

## HISTORICAL BACKGROUND

Two British royal yachts were called *Royal Caroline*. The first, laid down in the shipyards of Sheerness in 1700, was launched under the name *Peregrine Galley* and served in the Royal Navy until 1733. After appropriate adaptation work to convert her to a royal yacht, this ship had the honour to be called *Royal Caroline*. In 1749 she was converted back to Royal Navy use, assumed the name *Peregrine* and was lost in 1761 on route to Lisbon.

By contrast, the second *Royal Caroline* was planned from the outset to be a royal yacht (to replace the *Peregrine*) and was launched in 1749 in the shipyards of Deptford. It is a model of this ship that is presented in this construction kit.

In the year 1761 when the *Peregrine* was lost, the *Royal Caroline* was renamed *Royal Charlotte*, continuing to serve the British Royal Family till 1805. She was finally dismantled in 1820.

## 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 shown on Plan 7.
- Figure numbers given below (Fig.1, etc) refer to the numbered figures on Plans 1, 2 and 3.
- Part numbers (P.23, Part.23, etc.) refer to the detailed drawings on Plans 3, 4, 5 and 6.
- The sequence given here is the recommended order for completing the model.
- It is useful to hold the keel in a vice or working cradle while the ship is being assembled. Keel-clamp **Mantua Model Art.8155** (not supplied) is ideal for this purpose. If you do not have a suitable clamp, make up a working cradle by nailing two wooden runners 5mm thick and set 5mm apart onto a wooden base, so that the keel will sit between the runners.

### PLAN NUMBER 7

Put the laser-engraved sheet of decorative panels to one side for use later. On the seven laser-cut plywood sheets supplied, and using the full-sized drawings on Plan Number 7 as a guide, mark the identity numbers on the back of the parts with a soft pencil - so that the marks may be erased later if necessary.

Provide yourself with some numbered storage boxes. Remove all of the plywood parts from the plywood sheets by cutting through the small bridges with a craft knife, smoothing all cut edges with fine sandpaper and taking care not to destroy the laser-cut outline of each piece. Put the pieces in the storage boxes for safekeeping.

### PLAN NUMBER 1

This plan shows how to construct the framing of the ship; how to fit the deck supports and decks; and how to plank the hull and stern.

**Fig. 1:** Trial-fit frames n.1-n.10 into the keel n.12 and fit deck-plates n.16 and n.17 down into the frames **without glue**, filing the slots in the parts as necessary so that they slide together without being forced. **Warning: the parts are fragile and will fracture if forced.**

**Fig. 2:** Glue the transom supports n.18 into frame n.10 and then fit the transom frame n.11. Use small pins to hold the pieces together until the glue has set, then remove the pins. Glue the beam n.1a accurately in place on the top of frame n.1.

**Fig. 3:** Before continuing with the assembly, chamfer the edges of frames n.1 and n.2 and the support cheeks n.15 and n.23 so that the hull planks will form a smooth curve around the frames (see **fig.4**).

**Fig. 4:** Glue and fit frames n.1-n.10 into the keel n.12 and before the glue sets, glue the deck-plates n.16 and n.17 securely in place. Using a straight-edge or ruler, check that the keel is not twisted or deformed along its length. Ensure that the frames are aligned with each other and that they are square to the keel. Clamp the assembly and put aside until the glue has set.

**Fig. 5:** Glue the deck support beams n.1b, 2b, 3b, 4b, 5b, 6b, 7b, 7c, 8b, 8c, 9b, 10b, and 11b (*but not n.2a, 3a or 6c*) onto the appropriate frames as shown in **fig.5**.

**Fig. 6:** Glue the support cheeks n.15 and n.23 in place both sides of the bow.

Trial-fit the main-deck n.20, filing the slots as necessary to get a good fit around the frames and onto the curved deck supports. *Tip: hold the sides of the deck with one hand to curve the deck from side-to-side before insertion between the frames.* Apply glue to the tops of the deck supports n.1b to n.7b and fit deck n.20 in place, clamping it with temporary pins to hold the deck down firmly onto each curved support until set. Remove the pins.

Now fit and glue the cabin front transom n.6C into position in frame n.6. Fit the fore-deck support beams n.2A and n.3A.

Apply glue to the tops of the remaining deck supports and first fit deck n.21 then deck n.22 in place, clamping them with temporary pins to hold the decks down firmly onto each curved support until set. Remove the pins.

**Important:** File down or sand the outside edges of the decks so that they are flush with the edges of the frames, to ensure that the hull planks will fit accurately against the frames and deck edges.

**Fig. 7: Hull Planking:** *If you are new to ship-building, please first read the separate instructions on planking provided at the end of this booklet.*

Two layers of planking are applied: **The inner layer of planks uses 1,5x6 strips; the second layer uses 1x6 strips.**

Start the planking of the hull by setting the first two planks on each side of the hull aligned accurately as shown in **fig. 9** by the two sets of dashed lines and the symbols 1• and 2•. The intersection points of these planks with the various frames can be directly seen on fig. 9, drawn to a scale of 1:1. Now fit three more planks to each side below the first plank. Add three further planks below these four. The first seven planks will fit without tapering. Further planks will need to be tapered to fit the curve of the hull

To achieve a good result, we advise you to follow the planking sequence shown in fig.7. Alternate the sides every 3 planks to avoid twisting the structure. As necessary, add more planks to bring the sides up to the required height to cover the frames, cabin sides, etc. Leave the stern ends of the planks protruding at least 20mm past the stern transom as these will be trimmed to shape later.

**Fig. 8:** Note that the planking on the sides of the forward deck n.19 protrudes 3mm above the top of the frames n.1-n.3. The highest part of this planking must also continue toward the centre of the hull, protruding at least 25mm beyond frame n.3.

As shown in **fig.9**, note also that the fore part of plank 2• and the others below it must protrude beyond the front edge of the cabin by at least 35 mm. The planking sides of the cabin deck n.22 must protrude at least 3mm above frames n.6-n.8.

**Fig. 9:** This is a cross section of the framework drawn to a scale of 1:1.

**Fig. 10:** Cover the curved underside of the transom supports n.18 with 1,5x6 mm planks cut to shape to fit between the protruding ends of the stern hull planks. After the glue has set, trim the stern planks back flush with the transom planking as shown. To prepare the hull to receive the second layer of planking, fill any cracks or splits with slivers of wood or wood filler; scrape the surface of the hull to remove excess glue and then smooth carefully with fine grade sandpaper.

Now apply the second layer of planks using **1.5x6 strips**, following the same instructions used for the first planking. Plank the second layer with greater care, as this is the layer that will be in view. Fill any splits or cracks with wood-coloured filler, then scrape and sand the entire hull surface smooth. Protect the hull with two coats of sanding sealer (such as Mantua Model Art.4401714, not supplied in the kit), sanding lightly between coats.

## **PLAN NUMBER 2**

This plan shows how to finish off the planking, how to build the ship's handrails and how to add some deck and hull items to the structure.

**Fig. 1:** With a small saw, remove the top part of frames n.2 and n.3 flush with the deck n.20 and support beams n.2a and n.3a. Remove the top part of frames n.9 and n.10 flush with deck n.21.

**Fig. 2:** For the deck planks, cut 0.5x3 light wood strips into accurate 80mm lengths, ensuring a neat, square cut at both ends. Note that it may be useful to make up a cutting template (see **fig.13**), as some 100 or so of these planks will be needed to cover the entire deck area. Cover decks n.20, n.21 and n.22 with deck planks, positioning the planks alternately using the scale plan-view **fig.16** as a guide. Leave tiny gaps between the planks to simulate caulked joints. 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 covering is finished and dry, scrape the surface of the deck to remove excess glues and then smooth carefully with fine grade sandpaper. Varnish the deck with sanding sealer.

When the deck planking is completed, plank the insides of the parapet walls (bulwarks) with horizontal 0.5x6 walnut strips. Cover the inside face of the bow transom n.1 and the stern transom n.12; and the fore and aft cabin transoms n.6 and n.8 with vertical 0.5x6 walnut strips. Paint the inside faces of the bulwarks with **Pompeian red acrylic**.

**Fig. 3:** Glue the plywood support plates n.2C and n.3C on the ends of beams n.2a and n.3a, ensuring perfect alignment with the bulwarks and beams.

**Fig. 4:** Now fit deck n.19 in place, securing it with temporary pins until set. Cover the deck with 0.5x3 light planks, positioning the planks alternately using the scale plan-view **fig.16** as a guide. Trim off the excess hull planking flush with the deck planking and smooth carefully with sand-paper. Protect with two coats of sanding sealer.

**Fig. 5:** Cut out the cardboard template supplied in the kit. Line it up on the starboard side of the hull with the three points of reference A-B-C, corresponding to the three fixed profiles of the hull and fix it to the side, using some small pins or masking tape. With a well-sharpened pencil mark the profile of the rails and the eight openings for gun-ports and stern windows. Remove the template and check the dimensions of the apertures against the side view on **Plan 4** and **fig. 9 on Plan 2** making any modifications necessary to achieve an accurate profile. Reverse the template and repeat for the port side. Using a small drill and cutter, carefully cut out the apertures and with a craft knife or small plane, trim the parapet walls to size. File carefully to final size and sand smooth.

**Fig. 6:** Fix the figure-head deck n.24 in place, modifying the profile, where necessary, to bring it into line with the hull planking below. Cover it with 0.5x3 light planks, laid longitudinally. Cover the bow transom with 0.5x6 planks fitted vertically.

**Fig. 7:** Cover the stern transom and the curved part below with 1x6 mm planks laid horizontally.

**Fig. 8:** Fit the three vertical companionway walls plywood parts X, Y and Z on deck n.21, inserting walls X and Y down onto the false deck n.17 below. Cut and glue the walnut edging planks around the companionway as shown in the fig.8

**Fig. 9:** This confirms the dimension of the cabin window apertures.

**Fig. 10:** Follow the sequence shown in the figure to create the three windows on each side of the royal cabin. The drips are made from walnut rings, Ø16xØ12x5, divided in two. Carry out the whole operation with the greatest care and attention using small amounts of glue, and keeping glue off the visible areas.

**Fig. 11:** Make the parapet rails from 2x6 walnut planks, ensuring that the rails are set to protrude 2mm over the outside edge of the parapet planks. Fit the cross-rails on decks n.19 and n.22 so that they protrude 1mm over the edges of the decks.

Fit two fender rubbing strakes made from 2x6 mm walnut plank along each side of the hull as shown, checking the positioning with the side view in **Plan 4**. Soak the planks in hot water before bending them. Hold them in place with temporary pins until the glue has set

Line the eight gun-ports with 0.5x3 mm walnut planks.

**Fig. 12:** This figure shows the sequence for building the upper handrail, located in the central part of the parapet wall. It also recommends suitable tools.

**Fig. 13:** This shows the method of cutting deck planks using a home-made cutting jig. The figure also shows how the top of the stern transom should be filed to take the transom rail, so that the rail will sit parallel to the side rails.

**Fig. 14:** Make the transom handrail from 2x8 mm plank, soaked then bent to shape, and glue it on the stern transom. After the glue is set, file down the two edges, bringing the rear edge flush with the outside planking on the transom. *Note: A brass moulding will be glued on this handrail edge later. The moulding must decorate the upper part of the transom itself.*

File the front edge of the rail to match the curve of the transom.

**Fig. 15:** This diagram shows the construction of the stern side windows. Ensure that the apertures are cut accurately to 34x17mm as shown. Paint the upper side and the lower side of the two plywood

parts K **azure blue acrylic** and glue them in place on the hull.

Cut out the two pre-formed plastic windows supplied in the kit. Paint the inside surfaces with **light-grey acrylic paint** to simulate reflected sky. When dry, fix the windows on each side between the two plates K with a little glue, noting that the two windows are angled differently for port and starboard.

Build the window frames from pieces of walnut plank, gluing them to each other, and keeping glue off the window panes.

**Fig. 16:** This 1:1 scale view is for reference and shows an overhead view of the model with all the deck structures in place.

### **PLAN NUMBER 3**

**Figs.1, 2 and 3** provide three detailed views of the ship with the various items annotated with reference numbers (P.1, etc.). Detailed drawings for each item (Part 1, etc) are provided to show how each is constructed. Also refer to **Fig.16 on Plan 2** for the positioning of these items on the ship.

**Fettle the brass castings supplied with a fine file and small wire brush to remove excess casting material and to achieve a bright finish.**

#### **Part 1: Large bollards on the figure-head deck.**

Two required. Make these from 6x6 Walnut strips and fix each to the deck with a tenon made from Ø 1.5 brass wire.

**Part 2: Foremast tacks.** Two required. Make these from Ø3 mm dowel and 3x3 Walnut. Drill the hull each side and glue the tacks in place. Refer to **fig.16 on Plan 2** to set the angles.

**Part 3: Cleats.** Two required. Make these from 2x6 Walnut strips. Fix them to the figurehead deck with tenons made from Ø 1 brass wire.

#### **Part 4: Figurehead.**

Before fixing the figure-head, drill a Ø1.5 hole through the hand and fit the sceptre in place with a drop of instant glue. Fix the figurehead in place on the ram.

Gently form the brass ram curves so that they sit against the bow and hull as shown. Hold the ram curves in place and mark the profiles on the ram and the hull each side with a pencil. Paint the areas behind the ram curves with matt black acrylic. When dry, fix the two ram curves in place.

**Part 5: Hawse-hole Plates.** Two required. Make these from 2x8 mm strip. Drill Ø3 holes to take the anchor ropes. Fix the anchor rope later when the anchors assemblies have been built.

**Part 7: Cat-davits.** Two required. Make these from 6x6 mm walnut strip and fit them onto the foredeck as shown. Make the vertical posts (or bitts) from 5x5 strip, modelled and fitted in place as shown. Make the two cantilever davit supports from 4x12x12 walnut blocks. Make the two davit hooks from brass stemmed eyelets, fixing them in place with medium rope as shown.

**Part 6: Brightwork.** Using figures 1, 2 and 3 as a guide, and referring to the scale side view on Plan 4, fit the remaining brass rails and decorative castings in place around the ship as follows:

**Stern decoration:** Paint the stern transom and the curved area under the stern as far as the lower rubbing strake with **azure blue acrylic** and allow to dry. Prepare the laser-engraved plywood sheet as shown in the six photographs on page 10 of this booklet, using **azure blue acrylic** paint. Cut a sheet of clear plastic for the stern windows and paint it light-grey. Glue the plastic sheet onto the back of the laser-engraved windows. Fix the stern windows in place on the transom using small brass nails and referring to **fig.3** as a guide. Fix the various brass mouldings and decorative castings on the transom and under the stern as shown in **fig.3** and illustrated on the kit's box, leaving the lanterns until later.

**Gunwale decoration:** Using a soft pencil draw a line along the hull marking the position of the brass rail that runs from the figure-head deck to the stern, and through the centre-line of the gun-ports to the stern windows. Paint the area between this line and the wooden parapet hand-rails, including the bow transom above the figure-head deck) with **azure blue acrylic** and allow to dry. Fit the laser-engraved decorative strips prepared previously in place under the hand-rails as shown in **fig.1** and the side view on **Plan 4**.

**Gun ports:** Fit a decorative casting around each porthole, secured with instant glue.

**Stern Side Window decorations:** Fit a brass canopy above and brass swan support below each stern window.

**Side rails.** Fit accurately-cut sections of brass moulding along the hull to make a brass rail running from the figure-head deck to the stern, through the centre-line of the gun ports to the stern windows.

Fit accurately-cut pieces of brass moulding on the sides of the ship to make the remaining side rails as shown in **Plan 4**.

**Gingerbread:** Glue the remaining brass decorative mouldings along the sides and on the bow transom as shown in **figs 1 and 2**, and on **Plan 4**.

**Bow Support Rails.** Glue the scroll heads to the cat-head davits and bitts as shown in Part 6. Make the bow support rails from the brass moulding supplied and form them to shape using fingers rather than pliers. File a flat area on each end and drill a Ø1 hole in each flat to take a fixing nail. Fix the rails in place with a nail and a drop of glue on each end. Three cast figurines are fitted to the support rails on each side of the bow. Mark the positions of the three support rails on each figurine in turn and cut notches in the back with a round needle file to take the rails. Fix the figurines in place with glue.

**Part 8: Anchor.** File the two plywood anchor stocks supplied to achieve the desired tapers on three faces at each end. File square the opening into

which the upper shank of the anchor will fit to match the size of the anchor shaft. **Caution: the anchor castings are brittle and will snap if bent.** Secure the stocks on the anchors, and paint the assembly **matt black acrylic**. When dry, wind 5 or 6 turns of medium black rope in four places on each stock as shown, fixing the thread with a little glue. Insert a Ø6 brass ring through the tail of each anchor. Tie a 500mm length of large thread to each anchor ring and bind it with thin thread as shown. Put to one side as the anchor is fitted to the ship when everything else has been assembled.

#### **Part 9: Chain-wales.**

**Foremast Chain-wales.** Identify the two plywood chain-wales with five holes. Check that the curved edge of each chain-wale fits the curve of the hull where it is to be fixed. Paint the outside edges of the chain-wales matt black. Refer to the overhead view on Plan 2 for the horizontal positioning of these chain-wales, and refer to Plan 4 for the vertical positioning on the ship's sides. Make the triangular support brackets from 2x10 Walnut plank. The trapezoidal support (fluke) is made from 3x22x22 Walnut board. The support base (or clog) on which the fluke sits is made from 6x6 Walnut block.

**Mainmast and Mizzenmast Chain-wales:** Identify the appropriate chain-wales from the overhead view on Plan 2. Check that the curved edge of each chain-wale fits the curve of the hull where it is to be fixed. Paint the outside edges of the chain-wales matt black. Make the triangular support brackets from 2x10 Walnut plank. Refer to the overhead view on Plan 2 for the horizontal positioning of these chain-wales, and refer to Plan 4 for the vertical positioning on the ship's sides.

**Part 10: Chain-plates and Dead-eyes.** Fit dead-eyes and chain-plates into the chain-wales as shown. Note that the one-hole and two-hole chain-wales are fitted with the smaller size of deadeye. Fix the stirrup plates to the hull with long, brass nails and drops of glue, noting from **Plan 4** how the chain-plates are angled towards the mast caps.

**Part 11: Capstan.** Cut the 22x22 capstan base from 0.5 Walnut sheet supplied. Make the capstan bars from Ø2 dowel. Fix the assembly onto the deck.

**Part 12: Scupper Ports.** Make them from 2x8 plank. Glue them in place on the hull and carefully drill the Ø5 drainage holes when the glue has set.

**Part 13: Sea Gangway.** Make the risers of the bulwark steps from 2x2 Walnut blocks, surmounted by treads made from pieces of 0.5x3 strip.

**Part 14: Ladder.** Use the side pieces supplied. Use 1x6 strip for the treads. After gluing, cut the side-pieces down level with the top step. Put to one side.

**Part 15: Lanterns.** Cut out all lantern components from the photo-engraved brass sheet in the kit. Using a Ø10 dowel, fold the three lantern grilles to make them perfectly circular so they will fit into the end-caps.



File a small flat on the end of each lower lantern knob. Drill a Ø1.5 hole, 4mm deep, to take the support arm. Make the support arms from Ø1.5 brass wire. Paint the decorative rosettes **azure-blue**.

To make the lantern support brackets proceed as shown. Form the Ø1.5 brass wire around a Ø6 dowel using a pair of pliers to make the right-angle bends. After having cut off the excess wire, enlarge the ring as necessary to insert it over the knob and close the ring with pliers to pinch the knob tight. **Important Note.** *The centre lantern has a double support arm, while the two side ones have only a single arm.* Carefully drill the stern transom and fit the lanterns in place.

**Part 16: Flag-staff Support.** Position the two stanchions n.161 against the stern transom in turn, marking the points where the stanchions must be notched with a small file to fit around the handrail. Make the 4x12x12 flagstaff blocks from birch plank and drill a Ø2 hole through each. Chamfer the front and rear edges of the blocks to matches the slope of the stern transom. Paint the edges of the two stanchions **matt black**. Make the flag-staff from Ø2 dowel, and the flagstaff cap from Ø3 dowel.

**Part 17: Companionway Hatch Cover.** Make the sides from 2x3 strip glued onto plywood part n.171 and round off the four top corners. Notch the underside to fit the hatch onto the slide-rails. Paint the hatch **matt white**. When the paint is dry, glue a trimming piece of 0.5x20x20 walnut in the centre of the hatch. Glue the hatch in place on the slide-rails.

**Part 18: Falconet Supports.** Make these from 3x3 Walnut plank, and notch them to fit around the handrail and against the parapet wall.

**Part 19: Cabin-deck Railing.** Make the top handrail from 2x4 Walnut strip and fix it temporally to the lower rail with tape or pins. Carefully drill Ø2 holes through the rails as shown in the plan. Remove the tape or pins, and then insert the five pieces of Ø2 dowel. Lift up the handrail to the right height and fix the dowels in place with instant glue. File the dowels level with the rail, and glue the 0.5x3 finishing strip along the rail.

**Part 20: Royal Cabin.** The diagrams give step-by-step instructions how to make the doors and windows of the Royal Cabin from 0.5x3 strip, pieces of 1mm and 2mm thick Walnut sheet, 1x1 Walnut plank and clear plastic window material. Take the dimensions from the 2:1 scale diagrams for the door and windows. The drips will be made sections cut from Ø20x15x4 Walnut rings. Paint the rear side of the windows **light blue** to simulate reflected sky, and glue the wooden parts together and not to the glass. The small panel containing the royal coat-of-arms is made from plywood part p.20. Paint it **azure-blue** on one side, and frame it with pieces of 1x1 mm walnut strip. Glue the brass coat-of-arms casting in the centre when dry, and fix the assembly on the cabin wall.

**Part 24: Eyebolts.** Refer back to **Fig.16** on **Plan 2**. Make and fit eyebolts into the deck around the masts, and around the foredeck as shown. Fit small brass rings through the heads of the brass pintles supplied, drill Ø1 holes in the deck and secure the pintles in place with a drop of instant glue.

**Part 25: Bitts.** Make these from 3x5 strip. Insert tenons made from Ø1 brass wire. Drill the deck for the tenons and fix the bitts in place with glue.

**Part 27:** Six 3-pin and four 4-pin racks are required. With reference to **Fig.16** on **Plan 2**, make the belaying pin racks from 2x6 mm strip, and drill Ø1.5 holes in the rack and fit belaying pins. Make the support stanchions from 2x2 strip. Fit the racks against the bulwarks in the ten positions shown.

**Part 32: Hawse-holes.** With reference to **Fig.16** on **Plan 2**, drill two Ø4 holes in the deck and glue a Ø4 brass ring around each hole. The anchor ropes (if you wish to fit them on deck), run along the deck from the bow and then enter these holes. Secure the ropes in the holes with a drop of glue.

**Part 44: Bilge pumps.** Two required. Fix a stemmed-eyellet to the piston and connect the eyellet to the lever arm. Insert the piston in the body and fix the lever to the support, inserting a long, brass nail through the holes. Glue the support to the body. Drill a Ø1.5 hole at the bottom off the body and fit a drainpipe made from a Ø1.5 brass pin. Glue the two pumps to the deck as shown.

## PLAN NUMBER 5

All the details illustrated in this plan refer to the detail parts shown on **Figs. 1, 2 and 3** of **Plan 3**.

**Part 21: Winding Staircases.** A pair of 'handed' stairs are required. File the spiral steps supplied in the kit to the measurements given in the diagram. Glue the steps around a Ø4 dowel slightly overlapping, and so that they form a circular sector of 120 degrees – one right-handed and one left-handed. Glue plywood plate n.210 on each base. Plank the outside of the staircases using 0,5x3 light planks. On the side intended to touch the bulwarks, use longer planks so that they protrude below the base plate and sit on the curvature of the deck. The vertical sides of the steps will be painted **Pompeian Red**. Fit the staircases on the deck and position the plywood platforms n.211 with the fore edge of the platforms level with the top of the first steps. Fit the small set of stairs (**Part 14** on **Plan 3**) made previously on the port platform. With reference to **Part 19** on Plan 3, make and fit the hand-rope posts to the cabin deck and port staircase platform. Make the hand-rope from medium light thread. Secure the knots with a drop of instant glue.

**Part 22: Guns.** Eight required. Assemble the gun-carriages to the measurements shown in the plan. Glue brass axles in the grooves of the cross-bars.

Make the aiming chocks from 4x4 strip and glue one on each of the rear cross-bars. Fix the gun-barrel by inserting the rotation pin through the barrel and sit it down into the two necks of the gun-carriage. Glue two brass 'Q'-shaped brackets onto the carriage to hold the rotation pin in place. Fix Ø6 wheels on the front axle and Ø5 on the back axle, as shown in the plan. Cut off any excess axle flush with the wheels. Glue the cannons in place on the deck.

**Part 23: Boat-holder gang-board.** Make up two gratings, each consisting of 20 pre-cut elements, and frame them with 0.5x3 light strip. Using 4x4 Walnut strips, make up the two longerons and the two cross-bars so that they fit around the gratings accurately, and joint them using Ø2 dowel. In the ends of the longerons, insert the four supporting pins made from Ø3 dowel. Make two small saddles for the bow deck from 6x6 Walnut. Make up the main belaying pin rack and its associated support cross-bar. Fill the rack with belaying pins. Fix the support uprights to the deck using tenons made from Ø1 brass wire.

**Part 26: Foremast Pin Rack.** Make the supports from 4x4 Walnut, long enough to sit on the lower deck n.20 and protrude 22.5mm above the foredeck. Make the belaying pin rack from 2x6 strip and the rope-slide peg from Ø2 dowel. Paint the whole assembly **Pompeian Red**. Fill the rack with belaying pins. Cut two square holes in the foredeck and insert the supports gluing them onto deck n.20.

**Part 28: Foredeck Fife Rail and Bell.** Make the stanchions from 3x3 Walnut strip and fix them to the baseboard (2x6 walnut strip previously fitted) with Ø1 brass tenons. Glue the four belaying pin racks (2x3 mm walnut strip) in place, reinforcing with little triangular brackets made from 3x3 mm walnut strip. Assemble the bell components, making the bell axle from Ø0.8 brass wire. Paint the whole assembly **Pompeian red**, except for the bell.

**Part 29: Chimney-flue.** Make this from Ø6 dowel. Paint the flue **matt black**.

**Part 30: Ladders.** Make the treads from 1x6 strip. Round the upper corners of the ladder side-pieces and fit the ladders between the lower deck and the beam supporting the fore-deck (frame n.3).

**Part 31: Anchor Bitts.** Make the uprights from 6x6 walnut block. Cut the two back timbers from small birch plywood board, 4 mm thick. Paint the assembly **Pompeian Red**.

**Part 33: Main deck Gratings.** Make the front grating from 20 elements and the rear grating from 17 elements. Frame the gratings with 2x5 walnut strip. Sand the upper surfaces level and smooth. Sand the undersides to fit the curvature of the deck. Glue in place on the deck.

**Part 34: Skylight.** Make the frame from 2x6 strip, and the window bars from 2x2 walnut strip, taking

the measurements from **Fig. 16 of Plan 2**. Fit a piece of clear plastic inside the frame with a small amount of glue. Paint the inside of the window with light-grey paint. File the underside of the skylight to fit the curvature of the deck. Glue in place.

**Part 36: Tiller.** Make the tiller block from 6x6 walnut 12 long and drill a Ø3 hole for the rudder and a Ø2 hole for the tiller. Make the tiller from Ø2 brass wire, and fit the grooved cap on the handle end. At the other end, crush the last 3mm of the wire with pliers to create a blade that will prevent the tiller from twisting once it is inserted in the tiller block.

**Part 37:** Make the 2mm-thick bases from Ø8 dowel. Glue on the brass disks. Paint the hollow areas **azure-blue**. Fit trimming pieces to the ships sides made from 2x2 walnut strip as shown.

**Part 38: Hanging the Rudder.** Shape the top 15mm of the rudder into a Ø3 stem so that it will slide into the tiller without forcing. Fit four of the black 'U'-shaped rudder shackles supplied to the keel with short brass nails as shown in the side view on **Plan 4**. Carefully cut a hole in the underside of the stern to take the top part of the rudder and slide the rudder into position. Mark the position of the tops of the rudder shackles on the rudder and fit four 'U'-shaped shackles to the rudder with the bottom edges lined up on these marks. Place the rudder in position and glue the four rudder pins into the shackles to hold the rudder onto the stern. With the rudder lined up down the centre-line of the ship, fix the tiller in position on the rudder stem, ensuring that the tiller is lined up with the centre-line of the ship and is positioned as shown in the side view on Plan

**Part 39: Rudder Chains.** Fit pieces of rudder chain to pintles inserted in the rudder and stern as shown.

**Part 40: Platform.** It shows how to make the small platform that supports the central figure of the transom. Make this from 2x8 mm plank.

**Part 41: Stern Moulding.** This shows how the brass moulding at the base of the transom is fixed onto a 2x3 walnut plank, connecting the two ends of the fender rubbing strake.

**Part 42: Stern Windows:** To prepare the laser-engraved sheet see the photographs on page 10 of this booklet.

**Part 43: Stern mouldings.** This shows the lower decorative moulding fitted on the stern, in the same way as Part 41 above.

## LIFEBOAT

The lifeboat parts are found on the 2mm-thick plywood sheet.

Chamfer the edges of frame n.1 and the support cheeks n.9. With a small saw, groove both sides of the frames n.2 to n.5 as shown, so that the top parts can be removed after the hull is planked. The deck-

plate n.7 is assembled without glue, so that it too can be removed after the hull is planked.

Assemble the frames to the keel. Plank the hull with two layers of 0.5x3 planks using the same basic technique as for the ship's hull planking. When the glue has dried, remove the top part of frames n.2 to n.5 and the deck-plate n.7. Scrape and sand the hull and the inside surface of the boat. Coat the hull with sanding sealer.

Make up the bilge grating from 0.5x3 walnut planks glued in place on the frames. Make the top rail from 2x3 mm strip – steeped in hot water before being bent to shape.

Fit the decorative (wave-patterned) brass strip around the gunwales having previously painted it azure blue and rubbed it down to expose the raised brass pattern. Fit the lower rail made from 1x1 mm strip – steeped in hot water before being bent to shape. Fit false ribs made from 0.5x3 walnut strips (divided in two) around the inside walls. Make the stringers from 1 x1 strip, glued on the false ribs.

Insert the two plates n.10 and n.11 and cover them with 0.5x3 walnut strips. Fit seven rowing seats made from 1x4 walnut strip across the stringers.

**Rowlocks.** Eight required. Make these from 3x3 walnut strip.

**Tiller.** Cut and shape this from 4x4 mm light strip.

**Oars.** Four to eight required. The shafts and the handles will be made from Ø2 mm dowel. Make the square balance-weight part of the oars from 3x3 walnut strip. Make the blades from of 0.5x3 light strip.

**Eyebolt cleats.** Two required. Make the plates from 2x6 light strip. Glue the plates on the grating as shown. Drill Ø1 holes and fit two pintles as eyebolts.

Lash the completed lifeboat on two lifeboat supports glued on the boat-holder gang-board (Part 23).

**TOPS:** The diagrams at the bottom right of Plan 5 refer to the side view on **Plan 4** and show how the tops are assembled. These will be dealt with later.

## PLAN NUMBER 4

The main side view is a reproduction of the whole model drawn to a scale 1:1. In the two tables on the left of the sheet, we show the several kinds of rope to use in order to rig the ship and the several kinds of blocks and deadeyes to use. Each mast or spar has a dimension table attached giving the cutting and tapering measurements.

### Cutting the Masts and Yards.

Using the dowels provided in the kit, cut and taper all the masts and yards to the cutting and shaping dimensions noted on the side-view on Plan 4:

**L** = length;

**ØMax** = the largest diameter;

**ØMin** = the smallest diameter.

The spars (on which the sails are hung) are tapered on both ends as is the long boom on the mizzenmast. The masts and bowsprit are tapered towards one end only. Where indicated, taper the dowels using either i) a hand plane and sandpaper, or ii) an electric drill and sandpaper, or preferably, iii) an electric lathe (such as *Mantua Model Art. 8160*). For the yards, start the tapering 75mm from the ends, leaving the centre section unaltered. Finish the masts and spars with fine grit sandpaper and varnish with two coats of sanding sealer, sanding lightly between coats. Temporarily label the masts and spars with masking tape until assembled.

### Part 2 on Plan 5: Tops and Lower Mastheads.

Cover the platforms (plywood parts p.2) with 0.5x3 light planks on both sides. Glue a 0.5x3 walnut plank around the curved edge so that it protrudes above the top surface by 1mm. Glue a 1x6 walnut strip on the back (straight) edge. Line the inner faces of the cat's hole with 0.5x3 walnut strips. Drill Ø1 holes for the deadeyes positioned using the views provided. Glue on the radiating treads made from 1x1 walnut strip.

The platform supports and mast items have different dimensions depending upon which mast they are intended for. The measurements for the three sets can be read off the table in Part 2: *Maestro* means mainmast (in the middle of the ship); *Trinchetto* means foremast; *mezzano* means mizzenmast (the rearmost mast).

Taking the dimensions off the side view on Plan 4, file the top sections of the three lower masts as shown and fit the support cheeks on the side flats. Make and drill the masts caps (using the dimensions given) and assemble them on the masts, ensuring that they are lined up accurately with the support cheeks

Make up the cross-trees and trestle-trees to the dimensions shown, and then glue them on the support cheeks, aligned accurately fore and aft. The trestle-trees are made from 2x6 walnut strip; the cross-trees are made from 2x3 walnut strip.

The cheek plates, the outer edge of the top and the two mast trunks and mast cap are painted matt black.

Inset the topmast up through the mast cap and sit the lower end down into the cross trees. Line up the masts and secure the joints with instant glue. Slide the mast assembly up through the tops and glue the tops onto the cross trees, ensuring that the whole assembly is aligned accurately.

**Part 7 on Plan 5: Topmast Joints.** These diagrams show how the topgallant mast is joined to the topmast using trestle-trees, cross-trees and mast caps. All three masts use the same-sized items. The trestle-trees are made from 2x4 walnut strip; the cross-trees are made from 2x3 walnut strip.

Assemble the masts and joining items, ensuring that the masts line up accurately vertically and fore and aft. Coat the mast assemblies with sanding sealer.

**Part 14 on Plan 5: Bowsprit.** The jib-boom is joined to the bowsprit via a mast cap, with the lower end sitting on a wooden jointing saddle as shown. Protect with sanding sealer. With reference to the side view in Plan 4, and using the lashing method shown in Part 4 on Plan 6, lash the lower end of the jib boom to the bowsprit with 5 or 6 turns of medium black rope. Seal the knot with a drop of instant glue.

## PLAN NUMBER 6

This plan shows how the various elements of the standing rigging (that holds the masts in place) and the running rigging (that is used to raise and lower the yards). All the numbered detail views shown here refer to the side view on **Plan 4**. An overhead view is provided to identify the rigging points around the ship.

**Rigging points:** Using the view on **Plan 6** and the side view on **Plan 4**, drill Ø1 holes and fit rigging pintles at all the deck points and on the mast caps as shown on the views.

**Part 4: Mast stiffeners.** With reference to the side view on **Plan 4**, add stiffeners made from 0.5x3 light strip to the front and side faces of the lower masts, and lash the masts with medium black rope in the places shown. Seal each knot with a drop of glue.

**Stepping the masts:** Trial-fit the masts into the decks, making small adjustments to the deck as necessary to achieve a perfect vertical alignment; and the correct rake (tilt) as shown on **Plan 4**. Remove each mast in turn, glue the foot and insert the mast into the deck. Use small wedges to hold the masts in position and trim the wedges flush with the deck when set.

**Mast feet:** Make three mast feet size 12x12 in halves, from pieces of 1x6 plank and file a Ø10 semi-circular hole in each half so that the feet sit around the base of each mast. Glue the feet to the deck.

**Part 15: Bowsprit.** Carefully open the bowsprit hole in the bow with a round file so that the bowsprit slides into place. With reference to **Plan 4**, fit five gammoning wedges (made from 2x2 walnut) onto the bowsprit. Using medium black rope, lash (gammon) the bowsprit to the ram as shown in Part 15's diagram. Secure the knots with a drop of instant glue.

## Standing Rigging

Starting from the stern and working towards the bow, add the standing rigging to the ship. Use **Plan 4** as a guide and refer to **Plan 6** for detailed views and the rigging techniques to be used.

**Fig. 2** shows two ways of rigging the pulley blocks. In each case, the fixing rope of each block uses black, medium thread, while the binding uses light, thin thread. Secure the knots with a drop of instant glue

**Part 3: Lower Shroud Lines.** These are the ropes securing the masts via the deadeyes. Make these from medium thread and secure them to the masts using 'seized' loops as shown in the diagram. Pass the ends down through the side gaps between the platform and mast.

The lower ends of the shrouds are terminated around deadeyes and the deadeyes are tensioned against the deadeyes on the channels using thin light thread as shown in Part 3. Make the shrouds tight, but not so tight as to deform the masts.

Make and bind the ratlines (the rope-ladders) to the lower shrouds using thin thread – once the shrouds are tensioned correctly. Secure the end knots with a drop of instant glue.

**Part 17: Upper Shroud Deadeyes.** Fit deadeyes for the upper shrouds through the Ø1 holes in the tops with medium black thread. Tie the threads off to the lower shroud lines as shown here. Using the technique shown, lash pieces of Ø2 dowel to the shrouds to make ladders under the edges of the tops.

Rig the upper-shrouds as shown, using medium thread. Secure the top-shrouds to the top deadeyes with thin thread as shown in the side view. The recommended method for fixing the upper-shrouds to the mast is to make a 'seized' loop using thin thread. The loops should sit snugly on the taper of the mast. ***This method should also be used elsewhere on the model to secure ropes around masts and spars.***

Make and bind the ratlines (the rope-ladders) to the upper shrouds using thin thread – once the shrouds are tensioned correctly. Secure the end knots with a drop of instant glue.

**Part 16: Mainstay Blocks.** The method of tensioning the great ropes used to support the mainmast is shown here. Secure the knots with drops of instant glue. Working from bow to stern and following the plan, fit all the remaining standing rigging - the other ropes (or stays) used to tension and hold the masts and bowsprit in position.

**Part 9: Rigging the backstays.** This shows how to connect the backstays via pulley blocks to the rigging points on the rails behind each mast.

## Running Rigging: Yards

To permit work to proceed simply and rapidly, it is recommended that all of the mast components should be prepared apart. Note: the plan shows the yards angled fore and aft for clarity. Of course, these are usually set square across the ship on the



completed model; so that the rigging is equal each side of the ship.

**Part 13: Footropes.** Add footropes made from thin thread as shown to all yards - except the spritsail yard and the lower mizzen sail yard. Secure the knots with glue, and dress the rope into curves to give the impression of weight.

**Part 1:** All the rigging next to the masts and coming down from blocks above the tops platforms, must first pass through the cat's hole in each mast top before being terminated at the belaying points. The diagram also shows how to rig the blocks that support the upper yards.

**Belaying a line:** **Fig. 3** shows the way to terminate a line onto a belaying pin. **Fig. 4** shows how to tie up the excess line: Wrap a length of excess line around a 10mm former, tie the loop off and apply a drop of glue to the roll. Slide the roll off the former and loop it over the belaying pin, holding the loop down while applying glue to the loop. This technique gives the rope the appearance of weight.

**Halyards.** Referring to **Plan 4** and the detailed views on **Plan 6**, working from stern to bow and from the bottom of the mast upwards, proceed to rig the halyard blocks on the yards to the halyard blocks on the masts. Terminate (belay) the rigging to the numbered rigging points identified on the plan. Dual numbers indicate that the rigging is doubled and therefore needs two terminal points – one on each side of the ship. Use thin rope. 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.

**Brace lines.** Referring to **Plan 4** and the detailed views on **Plan 6** working from stern to bow and from the bottom of the mast upwards, proceed to rig the brace lines. These prevent the yards twisting round in the wind. Most braces are fed through blocks tied on the stays behind the masts as shown in Part 12. Belay the lines to the rigging points shown.

**Part 10: Flagpole.** Insert the flagpole and rig the silk flag on the hauling line of the flagpole (by hemming the edge of the flag with the thin light line held inside the hem). 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.

**Anchors:** Rig the anchors to the catheads and feed the anchor ropes up through the hawse-holes and secure with a drop of glue. Lash the anchor flukes to the bits on the foredeck as shown in **Fig 1 on Plan 3**.

## PLAN NUMBER 7

This plan shows the outlines of plywood parts used in building the model. The items list of all the materials contained in the kit is at the end of this booklet.

## Fitting Sails

Sails for the *Royal Caroline* are not supplied in the kit as many model-makers feel that quality models like this look better without them. If preferred, a set of ready-made sails for the *Royal Caroline*, **Art 34024** together with rigging instructions, may be purchased from Mantua Models.

## Painting.

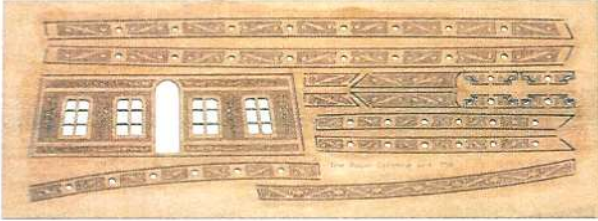
- As described previously, all the inner bulwarks of the model are painted **Pompeian red**, whilst the decorative panels are painted **azure-blue**.
- Windows are painted light-grey to simulate reflected sky.
- Optionally, the hull below the waterline may be painted matt **white**. Setting the ship absolutely level on the stand, use a pencil on a wooden block of the right height to mark a horizontal line all around the hull 60mm from the bottom of the keel. Mask above this line and paint the hull with two coats of matt white acrylic, sanding lightly between coats.
- Where no painting details are given, this means that the parts are left their natural colour and must be protected with sanding sealer or clear varnish.
- All varnishes and paints should be matt, not gloss.

## Finishing Off

- Touch in any varnish or paint as necessary.
- Build or buy a display cradle (not supplied) such as **Mantua Model Art.7210**. Assemble the ship on the cradle and admire a job well done.

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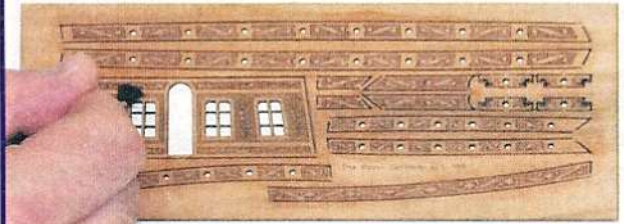
This is the laser-engraved sheet.



1

Protect the surface with two coats of sanding sealer.

Art. 1020



2

Cut through the small bridges with a craft knife, and smooth the edges.



3

We suggest that the panels are left their natural wood colour, but if preferred, paint the whole surface with matt azure-blue acrylic.



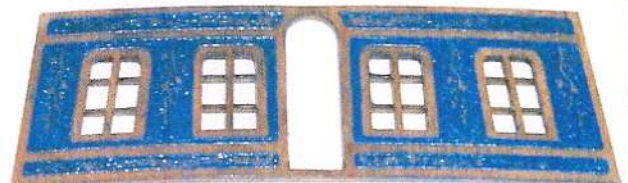
4



When dry, sand the surface very lightly with a fine grit sanding block to expose the raised parts. Coat with sanding sealer.

5

The painted decoration ready to use.



6

## 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 planked 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 proven system, 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 levelling 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, fixed on the outside of the hull.

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 a number of these are needed, 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 smooth this planking 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 modelling 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, which can be set for a fine cut.

**Scraper.** A razor-type blade used for finishing flat surfaces.

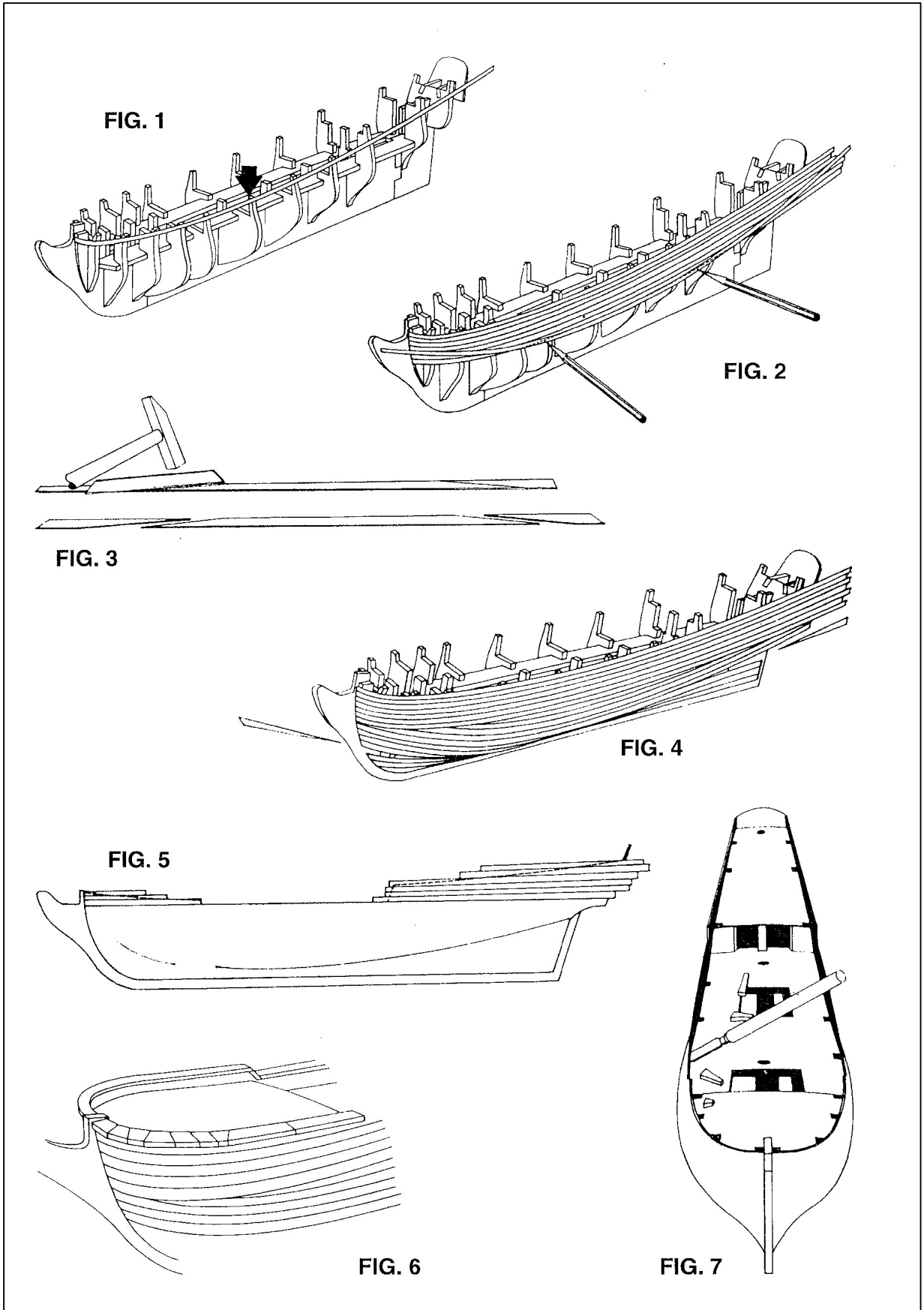
**Pin Vise.** A tool that looks like a jeweller's screwdriver but with collets of varying size, and which can take the smallest drill bit and act as a twist drill.

**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.** Various grades of miniature saw blades with a fine cut are available. They are usually tenon-backed and can be obtained in sets to include handle, mitre box, or blade only.

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