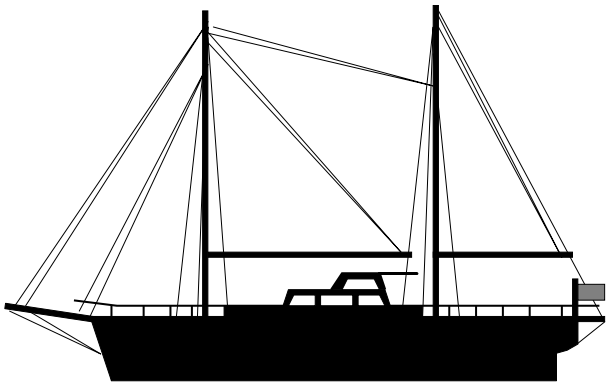

BRUMA

Ocean-Going Fishing Boat refitted as a Cruising Yacht

Art. 736

ASSEMBLY INSTRUCTIONS

English Version

Newly translated and improved by
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For the

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HISTORICAL BACKGROUND

The Bruma was originally an ocean-going fishing boat, later refitted as a cruising yacht and sailed under a Spanish flag. The yacht is rigged as a ketch, having a mainmast set forward of the cabin and a large mizzen mast, both equipped with booms and triangular sails, with jib sails bent onto the front stays. Strongly built and powered by twin screw propellers, the Bruma combined sea-worthiness with spaciousness and good looks.

This scale model of the original boat can also be fitted with an electric propulsion motor Art. 600 and radio control equipment. These are not included in this kit.

ASSEMBLY INSTRUCTIONS

General notes:

- All dimensions given are in millimetres. The symbol ∅ means diameter
- Figure numbers given below (Fig.1, etc) refer to the numbered figures on the respective plan sheets.
- Component numbers (n.11, etc) refer to the laser-cut plywood parts on Plans 1 and 2.
- All paints and varnishes should be matt.

PLAN NUMBER 1

The plan shows four of the five plywood panels (Tavolas 1-4) containing laser-cut plywood parts for the boat's keel and frames, plus the deck and some superstructure items. These scale drawings can be used to identify parts once they have been removed from the panels.

Before you remove the laser-cut parts from the plywood panels, number each component lightly with a soft pencil, following the plan.

Provide yourself with five numbered storage trays or boxes - one for each panel - to hold the plywood parts once they have been removed from the panels.

Remove the parts from the panels by cutting through the small bridges of plywood with a sharp craft knife (see Fig.1). Smooth the cut edges of each piece with fine sandpaper, taking care not to damage the machined profiles of the pieces. Put the parts in the appropriate trays for safekeeping.

PLAN NUMBER 2

The plan shows the fifth of the five plywood panels (Tavola 5) containing the laser-cut plywood parts for the superstructure. Number these parts lightly with a soft pencil. Remove these parts from the panel and place them in the storage tray for safekeeping.

Fig.2 on the plan shows a side sectional view of the boat's hull structure and identifies how the frames and false deck-plates fit together.

To prevent the keel from bending or twisting during the assembly process, hold the bottom 10mm of the keel in a keel clamp (such as Mantua Model part number Art. 8155) or alternatively, sandwich the keel between two 10mm x 500mm battens and clamp lengthways in a woodworking vice.

Using Fig.2 as the guide, and without glue, trial-fit the structure together as follows, carefully sanding or filing the pieces as necessary to get a good, sliding fit:

- Assemble the frames n1-n.11 into the keel. Insert the false deck-plates n.15 (one piece) at the prow, n.13 (two pieces) in the centre section and n.14 (two pieces) at the stern. Note that the slots in n.13 and n.14 go towards the outside of the hull, and that the tapered ends of n.14 go at the stern. Ensure that the deck-plates sit down fully onto the recesses provided in the frames.

- Trial-fit the deck n.20 onto the frames, noting that the deck has a 'sheer' or curve to it in two directions, when fitted down onto the tops of the frames. Check that the structure can be aligned without distortion. Secure the structure lightly in place with some rubber bands.
- As shown in Fig. 3, frames n.1 and n.2, plus frames n.10 and n.11 will need to be tapered to allow the ends of the hull planking to make a smooth curve to the bow and to the stern, and to increase adhesion on these frames. Using a 1.5x6x800 planking strip, check the tapering of these four frames and mark them with a pencil. Remove the parts and taper their edges with a file or sandpaper.
- Glue the frames n.1-n.11 into the keel; fit the false deck plates n.15, n.13 and n.14 down onto the ribs and nail them onto the frames. Ensure that all the frames are tight down onto the keel, pinning through the bottom sides into the keel where necessary to hold them in place. Before the glue sets, wipe any excess glue from the top of the frames and insert the deck n.20 checking that the frames line up with the notches around the deck. Clamp the assembly and allow to dry.
- Fix the motor mounts plywood parts n.16 and n.17 in place, having first filed the slots in n.7 and n.8 to provide perfect contact between n.16 and the keel.
- Insert the two propeller shafts through the holes in frame n.9 and the mount n.17. Trim the edges of the holes in frame n.9 as necessary to ensure that the shafts are not under any bending pressure. Trial-fit the two shaft supports n.18 onto the shafts and against the frame n.10, and then glue and clamp until dry. Place the bracing plates n.19 on the stern, lined up with the top edge of the keel.
- Trial fit the deck n. 20 onto the structure once more, sanding or filing as necessary to ensure that the deck will fit down against the tops of the frames. Glue the top surfaces of the frames and false deck-plates and clamp the deck in place. Use small nails, clamps or clothespegs to ensure that the deck is tightly down on each frame and that the correct curvature or 'sheer' of the deck is achieved. Allow the glue to dry.

Planking the Deck

The deck is to be covered with 1x3 Limewood planks and 1x1 Walnut planks laid alternately and curved across the deck to intersect with a central 1x6 Walnut plank. This will create the distinctive deck pattern shown in the scale plan view Fig.4. Accurate alignment is crucial here to achieve a matching pattern across the deck.

Measure and fit a single-piece of 1x6 Walnut plank along the exact centre-line of the deck - measured from frame to frame across the boat - checking that the plank lines up with the bow and stern ribs, and with the two mast holes in the deck. When dry, cut away the excess planking from the mast holes and the two deck cutouts using a sharp craft knife.

Starting at the bow end, clamp a 1x3 Limewood deck plank on one side of the deck against the inside of the frame ribs. Position one end of the plank exactly on the centre-line of frame n.6, curve the plank and clamp it in position (don't use pins) so that it sits against the ***inside*** edges of frames n.6, n.5, n.4, n.3 and n2. Bring the plank out between frames n.1 and n.2 and clamp the end against the deck so that it touches the ***outside*** edge of frame n1. Repeat for the other side of the boat. Adjust the planks so that the distances from the inside edges of the planks to the centre deck-plank are the same both sides and at each frame.

At the stern end, lay a 1x3 Limewood deck plank on one side of the deck against the inside of the frame ribs, to act as a 'former'. Position one end of the plank tightly against the Limewood plank fitted previously to the bow end. Curve the plank and clamp it in position in a number of places (don't use pins) so that it sits against the ***inside*** edges of frames n.7, n.8, n.9 and n.10. Bring the plank out between frames n.10 and n.11 and clamp the end against the deck so that it touches the ***outside*** edge of frame n11. Repeat for the other side of the boat. Adjust the planks so that the distances from the inside edges of the planks to the centre deck-plank are the same on both sides and at each frame.

Now run a line of glue onto the deck along the edge of one of the 'former' planks, and spread it out to 4 mm wide using a piece of wood. Lay a 1x1 Walnut plank against the 'former' plank starting at the centre point and place a 1x3 Limewood plank next to it. Clamp these two planks tightly against the 'former' plank at several places along the deck, so that the planks all fit together in a curve. Repeat for the other three 'former' planks fitted previously, making sure that the plank ends butt tightly against each other in the centre on n.6, so that the joints will not be visible. Continue fitting alternate 1x1 Walnut planks and 1x3 Limewood planks to create the deck's 'sandwich' pattern, measuring and trimming the ends where necessary to achieve a snug fit around frames, etc. Work in sequence around the boat, checking the alignment of the planks and making small adjustments where necessary to achieve a matched pattern. ***Use clamps, tape or shouldered pins to hold the planks in place while the glue is setting, but do not insert pins in the planks themselves as they are likely to split.***

Carefully cut the ends of the inner planks where they are to butt up against the central deck plank. To get a sharp, accurate cut, position the plank, and use a straightedge and hard pencil to mark the required edge on the plank. Use a Stanley-type blade and a small hammer on a wooden cutting block to cut along the pencil line. Check the fit before gluing.

Plank the gaps between the frames and the outside edge of the deck. Using a 1.5x6x800 hull plank laid along the outside of the frames, check that the edges of the deck planks will fit tightly against the hull planks, sanding the edges of the deck planks as necessary.

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 at least two coats of sanding sealer such as Mantua Model Art.4401714 (not supplied).

Planking the Hull

The hull is double-planked using 1.5x6x800 planks. The first layer of planking must be sanded and smoothed before applying the second layer.

- ***If the Bruma is to be sailed, the hull needs to waterproof. In choppy conditions water may get into the hull space and it is therefore advisable to waterproof both the inside and outside of the hull.*** Before planking, coat the entire surface of the underside of the deck, the deck-plates, the frames, the motor mounting, the radio-control base-plate and the keel with a suitable resin coat or with diluted aliphatic (waterproof) glue Art.1016. Before fixing the hull planks to the frames and after they have been formed to shape, coat the inside faces of the planks with a suitable resin coat or diluted aliphatic glue and allow to dry. Use aliphatic glue to bond the planks to the frames, and coat the outside surface of each planking layer with resin or diluted aliphatic glue.
- See the instructions at the end of this booklet for general guidance on the method of applying planking strips to a boat's 'skeleton'. ***Note that the frames above the deck are <u>not</u> to be cut off on this model.***

Fig. 2 shows how the first plank is fitted level with the top-surface of the deck at each frame, so that the plank curves upwards at each end. Chamfer the ends of the planks so that planks on each side will butt together and make a neat joint down the centre of the prow and stern. Use a plank bender to form each plank to the curvature at the bow and stern, steeping the plank in very hot water for 1 or 2 minutes until pliable, as necessary. Apply a drop of glue on each frame and clamp the formed plank in position. Fit a strip on the other side of the hull in the same position. To avoid twisting the structure, work down the hull, laying planks alternately on each side. Fit the planking tightly against the propeller shaft supports n.18 protruding through the hull.

Tips on planking the Bruma:

- Some constructors have experienced difficulty with making the planks fit around the stern and have developed an alternative method to overcome this problem: Fill the spaces between the stern and the frame n.11 with carefully shaped balsa pieces. Plank the hull up to frame n.11, smoothing the joints of the planks with the balsa to make them invisible. If this method is to be used, ensure that the balsa does not block off or restrict the rudder area.
- Where clamps cannot be used to hold a plank tight to the frames until the glue sets, use shouldered pins (which are inserted by the side of the planks). Alternatively, use small nails inserted through the centre of the planks, but do not drive the nails home as they are to be removed when the glue is dry.

Scuppers and Bulwarks: The 2mm high slot that runs between frames n.2 to n.10 at the level of the deck provides the means of draining water from the deck (the scuppers). Cut four strips 2 high x 19 long from a 1.5x6 plank and glue in place on the first hull planks. Line up the ends with the inside faces of n.2 and n.10 respectively, and trim the end to make a good joint at the prow and stern. Use a sharp Stanley-type blade and a small hammer to achieve an accurate cut. Fit the bulwark strips above the 2mm planks and secure these to the frames with clothespegs or clamps until the glue has set (see Fig. 5).

When the first layer of planking is completed, coat the hull planks with a resin coat or diluted aliphatic glue to waterproof and strengthen the planking, and to fill gaps between strips. Clean off any excess droplets of glue with a damp cloth. When the glue is dry, scrape the entire surface of the hull and sand with care to remove any high spots.

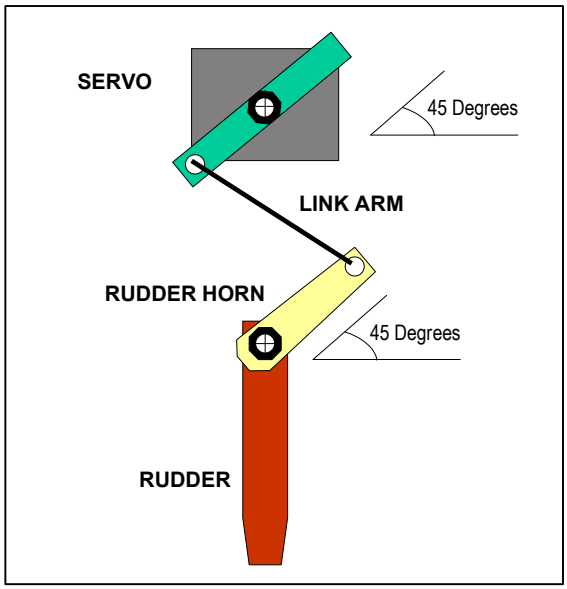
Fit the second layer of planking using the same procedure. This second layer will be the finished surface of the hull and needs to be applied and finished with great care.

Fig.6 – Propellor Shaft Fairings. The sketch shows how to build the fairings around the propellor shaft support pieces n.18 protruding from the hull, using 1x3 mm strips and waterproof wood glue. Double-plank the fairings and fill any joints. Coat with resin or diluted aliphatic glue to prevent water penetration.

Finishing off. Fill any gaps in the planking with slivers of planking wood. Filler may be used where the hull is to be painted. When the second layer of planking is completed, scrape and sand the entire hull to a good smooth finish. Coat the entire finished hull with a resin coat or diluted aliphatic glue. Apply two coats of a good sanding sealer product. When dry, sand again until the surface is smooth.

PLAN NUMBER 3

Fig. 7 - Rudder. Modify the rudder plywood part n.21 to create a hydrodynamic profile and shape the top of the rudder to fit under the hull. Notch the bottom of the rudder and the end of the keel n.12 to take the rudder pivot plate. Carefully drill through the square hole in the keel n.12 and through the hull planks with a ∅6 drill and fix the brass axle-bushing in place with epoxy glue. Make sure that the hull planks are sealed to the axle-bushing with epoxy to prevent water penetration. Assemble the nylon horn (lever), onto the rudder axle, locking the two nuts tightly against the horn and each other by using two spanners, or one spanner and a pair of pliers. The 'o' ring sits inside the axle-bushing with the brass washer on top. Insert the rudder axle into the axle-bushing. Make the rudder pivot plate from 2x5 plank and use a brass nail as a pivot. Assemble the rudder on the axle and glue it in place with epoxy glue, ensuring that the horn points back at 45 degrees to the right (starboard) side when the rudder is straight astern. Fit the pivot plate in position with two brass nails.



Screw Propellers. Fit the two screw propellers onto the two brass shafts, lock them with the nuts provided and insert the shafts into the sleeves. ***If the boat is to be sailed, the shaft sleeves should be filled with grease to reduce the likelihood of water making its way up the shafts and into the hull.*** Ensure that the sleeves protrude from the fairings such that the propeller bosses line up with the rear edge of the stern (see fig.11). Glue the sleeves in place at both ends with epoxy glue, making sure that the sleeves are sealed against water ingress where they protrude from the fairings.

Fig.9 - Marking the Waterline. Make up a right-angled marking jig from two pieces of scrap wood as shown in fig.9 and fix a pencil in the jig so as to draw a line 62mm from the bottom edge. Hold the boat upright on a flat surface and mark the waterline around the hull. Mask off the upper section of the boat with tape and paper and spray paint below the waterline with several thin coats of red acrylic paint (not supplied), including the rudder and screw propellers. Ensure that the propellers and rudder are still able to turn freely after painting.

When the red paint is thoroughly dry, mask off the bottom section below the waterline. Also mask off the deck planking, the frames and the inside faces of the bulwarks. Spray paint the upper hull with several thin layers of white acrylic paint (not supplied).

Fig.8 – Boat's Cradle. Assemble plywood parts n.22, n.23 and n.24 following the plan and varnish. Glue small pieces of foam rubber (such as draught-excluder, not provided in the kit) around the inner faces of the cradle, to protect the painted hull.

Fig.10 - Handrails. Carefully trim the planking at the bulwarks so that the parapet wall is level with the top of the frames. Fix the handrails (plywood parts n.25 and n.26) onto the frames above the bulwarks as follows. The handrail strips are to protrude 1 mm beyond the outside surface of the bulwarks. Drill ∅0.7 holes in the handrail where they touch the frames; Insert a brass nail into each frame with a drop of super glue on the cone, cut off the head and tap the nail shaft home. Sand and varnish the railings.

Fig.11 Portholes. Taking the dimensions from the side view fig.11, mark the five porthole positions on each of the hull sides and drill ∅4 holes through the hull planking. Open the holes out to ∅6.8 with a file, to take the portholes, without damaging the paint. As shown in Fig 12, fit the porthole glasses in the brass porthole housings with small drops of glue applied with the end of a pin. Glue the porthole housings into the hull as shown.

Rubbing Strakes or Bumpers. These are timber fenders fitted along the hull above the waterline to reduce damage when docking, etc. Taking the dimensions and positions from the side view fig 11, make the 2x3 bumpers from two pieces of 1x3 Limewood glued together and varnished. Fix to the hull using the same fixing method as for the handrails.

Fig.13 - Hawse holes, Rope Guides and Anchors. Taking the positions from the side view fig.11, drill a small hole in each side of the bow and carefully file to ∅8 to take the two brass anchor hawse hole bushes. Drill ∅3 holes and fit the four rope guides on each side – two of the smaller rivets at the bow and two at the stern. Glue the bushes and rivets in place with instant glue. Fettle the anchor castings to remove any excess material. Fix the anchors with instant glue inside the hawse holes in the position shown in Fig 11. Bend the anchor rod with the fingers, if necessary to get a good fit against the hull.

Fig.14 - Stern Bannister. Drill a ∅1 hole in one end of the fourteen turned wooden pillars (stanchions) and glue in a short piece of ∅1 brass wire to act as a tenon. Taking the positions from fig.4 on Plan 2, drill ∅1 holes in the handrail n.25 and glue the tenon end of the stanchions in place in the handrail. Sand and varnish the two hand-rail plywood parts n.27 and fix them in position on the stanchions using the same system of ∅0.7 holes, chopped off nails and glue used when fixing the handrails.

Fig.15 - Bow Bannister. Taking the positions from fig.4 on Plan 2, mark on the bow handrail (n.26) the position of the ten brass stanchions and drill ∅1.5 holes through the handrails. Clamp one end of the ∅1.5 brass wire in a vice and pull the other end of the wire with a pair of pliers to make the wire straight. Now shape the wire using fig.4 on Plan 2 as the template. Insert the wire through the brass stanchions five on each side) and insert the stanchions into the holes in the railings. Fix the ends of the wire under the front edge of the stern handrail using instant glue.

Fig.16 - Cabin Frame. Make the cabin frame from plywood parts n28 to n36 and fix with instant glue. Check that the assembly lines up with and fits into the centre deck aperture.

Fig.17 – Cabin Assembly. Sand plywood parts n.37, n38, n40 and n.42 smooth and paint with matt acrylic white paint. Glue the parts in place on the cabin frame in this sequence:

- Fit the floor n. 37;
- Fit the sun visor n.38;
- Insert the windows n.39 between the sides n.28, curving the outer face against the back edge of the sun visor n.38;
- Place the roof under the deck n.40, clamping with clothes- pegs until dry.
- Glue the front window n. 41 curving the outer face against n.40.
- Finally, fit the small roof n.42.

Fig.18 - Cabin hatchway. Assemble plywood parts n.43, n44 and n.45 and cover the corners with 0.5x3 Walnut planks. Build the two louvered doors by overlapping 0.5x3 Walnut planks one upon the other, laid on a piece of paper. When dry, cut to size and glue the doors on the hatchway framed with horizontal and vertical 0.5x3 Walnut planks. Varnish and fix in position in the cabin on the port (left) side (see fig.22 on Plan 4 for positioning).

PLAN NUMBER 4

Fig.19 - Small Side Cabinet. Assemble plywood parts n.46, n.47 and n.48, and cover the corners with 0.5x3 Walnut planks. Varnish and fix in position in the cabin on the starboard (right) side (see fig.22 for positioning).

Fig. 20 - Steering Wheel. Fettle the wheel casting to remove any excess material. Make the wheel support from a 3x6x15 Walnut block. Fix the wheel to the block with a brass nail and glue the assembly inside the cabin as shown in fig.22.

Fig. 21 - Windows. Cut neat pieces from the clear plastic sheet provided and fix the windows in place behind the frames using drops of clear epoxy glue.

Fig. 22 - Cabin Fittings. Finish the cabin by adding the following parts:

- Varnish plywood part n.49, fit the two dual bitts and glue the assembly to the floor;
- Varnish the handrails (plywood parts n.50) and fit them to the deck n.40;
- Paint the life-belts red and white, and fit them to the cabin sides with instant glue;
- Make the two brass rails from ∅1.5 wire and fit to the cabin sides;
- Paint the extinguishers red with white caps and position them either side of the cabin by the front end of the cabin rails;
- Paint the light and the horn white and put them in position on the roof.
- Cut the canvas sun canopy and fix it to the roof with epoxy glue.

Fig. 23 - Position Light Unit. Make the two position light supports from 1.5x6 mm plank. The units should be 20mm in length. Note that they are 'handed' for the port and starboard sides. Make the lamps from ∅4 dowel. Pain the port (left) light red and the starboard light green.

Fig.24 – Air Intakes. Make the four air-intakes from ∅6 dowel, taking the dimensions from Fig.11 on Plan 3. Paint matt silver and fix in position of the cabin roofs.

Fig.25 - Stern Seats. Varnish the stern seats plywood part n.51, placed so that it overlaps the handrails (plywood part n.25) by 1.5 mm. When dry, glue the four 8mm stanchions in position along the front edges of the seats.

Fig.26 - Stern Waist. Assemble plywood parts n.52 and n.53. Mark the surface of n.53 with a soft pencil at 3mm intervals to simulate planking, and varnish over. Fit to the deck.

Fig. 27 - Bow Capstan. Assemble plywood parts n.54 to n.58. Round the corners off and paint matt white. Fettle the metal capstan body and fit it through the holes in n.54. Drill two ∅2 holes in the top of n.55 and glue in the two small brass bitts. Glue the assembly onto the deck. Drill two holes through the rear part of the base plate n.58 and insert two of the four brass collars (large brass rivets) to take the anchor chains. Drill two ∅4 holes forward in the deck and fit the other two brass collars (see fig.4 on Plan 2).

Fig. 28 – Deck Cupboards. Make the two deck cupboards from plywood parts n.59 to n.62. Cover the corners with 0.5x3 planks. Plank the top edges with 0.5x3 Walnut planks. Sand smooth and varnish. Fit in position on deck as shown on fig.4, Plan 2.

Fig. 29 - Modern lifesavers. Make the transoms from 0.5x3 mm planks and glue them to the end supports plywood parts n.63. Fettle the lifesaver castings and glue in position on the frames. Varnish the assemblies and glue them on deck next to the deck cupboards as shown on fig.4, Plan 2.

Fig. 30 - Hatchways. Assemble plywood parts n.64 to n.65 and n.66 to n.67. Paint the tops matt white and the edges matt black. Fit the glass into the portholes and fit the portholes into the hatchways. Fix to the deck as shown on fig.4, Plan 2.

Fig. 31 - Mast belaying point rack. Glue the 4 stanchions (15 mm long) on the corners of plywood part n.68. Varnish and fix to the deck as shown on fig.4, Plan 2.

Fig. 32. Bulwark ladders. Cut 28 off pins 17mm long from the ∅1.5 mm brass wire and insert them into the four ladder sides (plywood parts n.69), fixing them with instant glue. Connect the pairs of ladders with the pivot blocks (plywood parts n.70) and varnish all parts. Tie the completed ladder assemblies to the brass handrails as shown in fig.11 on plan 3.

Fig. 33 - Boarding Entry (gangplank). Make the entry support struts from two 2x2 Walnut planks 84mm long. Make the treads from 0.5x3 planks 20mm long and space them 1 mm apart. Make the three 35mm long brass stanchions from ∅1 brass wire. Feed the rope handrail (∅0.5 mm rope) through the stanchions and thorough the struts. Tie a stopper knot on each end of the rope and secure with a drop of instant glue.

Double-Bitts. Fettle the four cast double-bitts and fit them to the deck in the position shown in fig.4 on Plan 2. Two bitts in the bow and two in the stern.

Stern Brace. Varnish and fit the 'v' shaped wooden stern brace (plywood part n.71) to the stern.

Belaying Pins. Drill the stern banisters with a ∅1.3 hole in each side and fit a belaying pin into each hole with a drop of instant glue. See the cover of the kit's box to identify where these two pins are fitted. Fit belaying pins into the rack fig 31.

Fig. 34 - Photo-etched Brass Sheet. Paint the entire surface matt black. When the paint is completely dry, and working on a flat surface, sand the sheet lightly with 600 grain sandpaper to reveal the detailing. Cut each piece out with a pair of scissors and smooth the edges with a fine file. Glue the nameplates "BRUMA" on either side of the bow. The other pieces will be used later to secure the bowsprit in place and to make the rotating jaws for the booms.

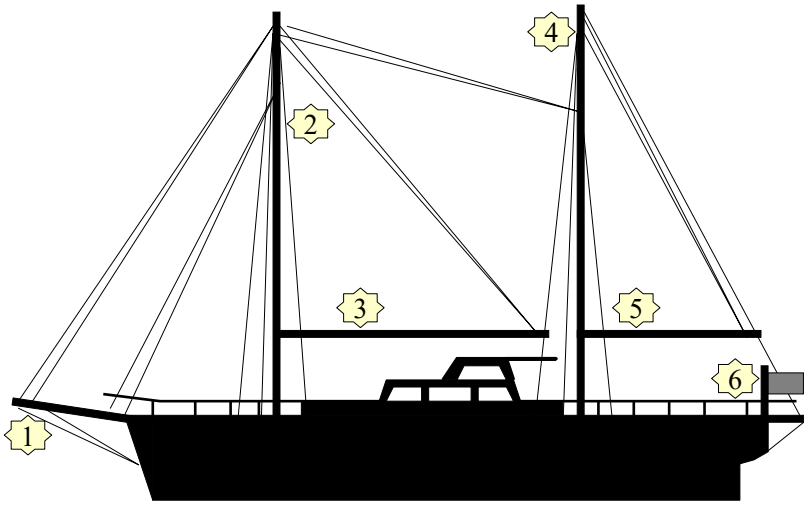
Fig. 35 - Optional Parts for Radio Control.

- The optional kit Mantua Model **Art. 600** contains the motor and the mechanical parts required to drive the boat's propellers.
- A separate, optional radio control set is required for remote control of the boat.
- The sketch in Fig.35 shows how to fit the radio control items (not included) to the base plate. If fitting radio control, check the centre of balance of the completed boat (with masts and all) by moving the power pack to a position that allows the boat to float with the waterline level to the water surface and with the boat sitting upright in the water. Fix the battery pack in place with rubber bands and hooks.
- Add ballast to the bottom of boat, if this is necessary, to trim the boat so that the waterline on the boat sits a minimum of 3mm above the water surface (to prevent water coming up the propeller shafts into the hull).

PLAN NUMBER 5:

MASTING

Fig. 36 shows a side view of the ship with mast and spar dimensions, rigging and rigging points. The names and dimensions of the masts and spars on the Bruma are shown in the diagram and table below.



Mast and Spar Scheme on the Bruma

Cut and taper the masts and booms to the cutting and shaping dimensions noted on the plan and in the table below. Taper with a hand plane and smooth with sandpaper (see fig. 37). Preferably, use an electric lathe (such as Mantua Model Art. 8160). Varnish the masts and spars.

Ref	Name	L *Length*	∅Max *the largest diameter*	∅Min *the smallest diameter*
1	Bowsprit	155	6	4
2	Mainmast	600	8	4
3	Mainsail boom	295	6	3
4	Mizzen mast	600	8	4
5	Mizzen boom	208	6	3
6	Flagpole	45	2.5	1.5

Stepping the Masts. Trial-fit the masts into the deck and check that they align vertically and with each other. Remove the masts, slide on the mast feet (plywood parts n.70) and apply glue to the bottom section of the masts. Insert the masts into the deck and hold in position with small slivers of wood, as necessary, trimming off any excess. Slide the mast feet down, gluing them to the deck.

Fig. 38 - Boom Jaws, Stiffeners, Winches and Lamps.

- Make up the boom stiffeners from ∅1 brass wire, taking the dimensions from fig.36. Drill the booms and glue the stiffeners in place.
- Form the two cross-shaped brass boom-jaw fittings (cut from the photo-etched plate) around each mast, taking the height from the scale side view Fig. 36. Carefully drill a ∅0.8 hole in the end of each boom and fit the booms to the jaws with brass nail, glued in place.

- Drill ∅1.8 holes in the masts and fit the winches in place on either side of the masts, using ∅1.8 brass tube. Glue the brass winch bodies to the brass tube. Insert ∅1 brass wire through each tube and form them into dual-ended crank handles.
- Fix the two lamps in place on the mastheads using ∅1 brass wire.

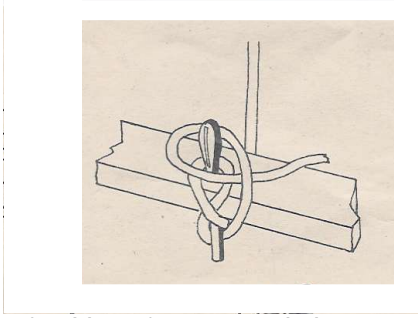
Bowsprit. Carefully cut through the handrail at the prow and insert the bowsprit. Fix the bowsprit in place with the two brass securing plates (cut from the photo-etched plate). Glue and nail the plates to the deck.

Flag and Flagpole. Drill a ∅2.5 hole in the stern and insert the flagpole. Glue on the flag.

RIGGING

Fig. 39 - Eyebolts and Turn-buckles. Open the ring of a brass eyelet with a pair of pliers, slide through the one end of the eyebolt and close the ring. Taking the positions from Fig.36 on Plan 5 and Fig.4 on Plan 2, drill ∅0.8 holes in the deck and fix the eyelets to the deck with epoxy glue. Drill and fit all the other brass eyelets and anchor points for the rigging indicated on the plan.

Starting from the bow, rig the ship as shown in fig.36. Put the ropes under some tension, but do not bend the masts or booms. Make the **standing rigging** *(the permanent rigging*



that holds the masts in place) with ∅1 rope and the **running rigging** *(for raising and lowering the booms)* with ∅0.75 rope.

Terminate the ropes to the eyelets and eyebolts as shown in Fig. 39. Where ropes terminate on a winch, glue the ropes in place to prevent them slipping. Where ropes are terminated to belaying pins, rig as shown below. Wind a length of the excess line around a 10mm former and glue it to hold it into a hank. Loop the hank over the belaying pin, and pull down on the hank to simulate the natural droop of the rope. Glue in position.

Cleats. Fettle the four 'C'-shaped cleat castings and glue them to the handrails in the position shown in fig. 36 - two at the bow and two at the stern.

Finally, mount the boat on the cradle and stand back and admire your achievement!

LIST OF THE MATERIALS CONTAINED IN THE KIT

LASER-CUT PLYWOOD PARTS

Tavola 1 -5x240x730 mm.	n. 2-4-5-6- 7 -9-10-11-12-16-18-19
Tavola 2- 5x240x620 mm	n.1-3-8-13-14-15-17-21-22-23-24
Tavola 3 -1 ,5x190x770 mm	n. 20-43-44-45-46-47 -48-49-51-52-54-55-56-57 -58-59- 60-61-62-63-68-69- 70
Tavola 4- 2x160x425 mm	n.25-26-27-50-53-64-65-67-72
Tavola 5- 3x175x660 mm	n.28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-66- 71

Walnut Planks

10 off	0,5x3x330 mm
50 off	1x1x400 mm
1 off	1x6x800 mm
2 off	2x2x400 mm
2 off	2x4x600 mm
1 off	2x5x50 mm
1 off	4.5x8x70 mm

Limewood Planks

50 off	1x3x400 mm
110 off	1.5x6x800 mm

Walnut Dowel

1 off	∅4x30 mm
1 off	∅6x300 mm
1 off	∅6x400 mm
2 off	∅8x600 mm

FITTINGS

Axle Pack

2 off	Assembled propeller shafts

Rudder Pack

1 off	Rudder axle ∅4x65 mm
1 off	Axle bushing ∅6x35 mm
1 off	Rudder Horn art. 2030
2 off	Nuts M4
2 off	Shake-proof washers ∅4 mm
1 off	Brass washer M4 ∅9 mm
1 off	O-ring Art.102

Nail Pack

100 off	Brass nails 10 mm

Porthole Pack.

10 off	Port-hole ∅6.8x3.3 mm
1 off	Port-hole ∅12 mm
10 off	Glasses ∅5 mm
1 off	Glass ∅9 mm

Chain Pack

4 off	Rivets ∅3 mm
8 off	Rivets ∅2.5 mm
1 off	Chain 300 mm Art. 32210
2 off	Brass bitts ∅3x5.5 mm
2 off	Hawse holes ∅10 mm
4 off	Brass bitts 6 x 5.3 mm

Stanchion Pack

18 off	Walnut stanchions 15 mm

Belaying Pin Pack

12 off	Walnut belaying pin
4 off	Walnut stanchions 8 mm

Block Pack.

20 off	Walnut single block 3 mm

Eyelet Pack

40 off	Brass eyelets Art. 33040
3 off	Brass eyelets 30 mm

Rope Pack

15m	Natural rope ∅1 mm
15m	Natural rope ∅0.75 mm

1 off	Clear plastic sheet 0.5x150x150 mm
2 off	40 mm propellers
1 off	Photo-etched brass sheet
2 off	Brass tube ∅1.8 x 120 mm
2 off	Brass tube ∅1.8 x 75 mm
1 off	Brass wire ∅1 x 1500 mm
1 off	Brass wire ∅1.5 x 2000 mm
5 off	Plans
1 off	Flag and sun canopy
1 off	Instruction Booklet

GENERAL GUIDANCE ON HULL PLANKING

Newcomers to this fascinating hobby, or those new to the construction of a Mantua Group 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. The Bruma was carvel-built

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 the Bruma, 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, as they were in the original vessel. 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. Where required, use a strip bender to curve the plank so that it fits the curve of the hull.

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 it's 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 (bulwarks) leaving the ends of the strips extending above the parapet line. This will be trimmed away later to achieve the correct outline when measured against the drawings. 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, 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.

Note that on the Bruma, the frames above the deck are **not** cut off. Ignore fig. 7 below.

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.

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.

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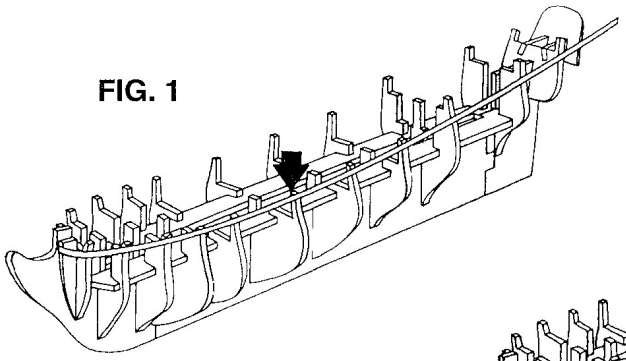
FIG. 1



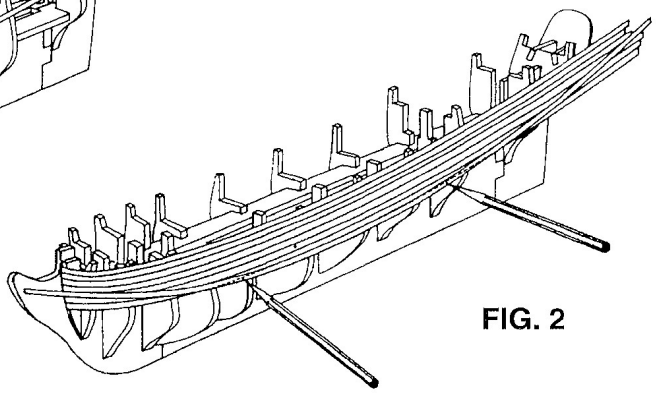


FIG. 2

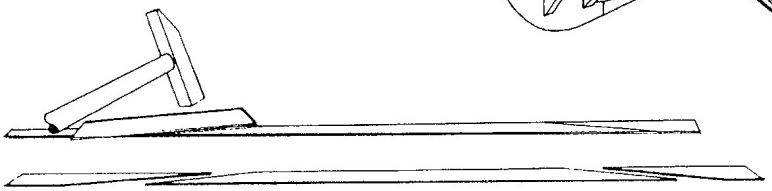


FIG. 3

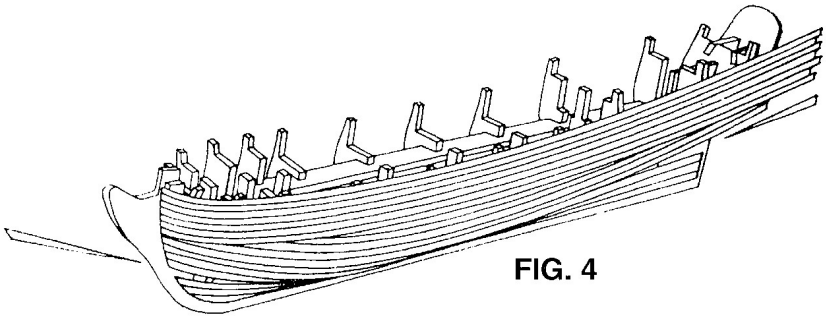
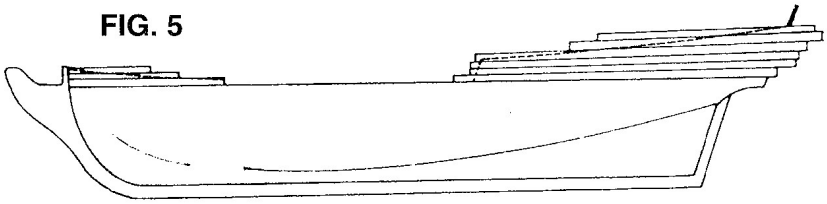


FIG. 4

FIG. 5



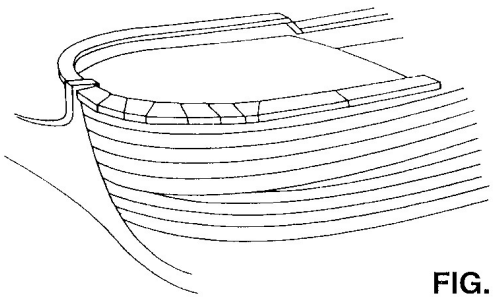


FIG. 6

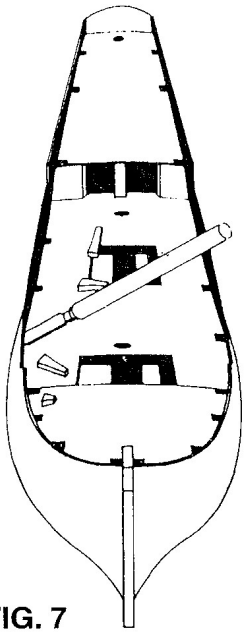


FIG. 7