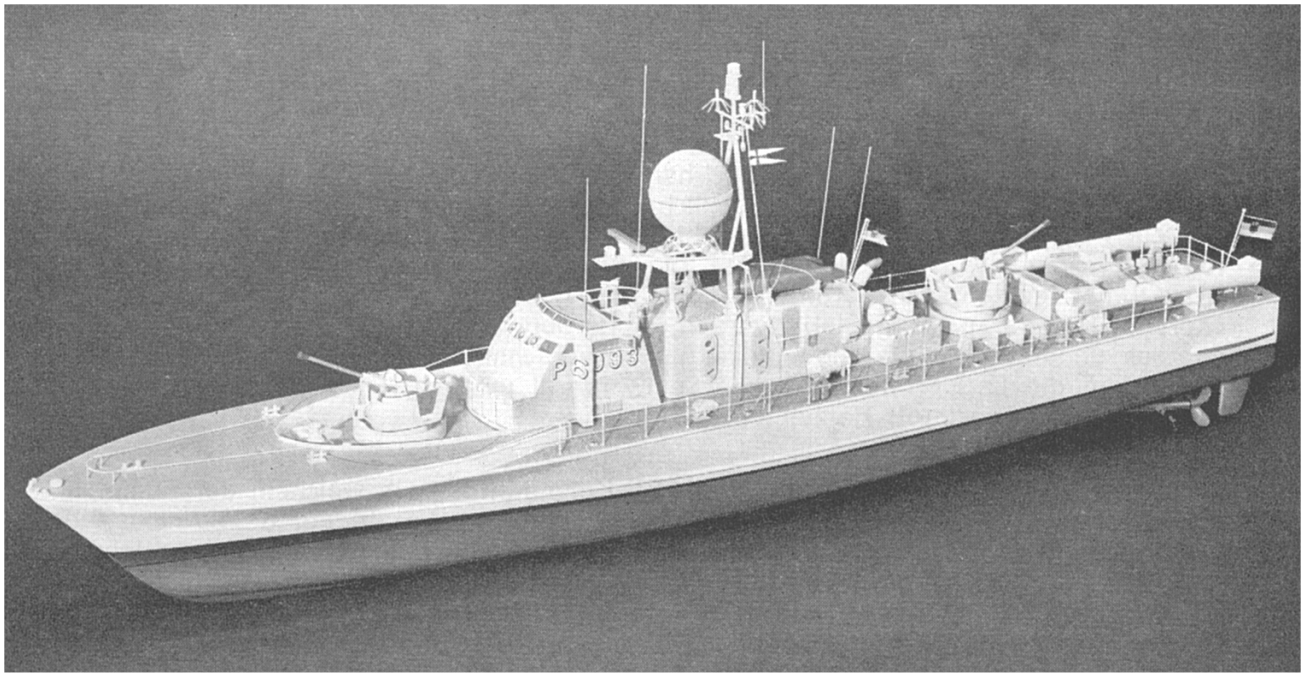
Graupner

Building instructions for the WIESEL motor torpedo boat, Order No. 2145



The full-size vessel

The motor torpedo boats of the ZOBEL class are slightly improved versions of the JAGUAR class vessels, and were launched in the year 1961. After just 8 years the four torpedo tubes were replaced by two stern torpedo tubes, and at the same time an improved radar system was installed. These modifications brought the boats up to the standard required for altered service requirements. In the early 1980's the boats were de-commissioned and sold, some to the Turkish navy (among them the WIESEL), the remainder to other owners; the worn-out vessels ended their days as target ships.

The model

We prepared our model of the WIESEL to a scale of 1 : 40 based on original drawings and documents, with particular emphasis on good detailing of the superstructure. Special 40 mm guns are available as optional accessories, and installing these weapons gives the boat an even more impressive appearance. All the parts which are difficult to make, including the hull, bridge, deck superstructure etc., are supplied in the kit as vacuum-mouldings, and this makes construction of the model much easier. Most of the wooden parts are supplied laser-cut to save even more time. A comprehensive fittings set is included as standard, and the many injection-moulded and brass parts in the set help to produce a visually imposing model with relatively little manual effort. The decal sheet now includes the names and NATO numbers of all the 10 motor torpedo boats of the ZOBEL class, which means that it is possible for a club to produce an entire motor torpedo boat squadron.

The hull offers ample space to accommodate a comprehensive RC system. The RC installation plan shows the position of the receiving system together with some of the optional auxiliary working systems. It is also possible to install the super-detailed 40 mm guns available as optional accessories (Order No. 320) instead of the standard weapons included in the kit. The recommended electric motors are well matched to the size of model, and the boat is capable of an exciting performance on the water.

Specification

	Model	Full-size
Length approx.	1070 mm	42.50 m
Beam approx.	175 mm	7.0 m
Draught max. approx.	58 mm	2.2 m
Displacement max. approx. (model incl. RC installation)	4.6 kg	160 t
Dry weight approx. (model excl. RC installation)	2.2 kg	-
Payload max. approx.	2.4 kg	-
Power system	3 x electric motors	4 x 20-cylinder engines
Scale	1 : 40	-

Important safety notes

You have acquired a kit which can be assembled into a fully working RC model when fitted out with suitable accessories. However, we as manufacturers have no control over the way you build and operate your RC model boat, nor how you install, operate and maintain the associated components, and for this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect use and operation of our products, or which are connected with such operation in any way. Unless otherwise prescribed by binding law, the obligation of the GRAUPNER company to pay compensation, regardless of the legal argument employed, is excluded. This includes personal injury, death, damage to buildings, damage due to loss of business or turnover, interruption of business or other direct or indirect consequent damage whose root cause was the operation of the model. The total liability in all cases is limited to the amount of money which you actually paid for this model.

This model boat is built and operated at the sole and express responsibility of the operator. The only way to avoid injury to persons and damage to property is to handle and operate the model with the greatest care and consideration at all times.

Before you run the model for the first time please check that your private third-party insurance covers the operation of model boats of this kind. If in doubt, take out a special insurance policy designed to cover modelling risks.
These safety notes should be kept in a safe place. If you ever dispose of the model, be sure to pass them on to the new owner.

Guarantee conditions

The guarantee covers replacement of any parts which can be shown to exhibit manufacturing faults or material defects within the guarantee period of 24 months from the initial date of purchase. No other claims will be considered. Cost of transport, packing and freight are payable by the purchaser. We accept no liability for damage in transit. When you send the product to GRAUPNER, or to the approved Service Centre for your country, you must include a clear and concise description of the fault together with the invoice showing the date of purchase. The guarantee is invalid if the component or model fails due to an accident, incompetent handling or incorrect usage.

The following points are important and must be observed at all times:

- This model is not suitable for young persons under 14 years of age.
- ***NEVER*** operate the boat when there are persons or animals in the water, as the model is capable of high speeds, and there is a serious risk of causing injury.
- Never run your model in protected sites, animal or plant sanctuaries or sites of special scientific interest (SSSIs). Check with your local authority that the stretch of water you wish to use is suitable for model boats.
- Do not run the model in salt water. Even the salt-laden sea air can attack, oxidise or even destroy the technical components in your model.
- Never run your boat in adverse conditions, e.g. rain, storm, strong wind, choppy water or strong currents.
- Before you run the model check that the radio control system is working reliably, and that all connections are secure.
- If you are using dry cells as the power supply, remember that they must never be recharged. Only batteries marked specifically as “rechargeable” may safely be recharged.
- Ensure that all batteries are fully charged before every run. Check the range of your radio control system. It is particularly important that the transmitter and receiver batteries are fully charged before each session.

- Ensure that the channel you intend to use is not already in use by other modellers. Never run your boat if you are not certain that your channel is free.
- Read and observe the instructions and recommendations provided by the manufacturer of your radio control system and accessory components.
- Do not work on the power system unless the motor is disconnected from the drive battery.
- When the drive battery is connected, keep well clear of the area around the propellers, as this represents the greatest risk of accident and injury. Make sure any spectators do the same.
- Do not exceed the recommended voltage of the drive battery. Increasing the voltage may cause the motor and/or the speed controller to overheat, and the electrical leads can even melt. In the worst case this may cause the model to go up in flames and be completely ruined.
- Check that all the drive train components work smoothly and freely. This applies in particular when you are running the model, as leaves and other detritus can get caught up in the power train. If this happens and you do not remove the obstruction, the speed controller or rudder servo may be ruined due to overloading.
- Ensure that the servos are not mechanically obstructed at any point in their travel.
- Dry cells and rechargeable batteries must never be short-circuited. Do not allow them to come into direct contact with water.
- Allow the drive motors and speed controller to cool down after each run. Don't touch the hot surfaces!
- Remove all batteries from the model prior to transporting and storing it.
- Do not subject the model to severe humidity, heat, cold or dirt.
- Secure the model and your RC equipment carefully when transporting them. They may be seriously damaged if they are free to slide about.
- If you wish to operate the model on moving water (e.g. a river), remember that the boat could be washed away downstream if the battery fails or a malfunction occurs.
- If you have to ***salvage*** the model, take care ***not to risk your own life or that of others***.
- Check regularly that the boat is completely watertight, as it may sink if too much water enters the hull. Check the boat for damage before every run, and remove any water which may have entered through the propeller shaft or rudder systems.
- Take great care to prevent water entering the boat. For example, check that the superstructure cannot shift while the boat is on the water. Ensure that any water which gets inside the boat cannot make contact with the RC components. Equipment damaged by water will not be replaced under guarantee!
- If you are using drive batteries connected in parallel, they must not be left inter-connected when the boat is not in use. When not under load the two batteries may interact, and the packs could be damaged. The simple rule is this: connect the batteries just before running the boat, and disconnect them again immediately after the run. Never store the batteries with the parallel cable connected.

Care and maintenance

- Clean the model carefully after every run, and remove any water which penetrates the hull. If water gets inside any RC component, dry the unit out and send it to your nearest GRAUPNER service department for checking.
- Clean the model and RC components using suitable cleaning agents only. Ask your model shop for information.
- Lubricate the propeller shafts at regular intervals.
- If the model is not to be run for a considerable time it is important to dismantle all the moving parts (propeller shafts etc.), and clean and re-lubricate them.

Building the model

- Before you start building the boat be sure to study the plan and read right through the instructions. We recommend that you refer constantly to the parts list as an aid to construction. The instructions and parts list reflect the sequence of assembly.
- The laser-cut parts are retained in their sheets by means of small lugs. Cut the lugs from both sides using a sharp balsa knife, and only then cut them right through.
- In the case of small, delicate laser-cut wooden parts it is a good idea to strengthen them by applying thin cyano to the edges or the whole part, otherwise they may break when you handle them.
- The laser-cutting process leaves a black cut-line round the components. This can easily be removed by gentle sanding.
- It is a good idea to assign the part numbers to the laser-cut wooden parts before you start construction. This can be done by comparing them with the drawings at the end of the building instructions. The part

numbers are intentionally not engraved on the wooden parts, as this would mean that they would have to be filled and sanded, and the black marks might show through the colour paint.

- Compare all the wooden parts with the drawings on the plan before reaching for the glue bottle. This is necessary to establish where edges have to be chamfered or otherwise prepared. Areas shown in the drawing with a cross-hatching pattern indicate where other parts are to be glued.
- To saw out the wooden parts of the boatstand the shapes can be copied onto the wood using carbon paper, although it is easier to cut the shapes out of the plan (or copy them) and stick them to the wood itself using a PRITT-stick or similar. The parts can then be sawn out, the paper peeled off and the cut edges cleaned up.
- Wooden parts which are given a coat of GLATTFIX sanding sealer to make them waterproof cannot be glued using UHU acrylit or STABILIT express. Take care to avoid excess glue being squeezed out of joints and soiling the model's surfaces, as in many cases this will prevent the final painted finish adhering properly. This applies in particular when gluing the vacuum-moulded plastic parts together.
- Before you start construction consider carefully how and when you wish to paint the model. We recommend that you should paint small parts before gluing them to the model. Some of the larger components should also be painted before installation, or before the next procedure, as this sometimes avoids considerable extra work with masking tape. Do bear in mind that the glued joints are only as strong as the paint if you glue parts together which have already been painted; this means that parts can break off relatively easily. Scrape off the paint from the joint surfaces before applying glue to vulnerable parts.
- Don't throw away scrap wood, ABS and wire immediately as these materials are often required to make other small parts.
- If you intend fitting auxiliary working systems, it is important to plan their installation carefully before you start construction. You will find information and tips on this at the end of the building instructions.
- It is important to ensure that the Centre of Gravity (CG) of this model boat is as low as possible. This means: avoid excessive glue above the waterline, and use lightweight finishing methods as far as possible.
- Bear in mind that tools can be dangerous; always be careful when handling them.
- The electric motors must be suppressed individually. The minimum is one 470 nF capacitor (Order No. 3588) for each motor, soldered between the terminals as a bridge (see sketch on the plan).
- Deploy all electrical cables in an orderly fashion, without crossing them over. Never allow a positive (+) contact to touch a negative (-) contact.
- Use cable of adequate cross-section, capable of carrying the high currents which will flow when the boat is running.
- Deploy the receiver aerial as far from high-current cables as possible (at least 3 cm).
- Lubricate the propeller shaft systems using a type of grease or oil which does not soil or contaminate water, e.g. Order No. 570.
- Before gluing parts together clean the joint surfaces carefully, i.e. remove all traces of grease. This is best done by sanding, followed by wiping with a non-greasy liquid detergent. The same applies to all surfaces which are to be painted, otherwise the paint will not adhere well. Before gluing parts to the hull sand the surfaces with fine abrasive paper and de-grease them using methylated spirits ("meths"). If you neglect to do this, the joints will be weak and may fail at any time.
- Recommended adhesives for various types of joint:

Material material	**Suitable adhesives**
Metal - metal	Cyano acrylate, UHU plus
ABS - wood	Cyano acrylate, UHU acrylit
ABS - ABS	Cyano acrylate, UHU acrylit, UHU plast spezial
ABS - metal	Cyano acrylate, UHU acrylit
Wood - wood	Cyano acrylate, UHU hart, white glue
Wood - metal	acrylate

Read the instructions supplied with the adhesives. Be sure to observe any special notes in the instructions regarding particular adhesives. If you are using acetone, methylated spirits or any other solvent as a cleaning agent, special safety measures are necessary. Read the instructions supplied with these materials.

Assembly instructions

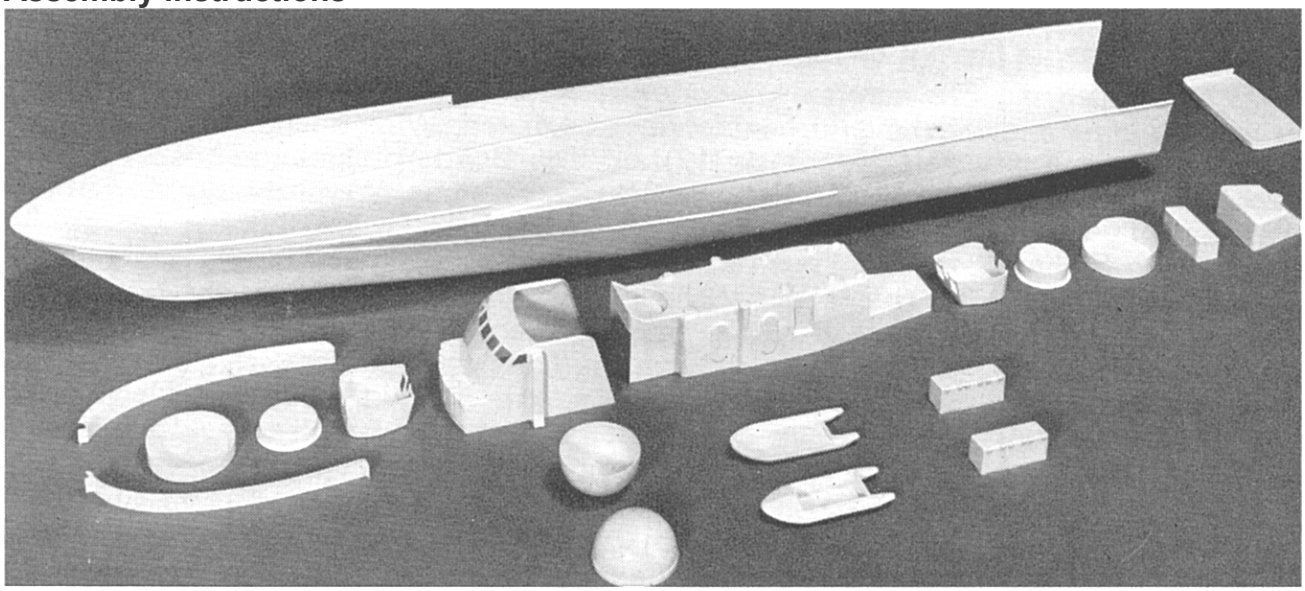


Fig. 1 Various ABS plastic components, trimmed and prepared ready for installation

The hull

The vacuum-moulded plastic hull (part 1) is supplied CNC-trimmed, and the height of the hull moulding is correct as supplied. You will find a step in the deck height of about 13 mm at a point about one third of the boat's length from the bow; file the cut lines smooth. To achieve the proper scale shape at the stern (the hull tapers upward towards the deck) the transom (2) is supplied as a separate vacuum-moulded part. The angled stern section of the hull is also machine-trimmed, and only needs to be sanded flat. Cut the transom (2) to size, leaving an excess width of about 8 mm. It can now be glued in the hull, with the edge of the transom exactly flush with the rear edge of the hull moulding. The bulge of the transom should project beyond the rear edge of the hull. Hold the parts together with spring clamps while the adhesive is hardening. When viewed from the stern, there will be an obvious gap at the joint area where the transom bulges; fill this gap with suitable 2-pack filler, e.g. Order No. 924. Allow the filler to cure, then sand it back flush. Mark the position of the propeller guards (3) on the vacuum-moulded hull as shown on the plan. Cut out the propeller guards (3), sand them to the marked height, and glue them to the sides of the hull as shown.

The 4 mm Ø holes for the rudder system bushes are already present in the hull. Cut the bushes for the rudder assemblies (4) to a length of about 45 mm. Fit the bushes through the holes in the hull from the inside, leaving them projecting by about 3 mm. Drill the rudder support (5) to suit the rudder spacing and cut it to length, then fit it over the ends of the bushes inside the fuselage. Align the parts carefully according to the dimensions stated on the plan, and set the bushes exactly vertical; they can then be glued in place permanently using UHU acrylit. Allow the glue to set hard, then assemble the rudder systems using the tillers (6), the collets (6a), the socket-head screws (7) and the bushes. Cut off the superfluous arms from the tillers as shown on the plan, leaving one actuating arm for the pushrod which is connected to the servo. **TIP**: to fix the tillers in place, swivel the rudder blades through 180° so that they face forward, tighten the tiller fixing screws then swing the rudder blades back again. Make up the rudder pushrod (7a) from the 1.5 mm Ø steel rod as shown on the plan. Bend the final 5 mm of the pushrod at right-angles at both ends. Complete the rudder linkage, and ensure that all the rudders are exactly parallel to each other. Fit pushrod retainer clips (7b) to the pushrod ends to prevent them slipping out. The rudder pushrod cannot be cut to final length until the rudder servo has been installed.

Now drill the 6 mm Ø holes at the marked points in the bottom of the hull for the stern tubes. Assemble the central motor console (8) and the two outer motor consoles (9), each of which consists of three parts. Attach the three electric motors to the plastic motor mounts (10), then glue the mounts to the consoles. The final location of the motor consoles is determined at a later stage, when the stern tubes are installed permanently.

Remove the propeller shafts from the stern tubes (11) and lay out the propeller shafts in front of you. The lubrication holes can now be drilled: position one stern tube bracket (12) about 18 mm from the end of each stern tube. Chamfer the hole in the brackets slightly using a 6 mm Ø drill bit. With the three brackets located correctly on the stern tubes (see plan), drill through the brackets at the marked points using a 2 mm Ø bit, continuing the holes into the stern tubes. When the model is complete, lubricating oil is applied to the bearing

areas of the propeller shafts through these holes; the silicone oil tubes are simply pushed onto the stubs on the brackets. The next step is to install the stern tubes in the hull, but first you should prepare the gluing jigs I and II: copy the shapes onto thick card and cut them out carefully; an easier alternative is to cut the shapes out of the plan and stick them directly to the card before cutting them out. Drill the 6 mm Ø and 4 mm Ø holes exactly at the stated points to ensure that the shafts are parallel to each other when installed.

Fit the propeller shafts into the three stern tubes again, and slip the stern tubes through the holes in the hull from the inside. Measured from the hull step, the central stern tube should project at the stern by 82 mm, and the two outer tubes by 117 mm. Fit jig I on the inner ends of the propeller shafts, and jig II on the outer ends; the bottom edge of the jig must rest on the bottom of the hull. The stern tubes can now be glued to the hull using UHU acrylit; clamp them exactly in this position until the glue has set hard. The mounting flange of the stern tube brackets should rest directly on the inner hull skin. Attach the flanges to the hull skin using UHU acrylit, applying the adhesive through the holes and a little around the flanges where they meet the hull surface. Cut the three stern tube braces (13) to shape from a flat piece of scrap ABS sheet; the shorter brace is intended for the central stern tube. Glue the braces between the stern tubes and the hull using UHU acrylit as shown on the plan. When the glue has set hard, screw the two propellers (14) on the outer shafts, and the propeller (15) on the central shaft. Cut the three silicone lubricating tubes (16) to a length of about 80 mm each, and push them onto the stubs on the stern tube brackets.

At this stage the consoles (with motors fitted) can be installed in the hull; the position of the consoles is shown on the plan. **IMPORTANT**: the motor shaft axis and the axis of the stern tube should line up as accurately as possible, i.e. there should be no more than minimal offset between the shafts to ensure that the power systems run as smoothly as possible. If it proves impossible to align the motor with the propeller shaft with complete accuracy, aim at least to obtain a single curve, so that the cruciform couplings only have to compensate for a small amount of offset; a double curvature (S-shaped offset) is much worse, as this can result in serious vibration and noise. Fit the reducer sleeves on the shafts, then push the shaft couplings (17) on the shafts. The motor consoles can now be trimmed to fit accurately, aiming to keep each shaft coupling exactly in line. When you are satisfied, glue the consoles to the hull using UHU acrylit. **TIP**: rotating the shafts slowly shows up any inaccuracies more clearly; you can then make adjustments as required. The glue will fill any minor gaps. Glue all the consoles to the hull in turn using this procedure.

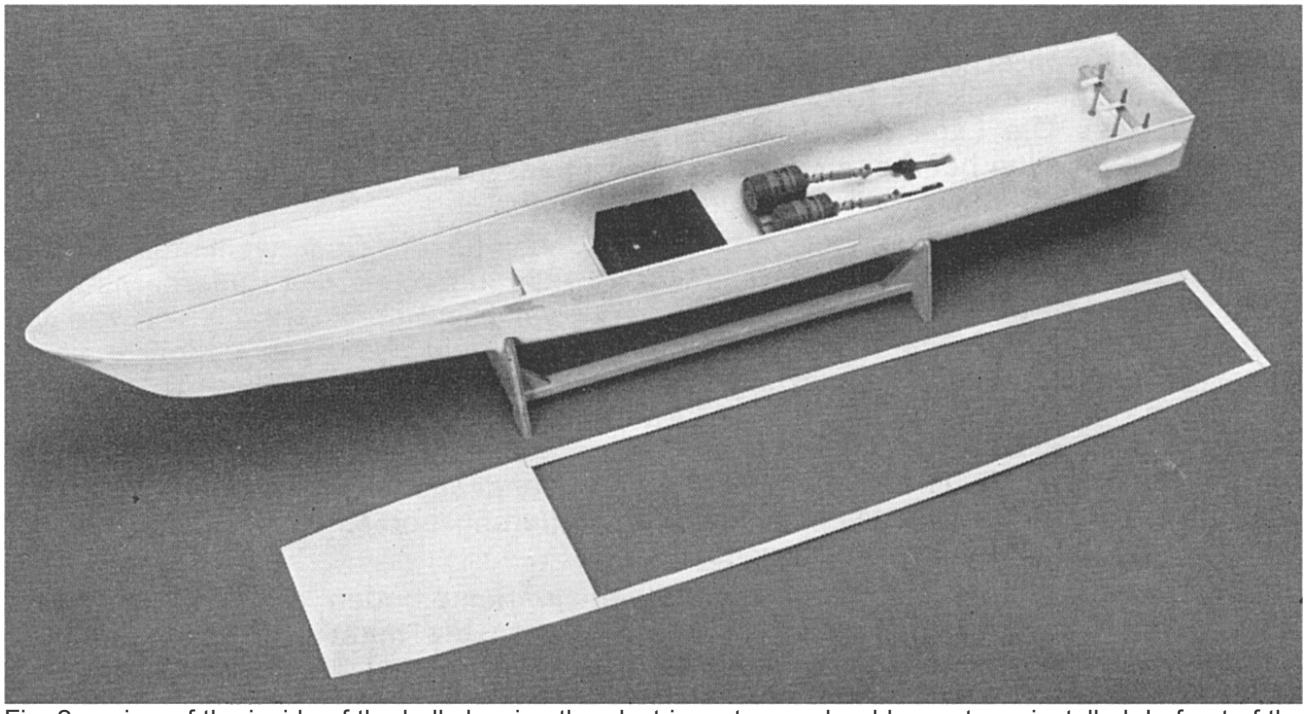


Fig. 2: a view of the inside of the hull showing the electric motors and rudder systems installed. In front of the hull are the assembled deck components. The photo also shows a lead-acid battery, although NiCd or NiMH batteries are the more modern alternative.

Glue the retaining strips (19) on the battery console (18), spaced to suit the drive batteries you intend to install. Please note that large batteries fitted to the console (as drawn on the plan) will inevitably project beyond the console towards the bow, so no retaining strip should be fitted at the front end. The batteries are

later fixed to the console using Velcro (hook-and-loop) tape. The remaining spruce strip material can be used to form a retainer for the additional small battery which is required to operate the receiving system. The completed battery console can now be glued in the hull: the correct position is shown on the plan.
The next step is to trim the deck components (20) - (23) to fit together accurately: the central deck should be a snug fit, without gaps. Hold the parts together with strips of adhesive tape applied on the top surface. Glue the deck formers (24) and (25) together in pairs so that each is 6 mm thick. Glue the individual deck formers (24) - (26) to the underside of the deck, followed by the deck girder (27) and the spacer former (28) at the front end. Glue one each of the fore-and-aft rails (29) and (30) to the front support (31) and the rear support (32). The supports should butt up together in the centre, and should project 6 mm beyond the fore-and-aft rails on both sides. The curvature must match that of the side decks. Be sure to make a handed pair: one support for the left-hand side and one for the right-hand side.

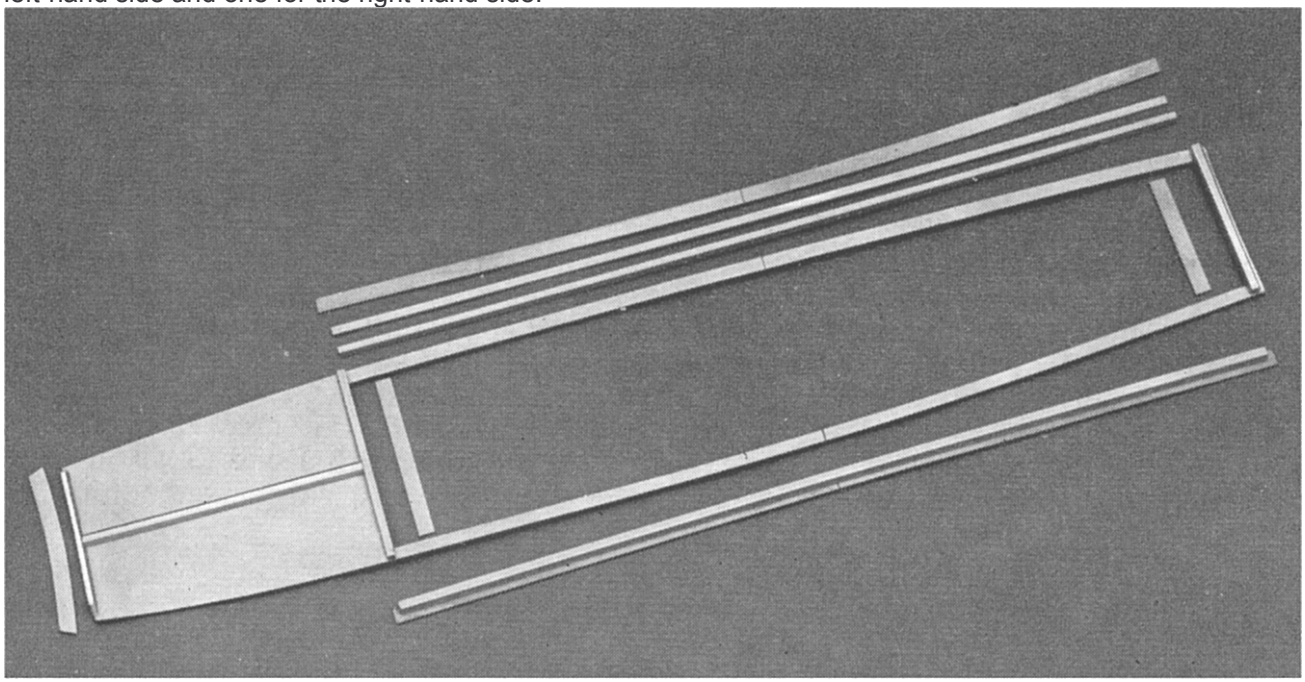


Fig. 3: the deck with the deck formers glued to it; the girders and fore-and-aft rails are also shown.

When the glue has set hard place the supports on the underside of the side decks. The difference in height between the rails (29) and (30) produces the deck camber (curvature), which is especially marked in the side decks. When gluing the parts together, lay the supports on a flat surface and weight down the parts with heavy objects while the glue is drying. The cross-section on the plan shows the exact location of the individual components relative to each other. Glue the two cross-pieces (33) and (34) to the underside of the appropriate deck formers. When the glue has set hard, round off the outermost edge of the deck (joint edge) and trim it to fit in the bulge of the hull. A certain amount of trimming is inevitable here.

Now apply a little adhesive to the bulge of the plastic hull and immediately insert the deck. Press the hull against the deck using spring clamps, and wrap rubber bands round the front end; the rubber bands are wrapped round the whole hull (see cross-section). Leave the glue to set hard.

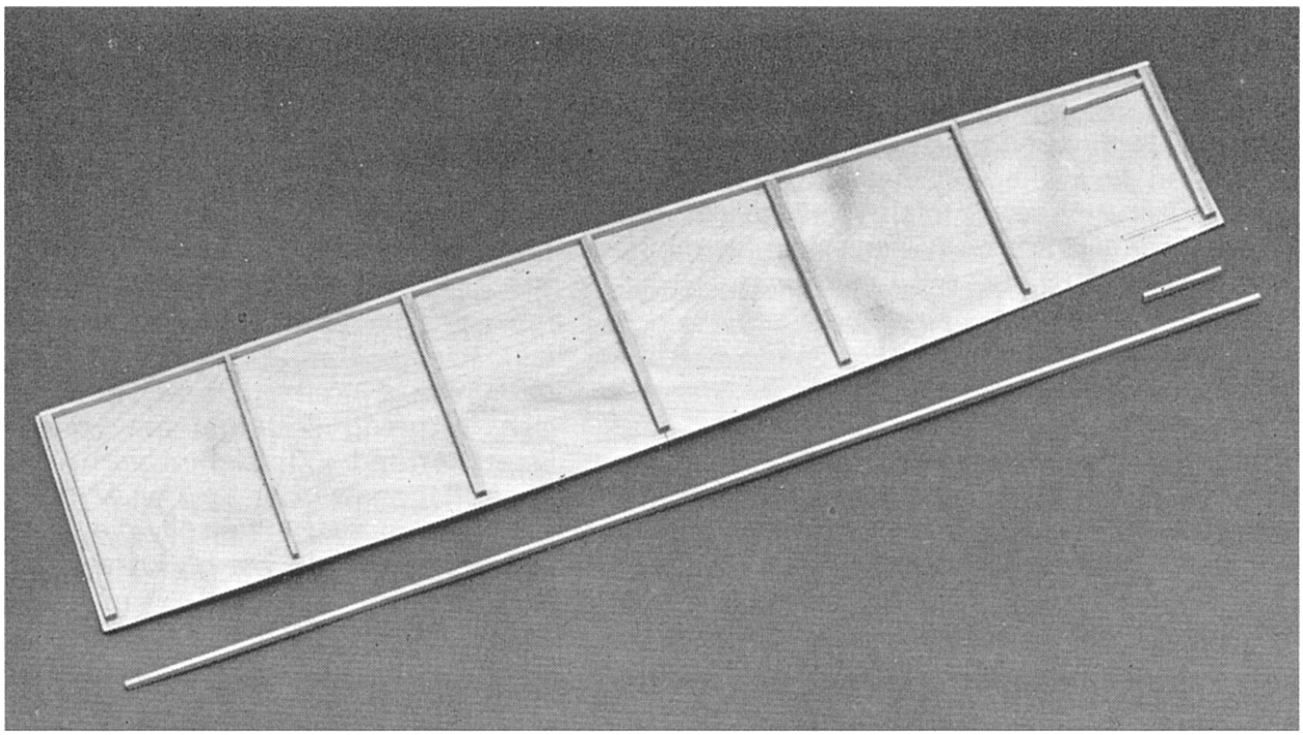


Fig. 4: the underside of the completed centre deck. The right-hand fore-and-aft rail has not yet been fitted.

Glue together the two parts of the transverse former (37) to double its thickness, then glue together the two centre deck components (35) and (36) over it (part 37). Glue the other transverse formers (38) - (43) to the underside of the centre deck at the locations shown on the plan. Fitting the two spruce fore-and-aft rails (44) and reinforcing strips (45) completes the construction of the centre deck, which can now be trimmed to fit in the boat deck. In the centre (at the butt-joint) the side decks (21) and (22) stand off too far from the centre deck, leaving a wide gap. To fill this gap glue the spruce spacer strip (46) in place under the butt-joint between the front and rear supports (31) and (32). Compress the hull at this point until the hull width is as stated.

Glue the girder (48) to the underside of the foredeck (47) to act as a reinforcement, and when the glue has set hard trim it to match the bulge of the foreship. Round off the outside edge neatly to suit. The bulged edge of the plastic hull does not make proper contact at the two rear ends of the foredeck (running inward at an angle), so it cannot be glued at these points. This can be corrected by cutting into the plastic hull side from the rear using a good, sharp knife, immediately above the underlying deck, and extending the cut as far as the corner (approx. 90 mm). **TIP**: this should be done using several light cuts - don't try to slice through the hull in one go! It is important to avoid damaging the deck, and to keep the cut even and neat. Now bend the plastic side down at the corner of the foredeck (end of cut) so that the inward end stays in this position over about 20 mm. The deck can now be glued in place using the usual technique. Hold it against the bulge using rubber bands while the glue is hardening. You will need to apply light pressure in the forward direction (towards the bow), to avoid the deck sliding away to the rear. Glue the sawn area of the hull side flush with the bottom deck. Any irregularity can be made good later using a file.

The plan shows how the breakwater (49) is assembled from the two plastic mouldings. Trim the mouldings to size, then glue them together at the front corner. Trim the breakwater to fit the deck accurately when the glue has set hard. Take particular care at this stage to avoid soiling the outside surface with excess glue. The glue is difficult to remove from the plastic, and might spoil the exposed surface of the model.

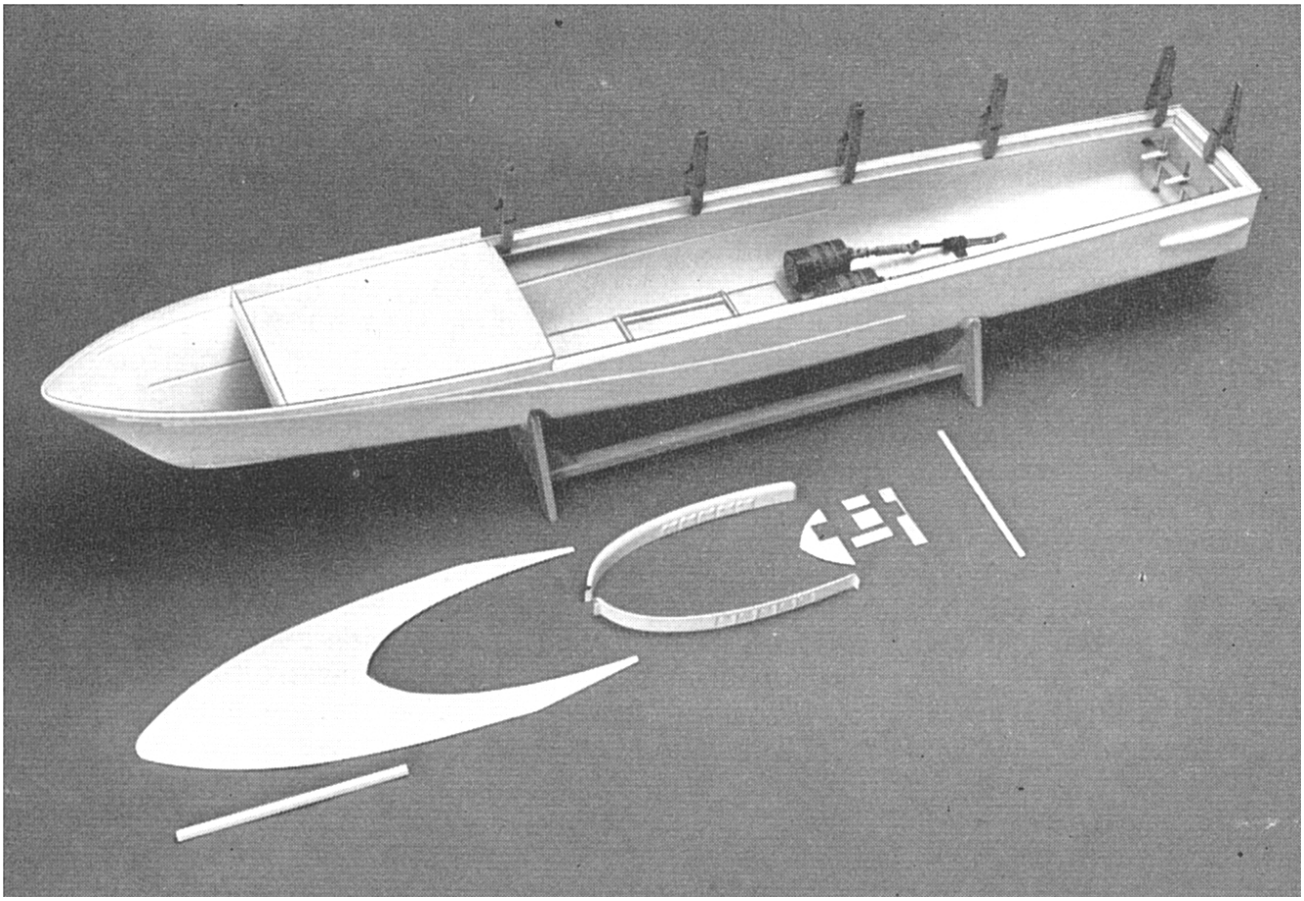


Fig. 5: the deck glued in the lower bulge of the hull. The foredeck is glued in the upper bulge. The prepared breakwater components are shown separately.

Glue the cross-piece (51) and the fore-and-aft members (52) and (53) to the underside of the cover (50). Allow the glue to set hard, then glue the angled part (54) in the opening. File off the projecting edges neatly when the glue has set hard. Trim the cover to fit in the front corner of the breakwater and glue it in place permanently.

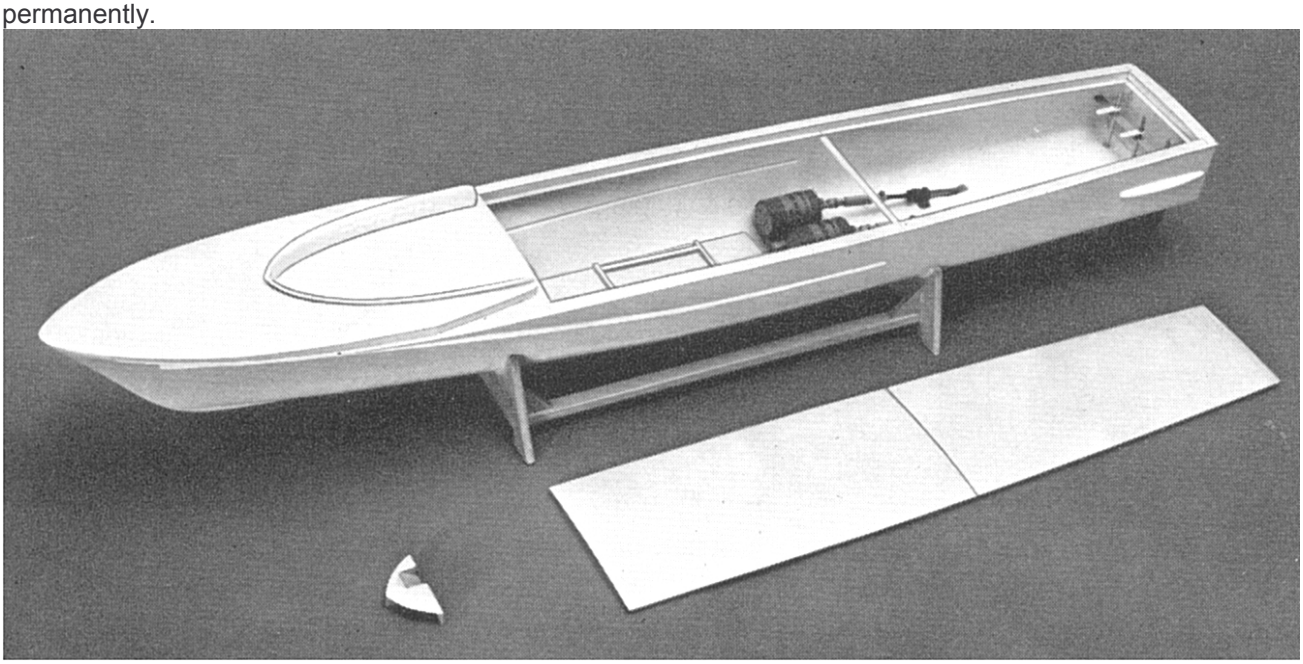


Fig. 6: the hull, with the centre deck in front of it. The transverse girder can be clearly seen in the opening in the deck.

The superstructure

Please refer to the exploded drawing of the superstructure, as this will make it much easier to assemble the parts correctly. The superstructure components are first joined and then painted before being glued to the deck permanently. Remove the excess material from all the vacuum-moulded plastic parts, cutting to the marked lines (around 3 - 6 mm). See also the drawing of the individual components on the plan.

The bridge superstructure and the engine room are assembled from parts (55) - (67); all the parts are glued together on the spacer plate (55). Glue one of the five transverse rails (57) to the transverse panel (56), after trimming the bottom edge of the parts to follow the camber of the deck. The remaining four transverse strips are glued to the spacer plate with the cambered edge facing down. When the glue has dried, the spacer plate should exhibit the same camber as the model's deck. The transverse panel (56) and the support plates (58) can now be glued to the spacer plate. Place the bridge superstructure plate (59) over the support plates, followed by the five corner fillet strips (60) at the front edge. Glue the spacer plates (61) - (63) to the plate (59) at right-angles, butting up against each other; they should also rest squarely against the corner fillets (60). Glue the two side panel plates (64) to the inside faces of the bridge superstructure with the top and rear edges butting up against the plastic. Cut away the top and rear surfaces of the bridge superstructure (65) as shown on the plan, and file the cut edges smooth. All window frames have to be drilled open in the middle very carefully. Then you have to take a file to work them out properly, leaving a thin brim of the outer contour.

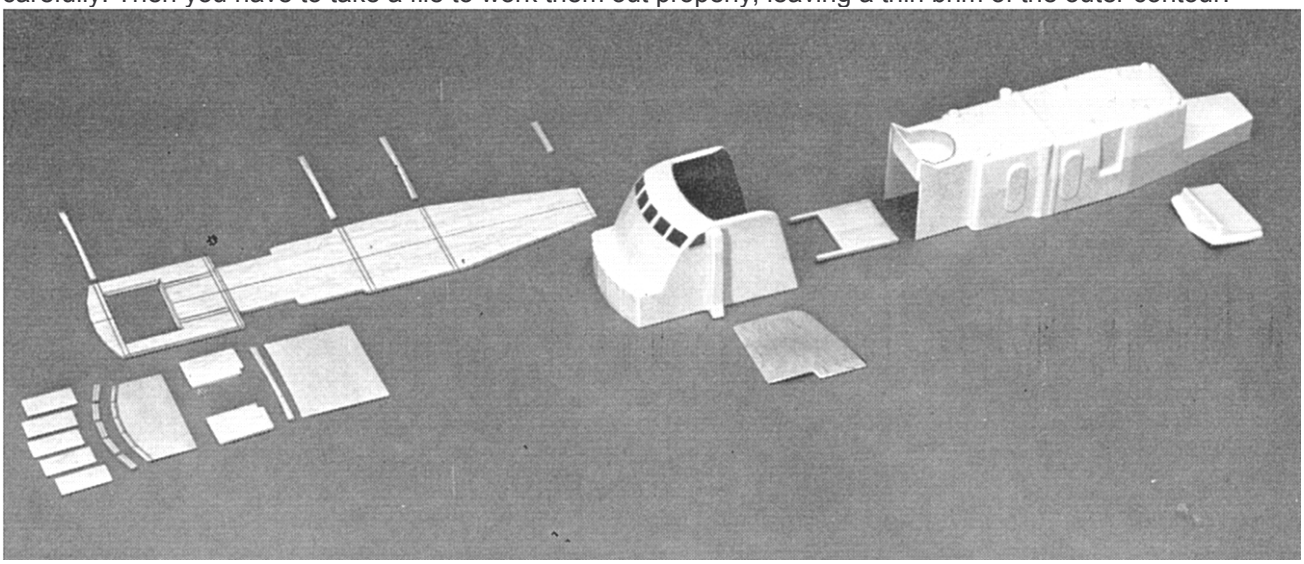


Fig. 7: the prepared plastic and wooden parts for the bridge superstructure and the engine room.

Cut off the front face of the vacuum-moulded engine room (66) along the marked lines and file the cut edges absolutely flat and straight. Drill the four 4 mm Ø holes for the radome platform braces and the two 2 mm Ø holes for the aerial base in the positions stated on the plan.

Trim the spacer plate (67) to fit (the two upper narrow ends have to be chamfered), then glue the plate in the engine room, exactly at right-angles. File off excess plastic material when the glue has set hard.

Trim the engine room moulding (66) to fit on the spacer plate (55). Note that the front end - with the spacer plate (67) fitted - must rest snugly against the transverse panel (56) without any gap. Glue these parts together. Assemble parts (67) - (70) to form the two companionways; they are eventually glued to the engine room, but only after painting is complete. Trim the vacuum-moulded plastic bridge superstructure to fit against the front face of the engine room, and glue the parts together carefully when you are satisfied with the fit. It is important that the outside edges should rest accurately on the deck when the spacer plate is fitted later; any corrections required can be carried out at this point. Assemble and install the two command seats (59a) and the seat bases (56b).

The plan shows how the aft ventilator section (71), the top piece (72) and the two exhaust pipe shells (73r/l) have to be trimmed and assembled: glue part (71) to the rear face of the engine room, and fit the top piece (72) centrally at the top. Glue together the two exhaust pipe shells (73r/l), allow the glue to set hard, then cut off the ends at an angle as shown on the plan. Glue the exhaust pipes to the short end of the ventilator section. The plan shows the correct orientation and position.

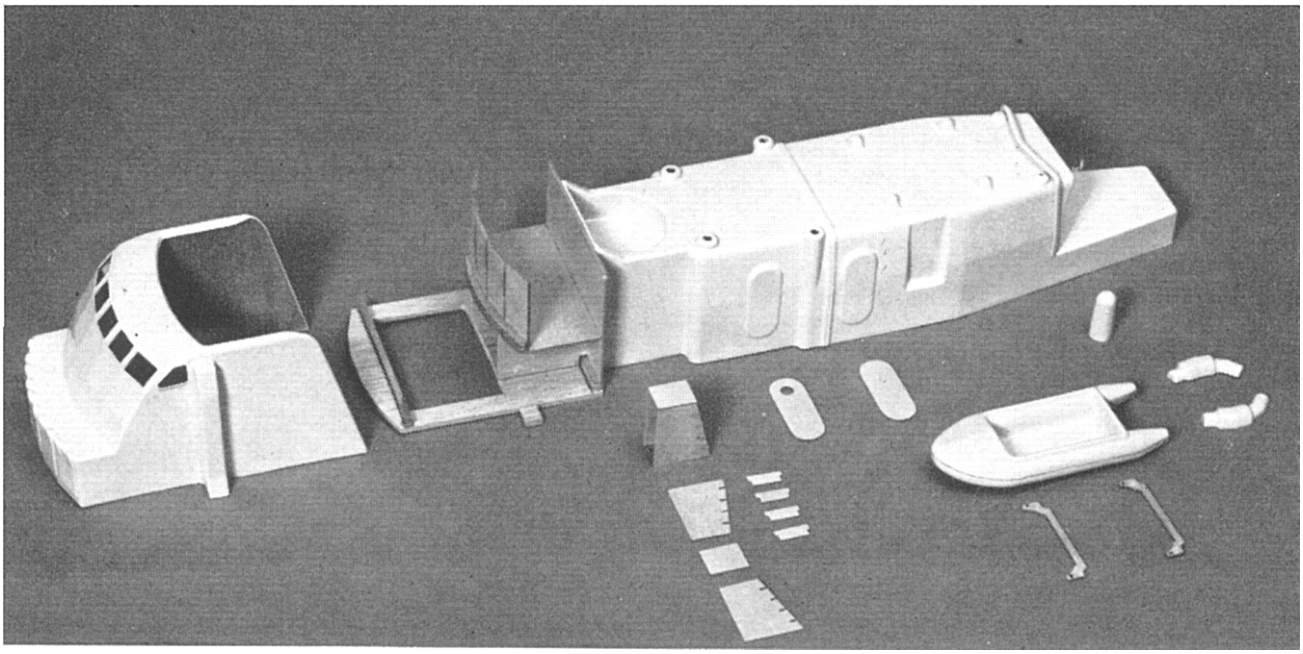


Fig. 8: the bridge superstructure about to be fitted on the wooden frame assembly forward of the engine room. The parts of the inflatable boat have already been glued together in this picture.

The bridge handrail (74) can now be assembled from 1 mm Ø brass wire. On the port (left-hand) side it is interrupted by the aerial duct. Drill holes in the bridge superstructure and insert the railing stanchions (75) and handrail. The bridge handrail is held in place with a few drops of glue. Make up the engine room handrail in the same way from parts (76) and (77) and install it in the position shown on the plan. Bend the parts of the railing (78) to shape from 1 mm Ø brass wire and solder them together. Drill holes for the railing and glue it in place aft of the bridge superstructure.

Trim the doors (79) and (80) to final size; they should not be fitted until painting is complete. The area behind the circular opening in the front door should be painted grey before the door is fitted, in order to simulate a “glazed” panel. **TIP**: alternatively you can cut out the opening in the superstructure and glue a piece of clear plastic behind it later to form a proper “window”. Trim the two inflatable boat supports (81) to fit on the engine room at the prescribed location; make sure they are truly vertical.

The next step is to make up the radome platform. First cut four braces (82), 50 mm long, from a length of 4 mm Ø beech dowel. From the laser-cut plywood sheet cut out the four flanges (83), the platform (84) and the flange brace gussets (85) - (88). Please note the following when gluing the parts together: the platform (84) should be exactly horizontal, and when viewed from the side the rear platform braces (82) should stand exactly vertical. The platform can be held temporarily in this position by packing it up vertically using scrap material cut to the correct length of 47 mm. Glue the flanges (83) to the platform, keeping them horizontal. When the glue has set hard, take the supporting plates away, trim the brace gussets to exact shape and glue them to the flanges. Glue the transverse reinforcement (89) to the underside of the platform between the front braces, and the transverse reinforcement (90) between the rear braces. Trim the side reinforcements (91) - (94) to fit at the correct positions as shown on the plan, and glue them in place permanently. Glue the two-part radar platform (95) to the front, and glue the fore-and-aft brace (96) between the transverse reinforcements. The rear ends of the platform are braced to the centre using two diagonal struts (97). Drill holes through the rear side stiffeners and insert the 2 mm thick cross-piece (98). Fix the angle hooks (99) and S-hooks (100) to the cross-piece using UHU acrylit.

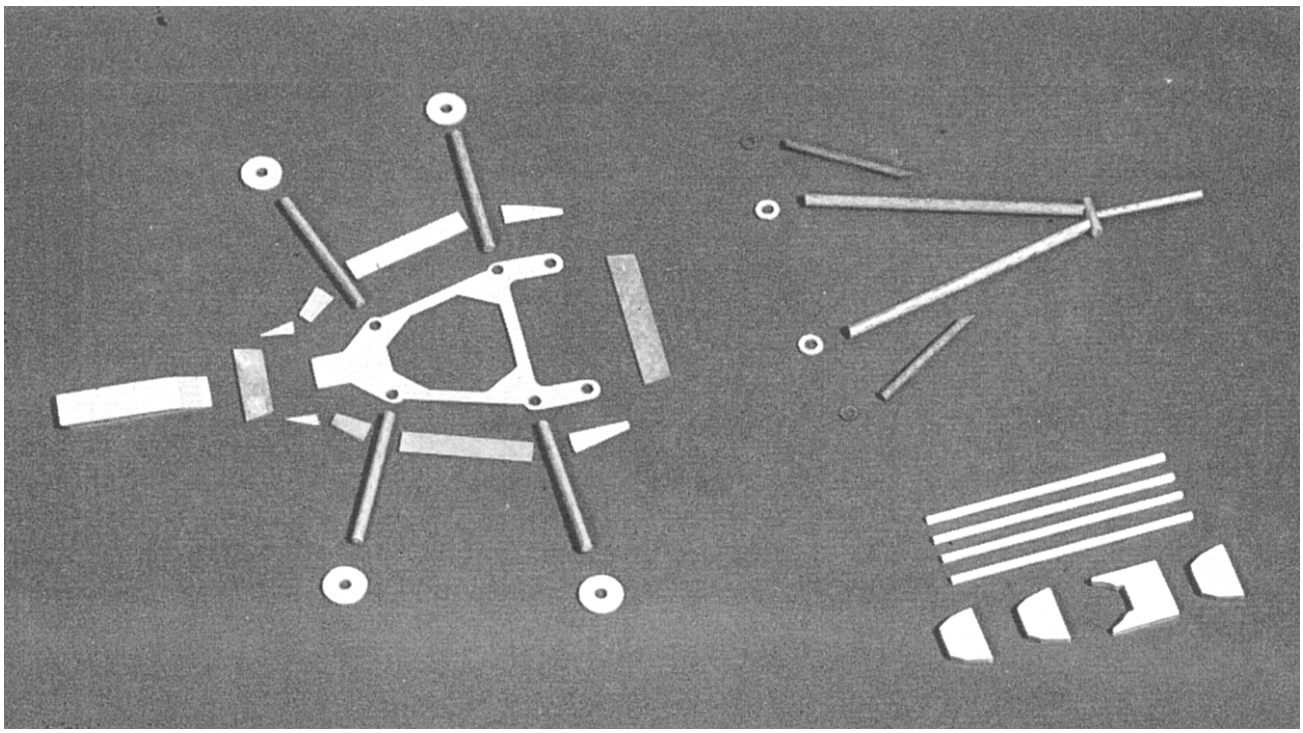


Fig. 9: the components of the radome platform before assembly. The picture also shows the mast and torpedo supports.

Assemble the ladder (101) by soldering the brass wire parts together, and place it vertically between the engine room and the fore-and-aft brace (96). Cut the parts of the mast (102) - (104) from beech dowel and glue them together over the plan, taking care to keep them symmetrical and in one plane (flat). Lay clear plastic film (as used for plastic bags) over the plan to prevent the parts sticking to the paper. When the glue has set hard, drill the holes required and insert the yard (105) and all the outriggers and aerials (106) - (115) as shown on the plan; glue or solder them in place. Fix the wire lamp supports (116) and (117) to the mast. Make up the two mast flanges (118), slide them on both bottom ends of the mast and glue them securely to the platform. Fit the two mast struts (119) and the strut flanges (120) to hold the mast in the vertical position. Make up parts (121) - (124) (note: some of them require several plywood parts to be glued together to obtain the required thickness). Glue the parts together and attach them to the mast. Attach parts (125) - (127) to the mast to complete this section.

Make up the radar antenna case (128) from three strips of 1.5 mm thick plywood and sand it to the profile shown on the plan. Glue the motor flange (129) to the underside of the case; it is also assembled from three plywood parts. A short piece of beech dowel represents the motor housing (130). This assembly can now be placed on the radar platform (95). The radar antenna can be made to swivel; in this case parts (128) and (129) should rotate on the fixed motor housing (130). Tips on this are included in the section at the end of the building instructions.

The frame for the radome holder is assembled from 1 mm Ø brass wire: bend parts (131) - (135) to shape as accurately as you can using a pair of flat-nose pliers, and solder them together. If you are not experienced at soldering, you may find it easier to glue the parts together using UHU acrylit or UHU plus sofortfest, Order No. 5806. In either case it is much easier to do this if you first prepare the parts, then pin or tape them down on a building board, and only then solder or glue them together. Add the six flexible sections (136) (brass tubes 8 mm long) and tack them in place with solder. Form the six supports (wire ends) into pairs, fit each pair in one of the three washers (137) and solder the parts together on a flat plate. Glue the support plate (138) in the inner frame (134) using UHU acrylit, setting the parts flush at the top. The prepared top and bottom radome components (139) and (140) can now be installed. Glue the spacer plate (141) to the bottom of the assembly and fix the whole radome to the frame support plate (138). This is eventually glued permanently to the platform, but only after painting is complete.
Solder two S-hooks (143) to the flagstock (142) in the position shown on the plan. They should be exactly central, and angled about 20° to the rear aft of the top piece (72). Attach the aerials (145) to the two aerial bases (144) and fit them in the holes in the raised sections of the engine room roof, angled to the rear by about 10°. Cut the connector box (146) to shape and glue it flat on the left-hand outside wall of the engine room. Cut one aerial box (147) to size and drill a 2 mm Ø hole in the top of it. Glue the aerial base (148) in the

hole, keeping it exactly vertical. Over this fit the protective sleeve (149) and fix the aerial (150) in the sleeve. Glue the box and aerial flat on the left-hand outside wall of the bridge superstructure. Take care to leave sufficient space for the navigation lantern and its mounting bracket. Drill a 2 mm Ø hole in front of this, and fit the aerial base (151) and aerial (152) in the hole, taking care to keep them exactly vertical.

Cut the seven glazing panels (153) to the shape shown on the plan and glue them carefully over the inside of the window openings. The windscreen (154) is attached in the same way: this part should be bent four times lightly and attached using the minimum of adhesive to avoid smearing. Glue the nameplate (155) to the base (156) at right-angles and glue it to the model in the position stated on the plan. Glue four of the cleats (157) to the outside walls of the engine room, and the other two on the breakwater on the foreship. Cut the toolbox (159) to size. Locate the rear step on the engine room (it is about 20 mm high), and glue the box on it; the correct position is shown on the plan.

The boatstand

The wood for making the boatstand is included in the kit. Locate the 8 mm thick plywood sheets (220 x 200 mm) and mark on them the shape of the two end-supports and the four gussets. Cut out the parts using a fretsaw and sand the cut edges smooth. **TIP**: the easiest method of marking out is to cut out the shapes from the plan, stick them to the wood and then saw them out. Cut the joiner rails from the two spruce strips (410 x 15 x 10 mm), and glue (and screw, if you wish) them to the end-supports as shown. Fix the four gussets to the end-supports and the joiner rails. When the glue has set hard sand the boatstand smooth overall using 120-grit abrasive paper before applying several coat of sanding sealer. When the sealer has dried sand the surfaces again using 320-grit paper. The boatstand can now be given several coats of paint in the colour of your choice. It is a good idea to glue strips of thin felt or foam to the inside faces of the end-supports, i.e. the areas which make contact with the hull. If you intend to do this, take the thickness of the padding into account when cutting out the end-supports.

Making additional superstructure parts

Cut the toolboxes (159) to the size shown, file the cut edges smooth and glue the bottom panels (160) in them. Bend the box lid handles (161) to shape from brass wire. Drill holes in the box lids and glue the handles in the holes. If you don't have a drill of the correct diameter, make the holes by pushing a pin through the plastic. One toolbox should be located in the centre of the deck; in this case it is necessary to sand the underside of the box to match the camber of the deck itself. Drill a 1.5 mm Ø hole in one manhole cover (163). Cut down the deck box (162) as shown, and glue the prepared manhole cover to its angled surface. Drill holes in the other three manhole covers; they should not be glued in place until painting is complete. Trim the equipment box (164) as shown on the plan, and place its four feet on the equipment box. Assemble and solder the handrail (165), drill holes for it as shown on the plan, and insert it in the holes. Apply glue to the inside of the joints to secure the handrail. The wooden floor (166) can now be fitted. When the glue has set hard, sand away the centre of the wooden floor to follow the deck camber. Trim the deck box (167) to fit, but do not install it until painting is complete.

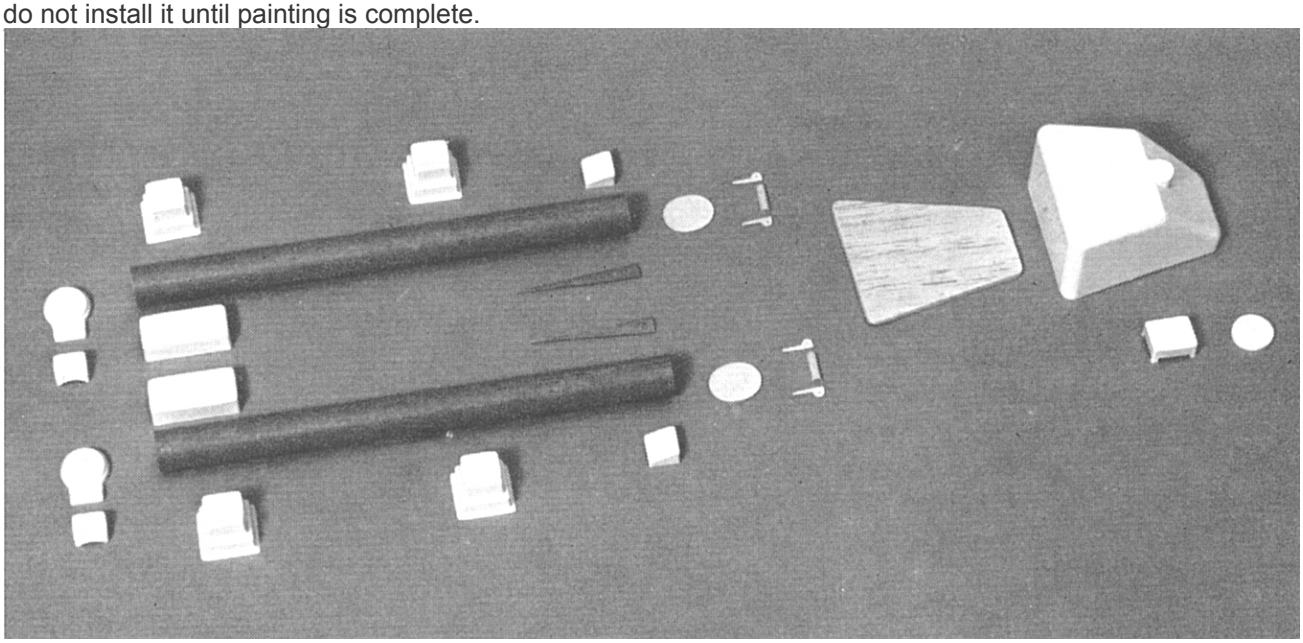


Fig. 10: trimmed parts for the torpedo tubes and deck box. The photo shows the old card torpedo tubes as originally supplied in the earlier kit of the WIESEL.

The torpedo tubes (168) are made from the two vacuum-moulded plastic half-shells; the side with the thicker end is the expanded bottom section of the torpedo exit opening facing the stern. Prepare the vacuum-moulded breech covers (169), and glue them to the other end of the torpedo tubes (169) (check they are the right way round). Trim the hinges (170) to fit on the side, directly adjacent to the breech cover and the tube, and glue them in place permanently. Trim the boxes (171) to fit neatly against the curvature of the torpedo tubes, and fit the hatch boxes (172) at the other end of the tubes. Glue the boxes and the hatch boxes in place together with the hatches (173). When the glue has set hard, correct any irregularities using a file. Glue the hinges (174) and shaft components (175) on the hatches in the position shown on the plan. Fit the small boxes (176) on top of the torpedo tubes. When all the glued joints have set hard, place each torpedo tube on two torpedo plinths (177). When gluing the plinths to the deck take care to take into account the angle of the deck. The torpedo tubes are glued on the deck itself, but only after the model has been painted. The next stage is to assemble the two guns from parts (178) - (203). Cut out all the vacuum-moulded plastic parts as shown on the plan and trim them to final size. On the rear face of the two splinter guards (182) the topmost edge (4 mm) should be bent inward by 20° (see side elevation of splinter guard). This is done by sawing a slot 4 mm deep at the two corners using a fretsaw, and bending the edge inward using flat-nose pliers. The edge to be bent is exactly in the centre of the two lugs left standing. Finally apply glue to the inside of the saw-cuts, and file the corners smooth when the glue has set hard. Solder together parts (183) - (186) to form the barrel support, drill 1 mm Ø holes for the support and glue it on the other side of the splinter guard using UHU acrylit. File off the excess wire on the inside when the glue has set hard. Glue the sleeve guides on the inner surface of the two rectangular cut-outs at the rear. The sleeve guides are made from the staircase-like parts included in the kit. Clamp these components in a vice and carefully cut them in half using a fretsaw. File them to the thickness shown and remove the rough edges.

The gun itself is assembled following the sequence of the part numbers. Take care to drill the 2 mm Ø hole in the gun sight (192) cleanly and exactly at right-angles. The muzzle dampers (195) should be sanded or machined to profile using a lathe or electric drill. If the pivot pins (198) and (199) are fitted at the fulcrum points shown on the plan, the gun barrel can be made to rotate, and its elevation adjusted. Make up two seats for each gun from parts (200) - (203); the backrests are made from the vacuum-moulded plastic parts. With the gun components prepared and painted, assemble them completely and fix them on the deck. The torpedo support brackets are simply assembled from parts (204) - (206).

Cut the mushroom ventilators (207) to size from the vacuum-moulded plastic parts and glue a central column (208) in them. Glue a flange (209) at the bottom of the column at right-angles. Paint the mushroom ventilators and glue them to the deck in the positions shown on the plan.

Painting

- We suggest that you ask your model shop or local paint supplier for advice on choice of paints.
- Use ONLY paints of the same type, made by the same manufacturer, otherwise they might react and attack each other or cause bubbles. Be particularly careful if you wish to combine spray-can paints with brushing types; always carry out an experiment on a scrap piece of material to ensure that the paints are compatible with each other.
- To ensure that the paint adheres strongly it is essential to rub down the surfaces beforehand using fine-grit wet-and-dry paper (600 to 800-grit). Remove all traces of grease from the surfaces using meths or a non-greasy cleaning agent. Try not to touch the surfaces again before painting, as the sweat on your skin contains grease which could again prevent paint adhesion.
- The wooden surfaces which are not exposed should be given several coats of sanding sealer (e.g. GLATTFIX, Order No. 207) or clear lacquer (e.g. HYDRO-AEROFIX, Order No. 926.1) to prevent them absorbing water.
- If you are spraying the paint, it is essential to mask out all areas which are not to be coated using masking tape or paper. Seal all openings at the same time, as the fine paint mist will penetrate into any opening, no matter how small.
- Read and observe the instructions supplied with the paints.
- **IMPORTANT**: before you start construction please consider how and in what order you will paint the model, as some areas and components will be difficult or even impossible to paint once installed permanently on the model.

Colour scheme
To help you select the correct hues the table below states the colours using standardised RAL names and numbers. You can take this information to any specialist paint supplier, who will then be able to supply the correct colours. Explain to your advisor in the paint shop that you are painting a model boat, so that he can select the optimum paint type for your application. We recommend using synthetic enamels. The RAL numbers listed below correspond to the colours used by the German Bundesmarine (Federal Navy) in the 1960's and 1970's. Dead-matt paints should be used for the deck and submerged hull, whereas a semi-matt finish is recommended for the other colours.

Early service years:	
Exposed hull, superstructure, inflatable boat, radome, mast, guns, torpedo tubes:	Light grey, RAL 7035
Submerged hull, gunners' seats:	Red oxide, RAL 3009
Waterline, navigation lamp brackets:	Solid black, RAL 9005
Deck, radar antenna, gun barrels, exhaust pipes:	Basalt grey, RAL 7012
Navigation lamps:	Red (port), green (starboard)
Lifebelts:	Signal orange, RAL 2010
Liferafts:	White, RAL 9016

Later service years:	
Exposed hull, superstructure, inflatable boat, radome, mast, guns, torpedo tubes:	Mid-grey, RAL 7000
Submerged hull:	Fire red, RAL 3000
Other colours as stated for early service years.	

The intensive action of sunlight and the aggressive sea air had a marked effect on the colour of the deck, which was usually severely bleached, i.e. the colour was much lighter than originally applied, and usually looked only slightly darker than the grey of the superstructure. Glue a piece of thin plywood or veneer in the stern of the inflatable boat where the outboard motor was attached. On the full-size this mounting plate was also made of timber.

Applying the decals
Use a sharp pair of scissors to cut out the individual decals as neatly as possible, leaving little or no margin round them. Apply the "P 6093" name placards to both sides of the bridge superstructure and the model's transom. The placard with the wide number "6" belongs on the left-hand side of the bridge superstructure. Stick the WIESEL name placard to the nameplate, the dark grey panels to the lateral splinter guards of the guns, the ladder-shaped dotted pattern to the rear gun fairings and the grey line to the front gun fairings. The red circular segment showing the swivel arc of the forward gun barrel should be drawn on using a pair of compasses and a red permanent marker (**TIP**: the pen can simply be taped to the compasses), as shown in the plan view in the drawing. Apply the double black line decals to the propeller guards. You will find a small double bulge on the engine room immediately forward of the rear door; apply a long grey line (sealing strip) between the two bulges. The imitation handles are intended for the doors: the locations for the shutter decals are shown on the plan and in figures 11 and 12. The largest shutter decal belongs on the aft ventilator section (71), the slightly smaller one on the rear wall of the engine room between the equipment boxes (159). The three black spots (power sockets) should be applied individually to the raised section of the connector boxes (146). Two of the four analogue instruments are applied to the front face of the boxes (171) which are mounted on top of the torpedo tubes; the exact length is shown on the plan. The three white circles - they represent centrifugal wipers - are applied to the glazing panels of the central three windows on the bridge superstructure. It does not matter where the central line is located.

Assignment of boat names to NATO numbers

Boat name	NATO No.
ZOBEL	P 6092
WIESEL	P 6093
DACHS	P 6094
HERMELIN	P 6095
NERZ	P 6096
PUMA	P 6097
GEPARD	P 6098
HYANE	P 6099
FRETTCHEN	P 6100
OZELOT	P 6101

Making and fitting additional parts

Mark the position of the railing stanchions (21) accurately on the side deck and the aft end of the removable centre deck, and push a pin through at each point to guide the drill. Drill 1.5 mm Ø holes exactly vertical at the marked points. A drilling jig is useful for this process: take a piece of wood about 180 mm long with a cross-section of about 10 x 20 mm. Drill a 1.5 mm Ø hole in the shallow edge exactly at right-angles, close to one end (ideally using a pillar drill). This hole now serves as guide for the drill bit. Place the strip of wood across the deck, with the centre of the drill bit located exactly over the marked point (pin-hole). A second person should now hold the drilling jig firmly while you drill the hole at the marked point. Apply a little glue to the holes and press the railing stanchions into them. Thread the side railing (211) (0.8 mm Ø steel wire) through the holes in the stanchions, and bend the final 4 mm at right-angles at the front end. Bend the upper wire rail down slightly at the railing stanchions, as shown on the plan. Drill holes in the deck and hull, and glue the angled rail ends in them. It is a good idea to glue (UHU acrylit) or solder each joint between the wire and the stanchions, as the joints strengthen the railing considerably. The next procedure is to fit the stanchions for the aft railing, but you should first bend the railing (212) to shape from the steel wire supplied. The dimension of the U-shaped rail is shown on the plan. Slip the appropriate number of railing stanchions on the two wire handrails, then press the pointed ends of the stanchions into the holes in the centre deck after applying a little glue to the holes. Solder the ends of the railing to the stanchions, then snip off the excess rail material. Mark the position of the holes for the woodscrews which secure the swivel latches (213). Drill 1.5 mm Ø pilot-holes at the marked points, and fix the latches in place using the woodscrews (214); they should be fairly stiff to turn by hand. Rotating the latches clamps the centre deck in the deck frame. The adhesive sealing tape (215) should be applied in full-length strips to the support rail - take particular care over sealing the tape at the corners - which then seals the centre deck and prevents water penetrating the hull. Solder the washer (217) and the two S-hooks (218) to the flagstock (216), and insert it in a hole drilled in the model's afterdeck. Solder together the brass wire parts (219) and (220) and place the assembly on the foredeck. These parts and the block (221) should be painted cream. Glue the block to the foredeck when the paint is dry. Glue the parts of the rescue floats (222) together in pairs in order to obtain a thickness of 6 mm. When the glue has set hard, profile the floats as shown on the plan. Apply several coats of GLATTFIX sanding sealer, and when dry apply orange paint. **NOTE**: vacuum-moulded lifebelts (222a) can now be installed as an alternative. They are fitted by gluing a scrap of ABS material (222b) to the rear face using UHU acrylit; when the glue is hard, clean up the edges and sand them to a slightly rounded profile. Finally the floats can be attached to the railings and handrails using 0.5 mm Ø thread. Make up small bundles of rope (223) - (225) from pieces of thread about 150 mm long (see also Fig. 12). Assemble the parts of the anchor capstan and trim the finished unit to the shape shown on the plan. Paint it the appropriate colour and glue it at the location shown.

Glue the fairleads and bollards (226) - (228) to the model's deck. Cut short mounting pins from 1.5 mm Ø mild steel rod (230) and glue them in the hubs of the four handwheels (229); they should be fitted in the holes in the manhole covers. Glue the smaller handwheels (231) in a hole in the torpedo tube breeches. Bend the crank (232) to shape from brass wire and fit this above the torpedo tubes, between the two instrument decals. A blob of solder on the end of the crank simulates a handle. Glue together the liferaft shells (233) in pairs and fix them to their plywood supports. Mount them on the deck and engine room as shown on the plan. Modify the top of the two navigation lanterns (235) as shown on the plan (remove the ring and mount) and glue them in the corners of the lantern brackets. Glue the plywood in-fill piece (236) to the rear face of each lantern bracket as shown. Paint these parts cream when the glue has set hard. Paint the coloured areas as directed, and glue the lantern assemblies to the bridge superstructure. The typhoon (237) is mounted above the right-hand (starboard - green) navigation lantern. The double typhoon should be cut in half; only one part is required for this model. Paint the morse lamp (238) red, and glue it to the mast support together with the red lamps (239); the holes for these should be drilled from the side.

Fig. 11: view of the completed midship area showing the full set of scale details. Note in particular the radome platform.

Fig. 12: view of the aftership. The wealth of scale details on the deck is clearly visible.

Make up the two aerial supports (240) from brass wire, solder the parts together and paint them cream. Drill three 1 mm Ø holes on each side of the deck, glue the supports in place, and file off the excess wire length when the glue is dry. Attach a length of thin thread to the top curved part of this support and run it to the cross-piece (58). Loop the end around the angle hook (99) attached to the cross-piece. From the S-hook (also attached to the same cross-piece) run another length of thread to the cleat (157). From the cleat adjacent to this run a length of thread up to the mast yard and back to the same cleat again. This forms the flag halyard; locate the group pennant (flag), fold it over and stick it to the halyard below the yard. Attach the flag halyards to the other two flagstocks (running from the bottom hook to the top hook and back again), and attach the appropriate flags to them. The BUNDESDIENSTFLAGGE (Federal Service flag) should be fitted to the stern of the model, the DIENSTFLAGGE DER SEESTREITKRAEFTE (Naval Forces Service flag) on the engine room. Attach two retaining ropes (0.5 mm Ø thread) to the rear loops (22) of the foredeck handrail (219), and belay (fix) the rope ends to the cleats glued to the breakwater. **TIP**: the flags look very realistic if you can bend or roll them into a slightly wavy shape. Simply take a look at any full-size flag to get an idea of a realistic wave form.

Use a pair of scissors to cut off the excess material from the top and bottom sections of the inflatable boat (241), (242), and file the cut edges smooth. The two parts must be trimmed to fit very accurately, otherwise it will not be possible to glue them together. The best method of joining the shells is to place the two parts together and apply a piece of adhesive tape about 50 mm long along one side, positioned exactly in the centre, i.e. along the straight joint line. Now open up the two shells using the tape as a temporary hinge, apply glue to the joint edges and fold the parts together again. Apply another piece of tape to the glued side to hold the shells together until the glue had set hard. When the joint is dry remove the tape and carefully file off the excess glue. The inflatable boat can now be painted. The correct colour is stated in the section “Colour scheme”. When the paint is dry, invert the inflatable boat, place it on the engine room and secure it with thread (crossed over, as shown in the photograph) running through the holes in the inflatable boat supports. Modify the two masthead lanterns (243) as shown on the plan and glue them to the deckbox (162) and the radar platform (95).
Coils of rope (thread) should be positioned at strategic locations on the deck, forward of the double cruciform bollards. Coiling the thread on the deck is difficult, so the following procedure should be adopted: wind up 1 mm Ø thread to form a neat coil, and glue it to a piece of paper or double-sided adhesive tape; the diameter of

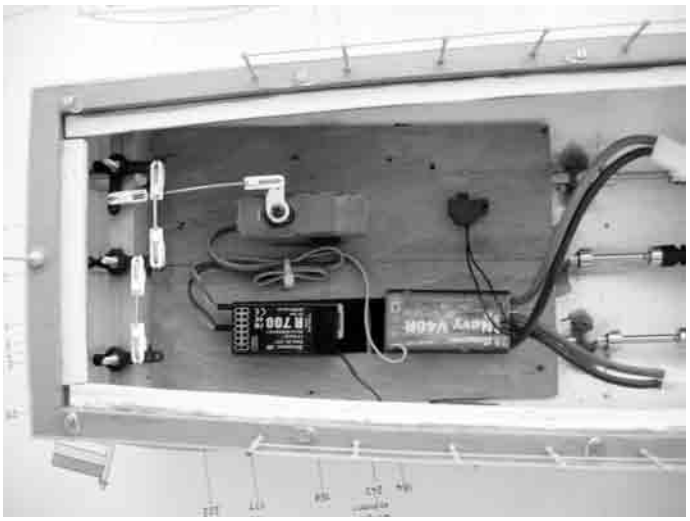
the coil should be about 15 mm. When the glue (if used) has hardened, cut off the excess paper and stick the coil of rope to the deck, paper side down. Loop the outer end of the rope around the double cruciform bollard. These details make a major contribution to the WIESEL motor torpedo boat's realistic scale appearance.

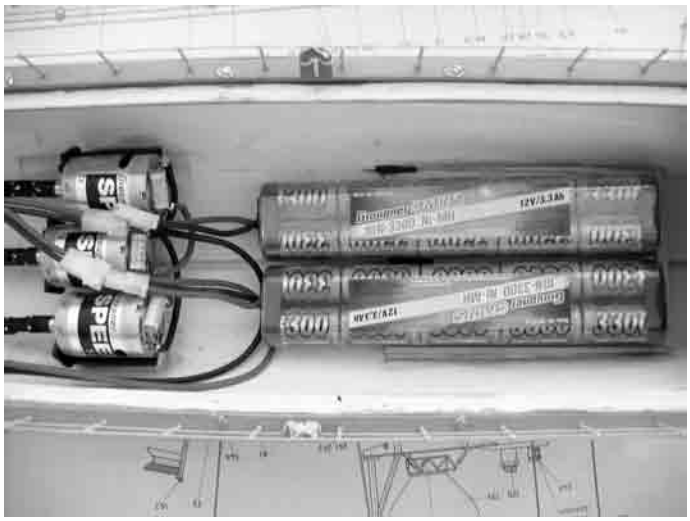
Information on the full-size vessels:
In the photographs of the ZOBEL-class motor torpedo boats which we have seen the guns are always directed with the barrels facing fore-and-aft, and at an elevation of about 20° so that crew members can walk under the barrels without having to bend down. All the outer handrails are fitted with a grey tarpaulin (colour similar to that of the superstructure), cut away square in the area of the bollards. The tarpaulin is also attached to the stern railing. The tarpaulin can easily be represented on the model using 0.5 mm thick ABS sheet, although perhaps a better alternative is to make it from paper; paper enables you more easily to represent the characteristic folds in the fabric: moisten the paper and place it over the handrail. Leave the model propped up on its side, so that the railing stanchions and handrails push the paper out of shape. When the paper is dry, paint and seal it to make it waterproof. The completed tarpaulin can then be glued or sewn in place as on the full-size boats.

Instructions for installing the RC system components
The actual RC installation plan is incorporated into the main drawing, and shows the position of the RC components for the standard running functions together with the accessories required for the optional auxiliary working systems. The wooden parts and other small components for the standard functions are included in the kit, and only need to be cut out or trimmed and installed. The parts required for the extra working systems are not included; you must obtain them separately or make them up from scrap wood. These instructions do not describe every single step involved in making the RC system supports and installing the RC system components; these are standard procedures, and we assume that the builder of this type of model will be familiar with them.

- The RC plan should only be considered as a guide for selecting and positioning the RC system components. Alternative items can easily be used for the standard running functions and auxiliary working systems at the builder's discretion.
- The rudder servo should be placed in a piece of heat-shrink sleeving which is then shrunk round it. The sleeve can then be glued to the RC installation plate. This is a simple and effective method of mounting servos, but if you wish to switch servos from one model to another, you can use plastic servo mounts (e.g. Order No. 1024) as an alternative; these are not included in the kit.
- The remaining RC system components, such as receiver, speed controller and batteries, should be attached to the model using Velcro (hook-and-loop) tape. It is particularly important to fix the heavy drive batteries in place securely; if these should shift and alter the boat's Centre of Gravity, the model could easily capsize.
- The maximum payload of 2.6 kg should not be exceeded, and the boat's Centre of Gravity should always be as low as possible; this means: don't locate any heavy components above the waterline.
- If the model does not float at the correct depth or attitude in the water, your first recourse should always be to re-position the drive batteries to correct the problem. Only if this is not sufficient, or if the boat is not low enough in the water, should you install ballast - such as lead sheet - in the lowest part of the model. To be on the safe side we recommend that you test the completed model by holding it at an angle of heel of about 30° in both directions. Release it, and the boat should right itself easily and reliably, without rocking from side to side.
- The wiring diagram shown on the plan represents the version using a NAUTIC Multi-Split module.
- As far as possible we recommend that you plan the installation of the auxiliary functions, such as lighting system and rotating radar antenna, before you start building the model, as the extra equipment may be difficult or even impossible to install at a later stage.
- Ensure that the servos are not mechanically obstructed before they reach their end-points (a typical problem would be that the rotary gun mechanism hits its end-stop before the servo reaches maximum travel). If you cannot adjust the mechanism to meet this requirement, reduce the servo travel using the servo travel adjustment facility on your transmitter (mc-series computer transmitters).
- The two servos used for the gun rotation function can be controlled in common if you wish - this is the method suggested in the function assignment section - or separately. In the latter case you need one extra radio channel.
- To control the auxiliary working systems, such as lighting system and rotating radar antenna, we recommend the use of RC switches (e.g. Order No. 3294) or micro-switches (e.g. Order No. 3757), which are servo-actuated.

- The photographs below show an earlier model of the WIESEL converted to house more modern equipment. The photos are only intended as a guide to help you estimate the position of the RC system components and drive batteries. Please note: the drive batteries are not connected!





Optional auxiliary working systems

Auxiliary function	Accessories required	Notes on installation and operation
Sound module	POLICE BOAT sound module (Order No. 2460), loud-speaker (Order No. 2354), power supply: from main drive batteries	The loudspeaker must be positioned with the outside cone making no direct contact with the inside cone (acoustic short-circuit); this can be compared to a loudspeaker cabinet. We recommend fitting the speaker under the deck in the area of the small rear superstructure. Cut a few concealed openings over the speaker so that the sound waves can escape unhindered.
Lighting system	Navigation lamps (Order No. 396.10), masthead lamp and stern lamp (Order No. 604), power supply: two NC packs of any capacity (e.g. Order No. 3621) wired in series. The slight reduction in voltage increases the life expectancy of the miniature bulbs.	The lamp housings are supplied in the kit, although they need to be modified slightly to allow the bulbs to be fitted. Ensure that the heat generated by the bulbs can escape, e.g. through small holes, other-wise the housings could melt. All four lamps should be switched on when the boat is running. Extra lights can be installed at the builder's discretion.
Rotating guns	Two C 577 servos (Order No. 4101), two output arms (Order No. 2400), 3 mm Ø brass rod (Order No. 1138.3,0), 4 / 3 mm Ø aluminium tube (Order No. 751.2)	Fix a piece of 3 mm Ø brass rod in the pivot axis of the guns. This runs in a suitable sleeve in the deck and is connected to the servo using the output arm. In use the guns should be rotated as slowly as possible.
Rotating radar antenna	3V mini geared motor for radar antenna (Order No. 1752), power supply: the battery for the lighting system can be used. A battery of higher capacity can be fitted if necessary.	To actuate the radar antenna use a length of very thin steel wire, glued into the rotary section of the antenna. Route the wire through the super-structure and connect it to the geared motor. This can be done by soldering an M2 threaded coupler to the wire (e.g. Order No. 3526), and screwing this into the geared motor connection. The motor can be mounted on scrap ABS. **IMPORTANT**: the wire and the antenna should be as free-moving as possible, otherwise the antenna will jerk about when the boat is running.

Typical RC system connections for the auxiliary systems

Function assignment (version excl. NAUTIC module):

Function 1	Speed controller, motor speed
Function 2	Servos for rotating the guns (connect using Y-lead, Order No. 3936.11)
Function 3	Vacant: for any other auxiliary working system at the builder's discretion
Function 4	Rudder servo
Function 5	Switch servo (Order No. 4151) for SOUND module
Function 6	Vacant: for any other auxiliary working system at the builder's discretion
Function 7	Vacant: for any other auxiliary working system at the builder's discretion

Function assignment (version incl. NAUTIC Multi-Split module, Order No. 4138 or 4140):

Function 1	Speed controller, motor speed
Function 2	Vacant: for any other auxiliary working system at the builder's discretion
Function 3	Vacant: for any other auxiliary working system at the builder's discretion
Function 4	Rudder servo
Function 5	Vacant: for any other auxiliary working system at the builder's discretion
Function 6	Vacant: for any other auxiliary working system at the builder's discretion
Function 7	Socket for connecting the NAUTIC Multi-Split decoder, Order No. 4139

Assignment of sockets on 1/5K NAUTIC Multi-Split decoder, Order No. 4139

Socket A	Vacant: for any other auxiliary working system at the builder's discretion
Socket B	Vacant: for any other auxiliary working system at the builder's discretion
Socket C	SOUND module (socket D)
Socket D	Servo for rotating the front gun (socket P)
Socket E	Servo for rotating the rear gun (socket P)

Note (all versions): extension leads may be required for some servos, but we cannot state actual requirements as this varies according to the location of the servos in your model.

You will also need the following items (not included in the kit):

3 x SPEED 500 E electric motor, Order No. 1788
2 x Suppressor capacitor, Order No. 3588 (packs of two)
1 x NAVY V 40R speed controller, Order No. 2875
2 x SANYO 10N-2400 RC 12 V/2.3 Ah drive battery, Order No. 2475
or
2 x GMVIS 10N-3300 NiMH 12 V/3.3 Ah drive battery, Order No. 2474.10
1 x G2 parallel cable, Order No. 3061
1 x copper flex cable, 2m, Order No. 3389
1 x G2 connector system, Order No. 2989
Other accessories, such as Y-leads, switch harness, servo extension leads, connectors etc. are not listed here in detail, as they vary according to the specific components and systems installed by the builder.

Radio control system

1 x MC-10 radio control set, Order No. 4721
or
1 x MC-12 radio control set, Order No. 4725
Other Graupner/JR FM computer radio control systems on the 40 MHz band are also suitable.

Optional accessories for the auxiliary working systems

These items are listed in the table which describes the optional auxiliary working systems which can be installed in this model; these parts are not included in the kit and must be acquired separately. Other essential accessories, such as connectors, cables etc. are not listed individually here, and must be assembled separately at the builder's discretion.

Maiden run

Charge up the batteries and check each working system in turn. Carry out a range check with the model. You should now be confident about running the boat for the first time. Keep the speed down to a moderate level initially until you feel familiar with the boat's handling characteristics.

We hope you have many hours of pleasure building and running your model of the WIESEL.

Parts List

Part No.	Description	No. off	Material	Dimensions in mm
1	Hull	1	Plastic	Vac. moulded
2	Transom	1	Plastic	Vac. moulded
3	Propeller guard	2	Plastic	Vac. moulded
4	Rudder system	3	Ready made	Order No. 430.35
5	Rudder support	1	Plywood	1.5, as plan
6	Tiller	1	Ready made	Order No. 2400
6a	Collet	3	Plated brass	
7	Socket-head screw	3	Ready made	
7a	Rudder pushrod	3	Steel rod	1.5 Ø, overlength
7b	Retainer clip	6	Plastic	Ready made
8	Centre motor console	1	Plywood	4.5, as plan, (3-part)
9	Outer motor console	2	Plywood	4.5, as plan, (2-part)
10	Plastic motor mount	3	Plastic	Order No. 1157.2
11	Propeller shaft and stern tube	3	Ready made	Order No. 411
12	Stern tube bracket	3	Ready made	Order No. 2997.6
13	Stern tube brace	3	Plastic	1, as plan
14	Outer propeller	2	Ready made	32 Ø, R.H. rotation
15	Central propeller	1	Ready made	32 Ø, L.H. rotation
16	Lubricating sleeve	3	Silicone tube	5 / 3 Ø x 80 long
17	Double cruciform coupling	3	Ready made	Order No. 354
18	Battery console	1	Plywood	1.5, as plan
19	Retaining strip	7	Spruce	750 x 5 x 3 overall
20	Front deck section	1	Plywood	1.5, as plan
21	Front side deck	2	Plywood	1.5, as plan
22	Rear side deck	2	Plywood	1.5, as plan
23	After deck section	1	Plywood	1.5, as plan
24	Rear deck former	2	Plywood	3, as plan
25	Centre deck former	2	Plywood	3, as plan
26	Front deck former	1	Plywood	3, as plan
27	Deck girder	1	Spruce	230 x 6 x 6
28	Spacer former	1	Plywood	3, as plan
29	Inner fore-and-aft rail	2	Spruce	670 x 7 x 2
30	Outer fore-and-aft rail	2	Spruce	670 x 6 x 6
31	Front support	2	Plywood	1.5, as plan
32	Rear support	2	Plywood	1.5, as plan
33	Front cross-piece	1	Plywood	1.5, as plan
34	Rear cross-piece	1	Plywood	1.5, as plan
35	Front centre section	1	Plywood	1.5, as plan
36	Rear centre deck	1	Plywood	1.5, as plan
37	Transverse former	2	Plywood	3, as plan
38	Transverse former	2	Plywood	3, as plan
39	Transverse former	2	Plywood	3, as plan
40	Transverse former	2	Plywood	3, as plan
41	Transverse former	2	Plywood	3, as plan
42	Transverse former	1	Plywood	3, as plan
43	Transverse former	1	Plywood	3, as plan
44	Fore-and-aft rail	2	Spruce	650 x 5 x 3
45	Reinforcement	2	Spruce	45 x 5 x 3
46	Spacer strip	1	Spruce	160 x 5 x 3
47	Foredeck	1	Plywood	1, as plan
48	Foredeck girder	1	Spruce	180 x 6 x 6
49	Breakwater	2	Plastic	Vac. moulded
50	Cover	1	Plywood	1, as plan
51	Cross-piece	1	Plywood	1, as plan
52	Centre fore-and-aft member	1	Plywood	1, as plan
53	Outer fore-and-aft member	1	Plywood	1, as plan
54	Angled part	1	Plywood	1, as plan
55	Spacer plate	1	Plywood	3, as plan

56	Transverse panel	1	Plywood	1, as plan
57	Transverse rail	5	Spruce	370 x 6 x 5 overall
58	Support plate	2	Plywood	3, as plan
59	Bridge superstructure plate	1	Plywood	1, as plan
59a	Command seat	2	Plastic	Vac. moulded
59b	Seat base	2	Beech dowel	16 x 4 Ø
60	Fillet strip	5	Spruce	90 x 5 x 3 overall
61	Spacer plate	1	Plywood	1, as plan
62	Spacer plate	2	Plywood	1, as plan
63	Spacer plate	2	Plywood	1, as plan
64	Side panel plate	2	Plywood	1, as plan
65	Bridge superstructure	1	Plastic	Vac. moulded
66	Engine room	1	Plastic	Vac. moulded
67	Spacer plate	1	Plywood	3, as plan
68	Companionway string	4	Plywood	1, as plan
69	Step tread	8	Plywood	1, as plan
70	Platform	2	Plywood	1, as plan
71	Aft ventilator section	1	Plastic	Vac. moulded
72	Top piece	1	Plastic	Vac. moulded
73r/l	Exhaust pipe shell	2	Plastic	Vac. moulded
74	Bridge handrail	3	Brass wire	210 x 1 Ø overall
75	Handrail stanchion	3	Ready made	10 x 1 Ø (split pin)
76	Engine room handrail	2	Brass wire	200 x 1 Ø overall
77	Handrail stanchion	6	Ready made	10 x 1 Ø (split pin)
78	Railing	1	Brass wire	320 x 1 Ø
79	Front door	1	Plywood	1, as plan
80	Rear door	2	Plywood	1, as plan
81	Inflatable boat support	2	Plywood	1, as plan
82	Platform brace	4	Beech dowel	50 x 4 Ø
83	Flange	4	Plywood	1, as plan
84	Platform	1	Plywood	1, as plan
85	Flange brace gusset	4	Plywood	1, as plan
86	Flange brace gusset	4	Plywood	1, as plan
87	Flange brace gusset	8	Plywood	1, as plan
88	Bottom brace gusset	2	Plywood	1, as plan
89	Front transverse reinforcement	1	Plywood	1, as plan
90	Rear transverse reinforcement	1	Plywood	1, as plan
91	Centre side reinforcement	2	Plywood	1, as plan
92	Rear side reinforcement	2	Plywood	1, as plan
93	Front side reinforcement	2	Plywood	1, as plan
94	Gusset	2	Plywood	1, as plan
95	Radar platform (2-part)	1	Plywood	3, as plan
96	Fore-and-aft brace	1	Spruce	41 x 2 x 2
97	Diagonal strut	2	Beech dowel	35 x 3 Ø
98	Cross-piece	1	Brass tube	90 x 2 Ø x 1.2 Ø
99	Angle hook	2	Brass wire	20 x 0.5 Ø
100	S-hook	2	Brass wire	20 x 0.5 Ø
101	Ladder	1	Brass wire	150 x 1 Ø
102	Lower mast	2	Beech dowel	95 x 4 Ø
103	Cross-piece	1	Beech dowel	12 x 4 Ø
104	Upper mast	1	Beech dowel	40 x 3 Ø
105	Yard	1	Brass tube	58 x 2 Ø x 1.2 Ø
106	Aft outrigger	1	Brass tube	20 x 2 Ø x 1.2 Ø
107	Brace	1	Plated steel rod	25 x 1.5 Ø
108	Cross-piece	1	Brass tube	14 x 2 Ø x 1.2 Ø
109	Alarm aerial	3	Brass tube	8 x 2 Ø x 1.2 Ø
110	Washer	3	Brass	7 Ø, Order No. 560.3
111	Radiator	24	Brass wire	340 x 0.5 Ø overall
112	Holder	3	Brass wire	50 x 1 Ø overall
113	Special aerial	1	Brass wire	90 x 0.5 Ø
114	Washer	1	Brass	4.5 Ø, Order No. 560.2

115	Holder	1	Brass tube	10 x 2 Ø x 1.2 Ø
116	Lamp support	1	Brass wire	30 x 1 Ø
117	Lamp holder	1	Plated steel rod	20 x 1.5 Ø
118	Mast flange	2	Plywood	1, as plan
119	Mast strut	2	Beech dowel	90 x 3 Ø overall
120	Mast strut flange	2	Brass	6 Ø, Order No. 560.6
121	Shaped mast (5-part)	1	Plywood	7.5, as plan
122	Lower rotating section	1	Beech dowel	16 x 8 Ø
123	Disc	1	Plywood	1, as plan
124	Upper rotating section	1	Beech dowel	12 x 10 Ø
125	Platform	1	Plywood	1, as plan
126	Strut	2	Plywood	1, as plan
127	S-hook	2	Brass wire	10 x 0.5 Ø overall
128	Radar antenna case (3-part)	1	Plywood	4.5, as plan
129	Motor flange (3-part)	1	Plywood	3, as plan
130	Motor housing	1	Beech dowel	9 x 10 Ø
131	Frame side section	3	Brass wire	70 x 1 Ø
132	Frame top section	1	Brass wire	110 x 1 Ø
133	Frame bottom section	1	Brass wire	100 x 1 Ø
134	Inner frame	1	Brass wire	90 x 1 Ø
135	Angled frame section	3	Brass wire	90 x 1 Ø
136	Flexible section	6	Brass tube	8 x 2 Ø x 1.2 Ø
137	Support washer	3	Brass	4.5 Ø, Order No. 560.2
138	Support plate	1	Plywood	1, as plan
139	Radome bottom section	1	Plastic	Vac. moulded
140	Radome top section	1	Plastic	Vac. moulded
141	Spacer plate	1	Plywood	1.5, as plan
142	Flagstock	1	Plated steel rod	65 x 1.5 Ø
143	S-hook	2	Brass wire	12 x 0.5 Ø overall
144	Aerial base	2	Brass tube	20 x 2 Ø x 1.2 Ø
145	Aerial	2	Steel wire	150 x 0.8 Ø
146	Connector box	1	Plastic	Vac. moulded
147	Aerial box	1	Plastic	Vac. moulded
148	Aerial base	1	Brass tube	30 x 2 Ø x 1.2 Ø
149	Protective sleeve	1	Brass tube	15 x 3 Ø x 2.2 Ø
150	Aerial	1	Steel wire	220 x 0.8 Ø
151	Aerial base	1	Brass tube	20 x 2 Ø x 1.2 Ø
152	Aerial	1	Steel wire	150 x 0.8 Ø
153	Glazing panel	7	Celluloid	0.5, as plan
154	Windscreen	1	Celluloid	0.5, as plan
155	Nameplate	2	Plywood	1, as plan
156	Base	2	Plywood	1, as plan
157	Cleat	6	Plastic	Order No. 440
158	Toolbox	1	Plastic	Vac. moulded
159	Toolbox	3	Plastic	Vac. moulded
160	Box bottom panel	3	Plywood	3, as plan
161	Box lid handle	9	Brass wire	100 overall
162	Deck box	1	Plastic	Vac. moulded
163	Manhole cover	4	Plastic	Vac. moulded
164	Equipment box	1	Plastic	Vac. moulded
165	Handrail	2	Brass wire	140 x 1 Ø
166	Floor	1	Plywood	3, as plan
167	Deck box	1	Plastic	Vac. moulded
168a/b	Torpedo tube half-shell	4	Plastic	Vac. moulded
169	Torpedo breech cover	2	Plastic	Vac. moulded
170	Hinge	2	Plastic	Vac. moulded
171	Box	2	Plastic	Vac. moulded
172	Hatch box	2	Plastic	Vac. moulded
173	Hatch	2	Plywood	1, as plan
174	Hinge	4	Plywood	1, as plan
175	Shaft	2	Beech dowel	13 x 4 Ø

176	Small box	2	Plastic	Vac. moulded
177	Torpedo plinth	4	Plastic	Vac. moulded
178	Rear gun fairing	1	Plastic	Vac. moulded
179	Rear gun cowl	1	Plastic	Vac. moulded
180	Front gun fairing	1	Plastic	Vac. moulded
181	Front gun cowl	1	Plastic	Vac. moulded
182	Splinter guard	2	Plastic	Vac. moulded
183	Barrel support	2	Brass tube	16 x 2 Ø x 1.2 Ø
184	Retaining tube	2	Brass tube	10 x 3 Ø x 2.2 Ø
185	Washer	4	Brass	6 Ø, Order No. 560.6
186	Frame section	4	Brass wire	40 x 1 Ø
187	Sleeve guide (2-part)	8	Plastic	
188	Compensator (2-part)	4	Plywood	3, as plan
189	Spacer (2-part)	2	Plywood	3, as plan
190	Trunnion	4	Plywood	1, as plan
191	Elevation quadrant (4-part)	2	Plywood	6, as plan
192	Barrel recoil jacket	2	Beech dowel	20 x 6 Ø
193	Automatic loader (2-part)	2	Plywood	2, as plan
194	Gun barrel	2	Brass tube	60 x 3 Ø x 2.2 Ø
195	Gun muzzle damper	2	Beech dowel	7 x 6 Ø
196	Gun sight holder	2	Brass tube	38 x 2 Ø x 1.2 Ø
197	Gun sight	4	Brass tube	4 x 3 Ø x 2.2 Ø
198	Fore-and-aft pivot pin	2	Plated steel rod	50 x 1.5 Ø overall
199	Transverse pivot pin	2	Plated steel rod	30 x 1.5 Ø overall
200	Seat plate	4	Plywood	1, as plan
201	Central column	4	Beech dowel	12 x 3 Ø
202	Base plate	4	Plywood	1, as plan
203	Seat backrest	4	Plastic	Vac. moulded
204	Torpedo support (2-part)	6	Plywood	3, as plan
205	Torpedo support (2-part)	2	Plywood	3, as plan
206	Torpedo support rail	8	Spruce	80 x 2 x 2
207	Mushroom ventilator	4	Plastic	Vac. moulded
208	Central column	4	Beech dowel	11 x 6 Ø
209	Flange	4	Plywood	1, as plan
210	Railing stanchion	44	Ready made	Order No. 450.3
211	Side railing	4	Steel wire	700 x 0.8 Ø
212	Aft railing	2	Steel wire	400 x 0.8 Ø overall
213	Swivel latch	14	Plastic	Ready made
214	Countersunk woodscrew	14	Plated brass	2 x 7, DIN 97
215	Sealing tape	1	Plastic	Ready made
216	Flagstock	1	Plated steel rod	70 x 1.5 Ø
217	Washer	1	Brass	4.5 Ø, Order No. 560.2
218	S-hook	2	Brass wire	12 x 0.5 Ø overall
219	Foredeck handrail	1	Brass wire	80 x 1 Ø
220	Loop	2	Brass wire	10 x 0.5 Ø overall
221	Block	1	Wood	Ready made
222	Rescue float	6	Plywood	6, as plan
222a	Rescue float	6	Plastic	Vac. moulded
222b	Rear face of rescue float 222a	1	Plastic	Vac. moulded
223	Anchor capstan, bottom (3-part)	1	Plywood	4.5, as plan
224	Anchor capstan, middle	1	Beech dowel	6 x 6 Ø
225	Anchor capstan, top	1	Beech dowel	3 x 8 Ø
226	Fairlead	2	Ready made	Order No. 303.3
227	Bollard	1	Ready made	Order No. 301.1
228	Double cruciform bollard	10	Ready made	Order No. 436
229	Handwheel	2	Plastic	Ready made
230	Retaining pin	4	Plated steel rod	20 x 1.5 Ø
231	Handwheel	2	Plastic	Ready made
232	Crank	2	Brass wire	25 x 1 Ø overall
233	Liferaft shell	6	Ready made	Order No. 323
234	Support	6	Plywood	3, as plan

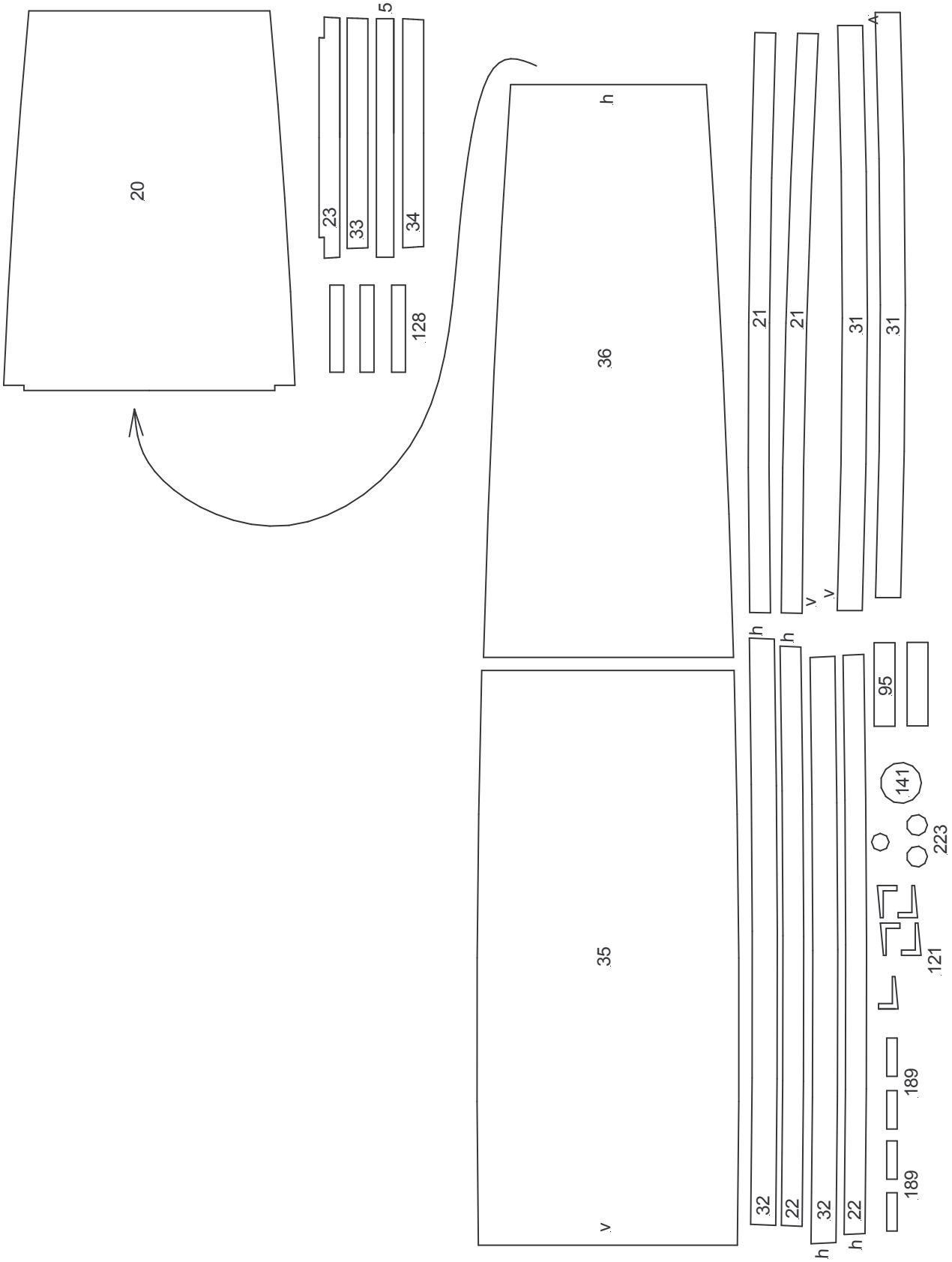
235	Navigation lantern	Pair	Ready made	Order No. 396
236	Lantern in-fill piece	2	Plywood	3, as plan
237	Typhoon (horn)	1	Ready made	
238	Morse lamp (red)	1	Ready made	
239	Lamp (red)	1	Ready made	
240	Aerial support	2	Brass wire	200 x 1 Ø overall
241	Inflatable boat, bottom	1	Plastic	Vac. moulded
242	Inflatable boat, top	1	Plastic	Vac. moulded
243	Masthead lantern	2	Ready made	

The Parts List includes some components which are not included in the kit. These parts must be acquired separately.

Key to strip, wire and rod for the WIESEL

No. off	Material	Dimensions in mm	Required for parts:
1	Spruce	1000 x 2 x 2	96, 206
2	Spruce	1000 x 7 x 2	29
4	Spruce	1000 x 5 x 3	19, 44, 45, 46, 57, 60
2	Spruce	1000 x 6 x 6	27, 30, 48
1	Beech dowel	500 x 3 Ø	97, 104, 119, 201
1	Beech dowel	1000 x 4 Ø	82, 102, 103, 175
1	Beech dowel	200 x 6 Ø	192, 195, 208, 224
1	Beech dowel	50 x 8 Ø	122, 225
1	Beech dowel	50 x 10 Ø	124, 130
1	Beech dowel	50 x 16 Ø	Gluing jig
1	Brass wire	1000 x 0.5 Ø	99, 100, 111, 113, 127, 143, 161, 218, 220
3	Brass wire	1000 x 1 Ø	74, 76, 78,101, 112, 116, 131, 132, 133, 134, 135, 165, 186, 219, 232, 240
5	Steel wire	1000 x 0.8 Ø	145, 150, 152, 211, 212
1	Plated mild steel rod	500 x 1.5 Ø	107, 117, 142, 198, 199, 216, 230

The table above states the parts for which the strip and wire supplied in the kit are required. All stated sizes are slightly oversize.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