either side of the bowsprit, pre-bending them using the scale plan view as a guide. Drill Ø2 holes into the hull through the hawseholes in the supports, to take the anchor ropes. Fit the Figurehead in position with glue.

Part 3 - Cat Davit. Two required. Make the blocks from 3x3 walnut strip and the outriggers from Ø2.5 walnut dowel, 25 long. Fix the outriggers to the blocks with glue and two brass nails. Making a notch in the underside of the blocks to fit the davits over the bow railings.

Part 4 - Anchors. The diagram shows how to assemble the anchors. The stocks are made from the brass rod supplied, bent to 90 degrees and with brass caps glued on each end. Paint matt black. Fit a 5mm brass ring through the tail of the anchor. The anchor cable is made from large thread and is tied on to the brass ring and 'seized' with a whipping of thin thread. The anchor rope is threaded into the hawseholes on each side of the bow. Tie a length of medium thread to each anchor ring and secure the ends to the cat davit outriggers with a clove hitch. Loop the excess rope on deck and secure with a drop of glue. Tie a length of medium thread around the fluke of each anchor and tie up each anchor to the railing as shown in the perspective view.

Part 6 - Crew Heads. Make these from 10x10 walnut blocks. Shape the backs to match the curve of the ship's rail as shown in the plan view. Cut away the back edge so that they will sit over the railing base. Cut out the doors from the photo-etched plate supplied. Glue the doors onto the completed units. Glue into position.

Part 10 – Windlass. Cut out the two support plates from the painted photo-etched brass plate, and finish the edges carefully with a file. Drill Ø1 holes in the plates and assemble the two brass cylinders and end caps (*supplied in the bag with the ship's wheel*). Fit and glue Ø0.8 brass wire rods to link the support plates at the base. Glue to the deck.

Part 11 - Multiple Pump. Make the pump base from 2x6 walnut strip 22 long and glue all the brass pump elements supplied to the base. Drill and fit the end supports into the base and insert a $\varnothing 0.8$ brass wire rod to secure the two pump wheels. Glue to the deck.

Part 14 - Wheelhouse Group. Make from the 6x6 walnut block supplied with the ship's wheel. Radius the top surface. Make the two front feet from $\varnothing 1$ brass wire. Fit the ship's wheel to the front end with a brass nail. Fit in position on the deck raised up on the brass legs so that the ship's wheel is just clear of the deck.

Part 15 - Skylight. The four sides of the frame are made from 2x6 Walnut plank. Cut the metal window out of the painted photo-etched brass plate, bend it carefully and glue it in position on the frame.

Part 16 – Quarterdeck Quarters. Glue together the plywood parts n25, 26, 27, 28, H and O, cover with 0,5 x 3 walnut strips and sand smooth. Fit the roof edge-trim using 2x3 Beech plank. Cut out the decorative panels and the door from the painted, photo-etched plate and trim to shape. Glue these on the assembled quarters. Curve the undersides of the two ends slightly to fit to the curve of the deck. Glue to the deck.

Part 17 - Quarterdeck Balustrade. Make the base from 0.5x3 Walnut plank. Make the handrail from 2x2 Walnut plank. Use $\varnothing 0.8$ brass for the metal uprights. Assemble and glue to the deck.

Part 18 and 21 - Hatches. The cover for the three hatches are made from plywood parts B, C and D respectively, covered with 0.5x3 Walnut planks. The four sides are made from 0.5 x 3 Walnut planks. Use 2 x 3 Lime strips to make the frame around the deck opening. Glue to the deck, using the plan view to confirm which sized hatch goes in which position.

Part 19 – Overhead Support Beams. The two beams for supporting the spare yards and spars are made by joining 2x3 beech strips; use 2 x 6 beech strips for posts. Set the width of the supports to fit the rail-to-rail dimensions of the constructed model. Adjust the height of the posts to give 10mm clearance of the spars above the level of the railings.

Parts 20 And 24 - Belaying-Pin Racks. The two pin racks are made from plywood parts 0. Make the support posts from $\varnothing 2$ walnut dowel to the dimensions shown. Drill the deck using the rack as a template, and glue the posts in securely. Glue the belaying pins into the racks Fix the racks on the posts.

Part 22 - Crew Quarters. Assemble plywood parts H, I and L. Cover with 0.5x3 walnut strips and finish with care. Make the roof trim from 2x3 lime plank. Cut out the decorative panels and the door from the painted, photo-etched plate and trim to shape. Glue these on the assembled quarters. Curve the undersides of the two ends slightly to fit to the curve of the deck. Glue to the deck.

Part 23 - Bow Beams. Posts will be made of $\varnothing 1$ brass wire; the beams from 2x3 Lime plank. Set the width of the supports to fit the rail-to-rail dimensions of the constructed model. Adjust the height of the posts to give 10mm clearance of the spars above the level of the railings.

Part 25 - Capstan. Make the two support posts from 2x3 lime strips and position the rotating group under the foredeck as shown. Insert the 3x3 Walnut square column in the deck cutout, gluing the base onto the main deck. Drill a $\varnothing 0.8$ hole through the ball top of the brass stanchion supplied and cut it off to make the handle pivot. Drill a hole into the top of the column and glue firmly in position. Make the rods from $\varnothing 0.8$ brass wire and the handles from $\varnothing 2$ Beech dowel.

Other Deck Parts.

Deck Belaying Points. Fit eight belaying rings to the deck as shown in the plan-view: four by the mainmast, two by the foremast and two by the bowsprit. Drill $\varnothing 1$ holes in the deck and fit brass pintles with a brass ring in each. See **Part 48 on Plan 3** for details.

Parts 60 and 62 - Capstans. Glue the small brass capstan part 60 (6x10 mm) on the foredeck behind the bowsprit, and glue the large brass capstan part 61 (8x12 mm) on the maindeck between mainmast and mizzenmast.

Part 62 – Compass. Fit the brass compass part 62 (4x6 mm) on the poop deck in front of the ship's wheel.

Part 63 – Bitts. These are used for securing ropes when docking, etc. Make up eight double bitts by gluing pairs of the single bitts provided to the eight bitt bases (5x12 mm) cut from the photo-etched brass plate. Position these on the deck in accordance with the plan-view.

Mast Feet. Three required: two of $\varnothing 6$ and one of $\varnothing 5$. Make from $\varnothing 1$ brass wire wound around a suitable piece of mast dowel and cut the wire neatly to make smooth rings. Put these to one side until the masts are ready for insertion in the deck.

Assembly of Masts and Spars.

Having previously cut and tapered the masts and yards to shape, work through the following sequence to assemble and rig the yards before assembling them on deck.

1. REINFORCE THE MASTS

Parts t11 and m13 - Reinforce the front face of the foremast and mainmast with 2x2 Walnut plank glued to the front face of each mast.

Part 31 – Reinforcing Mast Fasteners. Six required. Make from 3mm wide copper strip supplied. Attach the fasteners to the masts with $\varnothing 1$ brass pins and glue in place as shown on the side-view.

2. ASSEMBLE MASTS AND MAST TOPS.

Part 29 – Topmasts. This shows how the topmasts are assembled to the lower masts using mast caps (plywood parts A), tops (curved platforms plywood parts E, F and G) and support cheeks (plywood parts M). Splicing a mast section to the foot as shown makes the 'dog-legged' foot on each topmast. Take the dimensions from the scale side-view. Sand the joints smooth to resemble a shaped iron mast. Tops should be covered on both sides with 0.5x3 walnut planks, and with 2x2 Walnut planks inserted in the two apertures as shown in Part 51 on Plan 3. Glue the tops accurately in place taking care to align the tops with the fore-aft centre-line of the mast, and ensuring that space is left on each side between the top and the masts through which the shroud line will pass. Carefully align the mast items before the glue sets.

Part 36 – Topgallant Masts. The sketch shows how the topgallant masts are assembled to the topmasts using tressle-trees and cross-trees. Take all dimensions from the scale side-view. Splicing a mast section to the foot, as shown makes the 'dog-legged' base on each topgallant mast. Sand the joints smooth to resemble a shaped iron mast. Use 3x2 Walnut plank for the cross-trees, bridging the fore ends with 1x3 Walnut plank. Use 2x2 Walnut plank for the tressle-trees noting that they 'fan out' towards the stern. Part 36 on Plan 3 provides additional views of this assembly. Carefully align the mast items before the glue sets.

3. PREPARE YARD FITTINGS

Part 30. Illustrates the gimbal joint between the three lower yards and the parrels fitted to each lower mast. Each parrel is made from 3mm copper straps and is nailed to the mast; the two attaching brackets are cut from the photo-etched brass plate and are joined by a $\varnothing 1$ brass pin, flattened with pliers to rivet it in place. Do not fit the yards to the masts until the rigging has been prepared.

Upper Yard Fixings. Drill the mast caps and insert fixing hooks made from $\varnothing 1$ brass wire as shown in **Part 50 on Plan 3**.

Part 45 – Gaff Terminals. This diagram shows how the necks of the two gaff spars are connected to the gaff terminals on the mizzen and main masts behind the yard parrels. Drill $\varnothing 0.8$ holes in the gaffs and insert $\varnothing 0.8$ brass wire. Make two 3x3x3 Walnut blocks and drill a $\varnothing 0.8$ hole in the centre of each block. Radius the fore surfaces to fit snugly against the masts. Glue in place behind the yard parrels.

Parts 35 And 37 – Studdingsail Booms And Outriggers. The outrigger loops are made from $\varnothing 0.8$ brass wire eyelets. Fix the outriggers and studdingsail booms into position with medium thread using the scale side-view as a guide.

4. RIG THE MASTS AND YARDS

For convenience, it is strongly recommended that the rigging blocks (pulleys) are fitted to the masts and spars before these parts are assembled together and before the masts assemblies are fitted to the deck. Working from bow to stern and using the scale side view as a guide progressively rig the blocks to the masts and yards are shown. All blocks are the same size.

Part 28 shows how the yard halyards (that raise or lower the yards) are rigged to the yards. **Part 49 on Plan 3** provides an additional view of how the halyards are rigged over the front edge of the tops. **Part 39 on Plan 3** shows how blocks are fitted to the bowsprit.

5. FIT (STEP) THE MASTS INTO THE DECKS

Trial-fit the masts into the deck and make adjustments to the deck holes as necessary to get a perfect vertical alignment of all three masts as viewed from the stern. Use the scale side view to align the masts with the positions on the drawing. Remove the masts and slide the base of each mast into the appropriate mast foot (made earlier from brass wire). Glue the masts in place ensuring that the masts align with the centre-line of the ship. Glue the mast feet in place.

Fix the lower yards in place by riveting the brackets to the parrels with $\varnothing 1$ brass wire. Hang the upper yards to the mast caps, closing the brass wire loops to secure them in place.

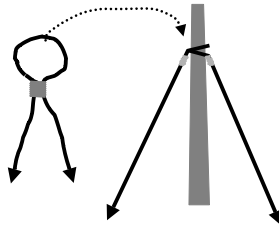
6. COMPLETE THE RIGGING

It is advisable to apply glue to stiffen the tips of the threads to facilitate insertion through the deadeyes, block holes or rings. Every knot should be secured with a bit of glue.

Lower Shroud Lines. Make these from medium thread and secure them to the masts by using seized loops as shown in the diagram **Part 46 on Plan 3**.

Terminating Lower Shrouds. The lower ends of the shrouds are terminated around deadeyes and the deadeyes are tensioned against the deadeyes on the channels using thin thread as shown in **Part 33 on Plan 3**.

Top Shroud Lines. The recommended method for fixing the top-shrouds to the mast is to make a 'seized' loop using thin thread as shown below. The loops should sit snugly on the taper of the mast. Drill the tops with $\varnothing 1$ holes and rig the top shrouds using medium thread. Tie the threads off to the lower shroud lines as shown in **Part 51 on Plan 3**.



Ratlines. Make and bind the ratlines to the shrouds using thin thread – once the shrouds are tensioned correctly using the dimensions on the scale side view as a guide. The knots are shown in **Part 40 on Plan 3**. Secure the end knots with a drop of instant glue.

Fixed Rigging. Working from bow to stern fit all the permanent, fixed rigging - the ropes used to tension and hold the masts and bowsprit in position. **Part 38 on Plan 3** shows the foremast rigging connections to the deck rings by the bowsprit stem.

Running rigging. Working from bow to stern, fit the running rigging (the rigging used to move the yards and spars) to the numbered rigging points as indicated on Plan 2. Dual numbers indicate that the rigging is doubled and therefore needs two terminal points – one on each side of the ship. The scale plan-view identifies the location of the numbered rigging points. The correct lines (ropes) for the various types of rigging is indicated by the thickness of the lines drawn in the scale side-view. Apply glue to stiffen the tips of the lines to help insertion through block holes. Ensure that rigging is tight, but does not deform masts or spars. **Part 34 on Plan 2** shows how the braces (ropes holding the yards in place) are fixed to the stays – the large ropes bracing the masts. **Part 47 on Plan 3** shows how to secure the mizzen stays. **Part 48 on Plan 3** provides an enlarged view of the double-main-mast stays.

Belaying a line to a Belaying Pin. The diagram below shows how to belay (terminate) a line to a belaying pin.

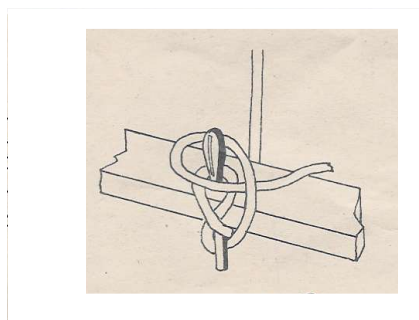


Fig. 1 on Plan 3 shows how to secure the flag on the hauling line of the flagpole. To give the flag an appearance of weight and droop in the absence of wind, fold and secure the flag in a draped position using some thin pins, and then spray the flag with fixer or transparent hair lacquer.

Varnishing: Leave all unpainted parts their natural colour and coat with matt varnish.

Sails: These are not supplied in the kit. However, a set of ready-made sails **Art 34015** together with rigging instructions may be purchased from Mantua Models. A sail plan for **Art 34015** is provided on Plan number 4.

Note: Depending on the availability of supplies the Mantua Model Group may from time-to-time, substitute alternative materials to those specified above.

PLANKING INSTRUCTIONS

Newcomers to this fascinating hobby, or those new to the construction of a Mantua Group period ship model, sometimes have questions when they start to work such as: "How big an obstacle is the planking? Is it possible to have something additional in the way of equipment or instructions to help in this most important part? Are there any photographs or diagrams that may help?" To assist you, we have produced this short instruction sheet in an attempt to lessen any problems you may encounter.

PLANKING OR THE APPLICATION OF STRIPS

First, a short note on the background. Each vessel was originally clad with large wooden boards positioned longitudinally or diagonally to the line of the hull, either with one plank overlapping the next (clinker-built), or plank one adjacent to the next (carvel-built), and nailed onto the ship's frames. This covering, in addition to being necessary for buoyancy (after caulking and sealing the joints) also gave considerable strength to the whole vessel. In the case of our own models, because of the nature of the materials used, the planking will be accomplished using not short planks, but with full strips wherever possible, and doubled up in most cases, as they were in the original vessels. This technique is made possible through the flexibility and quality of the materials provided.

To achieve a high quality finish to the planking, we suggest the following system that we consider is most effective, and which is demonstrated in the diagrams on the last page.

The planking operation begins on plan number 1 of each of our model's instructions. The position of the first plank is shown on a profile of the skeleton structure after assembly. This reference point normally corresponds to the highest point of the two or three central frames and coincides with the lowest point of the curve formed by the extreme tops of the frames themselves. Where required, use a strip bender to curve the plank so that it fits the shape of the hull.

The first strip applied must be perfectly parallel to the line of the keel and should be fitted at the bow, the other end projecting beyond the length of the hull as in Fig.1 below. If the ship is to be double-planked, the initial planks may be glued and lightly pinned to the frames. The pins are to be removed once the assembly has properly set. Please note that where the upper sections of the frames are to be removed later, the planks should be pinned only at these places, i.e. no glue applied.

Proceed in the same manner from the top to bottom, fitting each plank snugly against the other, checking that they can be positioned easily without having to unduly force or twist the plank longitudinally. **Be sure to cover each side of the hull alternately, working three to four planks at a time. This avoids twisting the hull.**

After a number of these 'easy' planks have been fitted, a certain amount of difficulty will be encountered in placing subsequent strips, as the planks will now want to overlap in some places. You will now have arrived at the curve or sheer, of the vessel. Planking now requires a different procedure. All the planks must adhere to, and lie flat against, the frames for their entire width without curling, twisting or forming strange and unwanted 'ears'. We need to overlap the new plank on the previously positioned plank, allowing the strips to guide us in determining at what point the overlapping is to begin at each end. Position this overlapping plank without gluing onto the central two or three frames of the hull (see Fig.2), holding the ends down with your fingertips, mark both ends where they overlap, with a pencil. Cut along the lines drawn, using a sharp craft knife (see Fig.3).

Reposition the cut strip on the hull, fitting it snugly against the preceding plank, making slight adjustments to the angled cut as necessary, to ensure an exact fit.

Now glue and pin the trimmed plank into position. Proceed with this method working towards the bottom of the hull i.e. towards the keel. Note that if this operation is carried out with due care, the planking will create the beauty of a wood inlay as the pieces fit together smoothly.

After proceeding in this manner for a while, we arrive at a point where the strips begin to leave a space (rather than overlapping). Irregular shaped spaces appear at the bow and stern ends of the strips as we position them alongside the preceding strips. Even in this case, let the strip itself guide you. Fix the strip into position, letting it follow its own natural curve. The spaces that are left, normally acute triangles, will be filled later with segments of strip carefully cut to shape (see Fig.4).

After the lower portion of the hull has been completely covered, proceed to cover the upper areas along the upper deck parapets (if this is relevant to your model), leaving the ends of the strips extending beyond the parapet line. This will be trimmed away later to achieve the correct outline when measured against your drawings (see Fig. 5). After the application of the first layer of planking over the entire hull, it will be necessary to smooth down the surface, removing the inevitable remains of excess glue, and leveling off any small imperfections in the planked surface.

Having finished the surface to your satisfaction, if you are working on a kit that is double planked, proceed to apply the second and final layer of planking. This will be the layer that is visible. Having gained the skills carrying out the first level, you should now be well able to ensure that the quality of the second layer is of a high standard.

The second planking will follow the same process, and, assuming a good level of preparation, should be somewhat easier.

In some instances, strakes or rubbing boards that stand proud of the planking should be fitted to the first level of planking, where indicated on the drawings. However the instructions may well direct you to fit them after the second-level planking has been completed.

FINISHING

When the final planking has been completed and the glue is fully set, the next task is to smooth the entire hull. We suggest the use of a scraper, a small wood plane (set fine) and various grades of sandpaper.

At this point, after having trimmed off the excess planking, according to the general profile at the parapet line, proceed to install the handrails and the gunwales, which are those planks that extend beyond the planking.

For the handrails, since they will be placed flat it will be necessary, especially at the bow and stern sections, to cut the strips into small angled (trapezoidal) sections in order to follow the curve of the hull (see Fig 6). The joints between these sections should be carefully sanded to make them as invisible as possible and to achieve a smooth, continuous curve.

For the gunwales, the strips will be fixed "edge on". The thickness of the strips (usually 2mm.) means that it will be necessary to pre-form them to fit the curves. We suggest the following methods to achieve the desired curve. i) If only a slight curve is required, use a standard plier-type plank bender. If a deeper curve is needed, ii) soak the strip in very hot water for a minute or two, then carefully bend and hold the strip in position against the hull or over an object of the right shape until set. Alternatively, iii) wet the strip and use a wheel-type bender.

When the strip dries out it will be stabilized and can be placed into position. If there are a number of these pieces to make, build a jig to save time and increase accuracy.

At this stage, after ensuring the main decks are properly positioned, cut out the sections of the frames that are visible above the decks (extending up to the parapet tops), and smooth them off level with the deck surface. Proceed to plank the inside faces of the bulwarks, covering the inside of the first layer of white planks. Carefully sand this last section of planking smooth using progressively finer grades of sandpaper.

The foregoing briefly describes the subject of planking in an effort to assist the beginner with what appears to be a rather daunting task but which can become a very satisfying achievement. The rest "as they say" is up to you. Take your time; use your own skill and ingenuity to develop your own methods having considered our suggestions.

TOOLS FOR THE JOB

Each individual may have their own idea about how many, or what type of tool to use and what to use them for. We set out below some general advice of modeling tools and their uses for your consideration. These are just some of the tools available. Please ask your supplier for details.

- **Craft Knives.** There are a number of sizes available, the larger handle being the most useful. There are many blades available from straight edge to curved and chisel ends, together with saw blades, etc.
- **Plank Benders.** There are two main types: i) plier-type strip bender for forming dry planks (used in most applications); ii) wheel-type bender suitable for bending wet planks.
- **Strip Clamp.** This is a quick release clamp for holding strips whilst you trim them. This also doubles as a hull clamp allowing you to work with both hands on intricate work.
- **Pin Pusher.** This tool is spring loaded. A pin is inserted headfirst into the barrel then the tool is used to punch the pin into the wood, removing the need to hammer pins in delicate places.
- **Balsa Plane.** A small plane with a razor-type blade, and can be set for a fine cut.
- **Scraper.** A razor-type blade used for finishing flat surfaces.
- **Pin Vise.** A tool that looks like a jeweller's screwdriver but with collets of varying size, and which can take the smallest drill bit and act as a twist drill.
- **Sanding Stick.** A small plastic spring-loaded stick with a tapered end that takes a thin sanding belt, for sanding in tight places.
- **Razor Saw.** There are various grades of miniature saw blade available that all give a very fine cut. They are usually tenon-backed and can be obtained in sets to include the handle, mitre box, or just the blade.

