



## SUBMARINE Type VII b

Technical data	of the original	of the model:
Scale	1:1	1:60
Length	66.5 m	1120 mm
Width	6.2 m	125 mm
Height (keel to top edge of tower)	9.5 m	170 mm

### Building Instructions

Congratulations on your purchase of this construction set. The submarine type VII was probably one of the most built submarines in the world. In its time it set the standard and became very successful. We hope that you will have a lot of fun building this model - either as a display version or a fully functional diving model.

With this construction set you can either build a pure display model without any additional kit or a fully functional diving model using the dive and drive set (Order no. 10311) which includes a flood tank and pump. The diving rudders fore and aft were enlarged somewhat for the functional version in comparison with the scale. Also, some covers on the hull of the diving model were designed to be removable, which, on the standard version, do not, of course, have to be cut open. These instructions apply to both models - any differences are clearly described.

### You also need the following material to build the standard model:

- ABS special adhesive, order no. 80478
- Fast adhesive "Ruck-Zuck", order no. 80492
- UHU "plus endfest" 300 adhesive, order no. 45640
- UHU "plus Acrylit", order no. 48315
- UHU "allplast", order no. 48410
- Spray lacquer, colours light grey and dark grey
- Small pots of paint (Humbrol or similar), black
- Lead ballast strips, 60 g, order no. 60107 (2 off)

### We recommend the following tools for the construction:

- Sharp and strong model building knife, order no. 416002
- Replacement blades for the knife, order no. 420019
- Drill bits, sizes 1 mm, 1.5 mm, 2 mm, 3 mm, 4 mm, 5 mm and possibly 7 mm
- Metal ruler
- Sanding block and sanding paper, various grades
- Round and flat files

### **The Material:**

The plastic used in this model set is 95% pure, impact-resistant ABS plastic. This material has a very long life and will not become porous quickly like some other plastics. We have been using this material for over 20 years in our production and, with the outside of the model lacquered, had the best results with it. The best adhesive for this material is the Krick ABS special adhesive (order no. 80478). This adhesive dissolves the ABS very slightly and virtually welds the components together. However, due to its many small details, the deck could not be manufactured from ABS. We have used polystyrene plastics instead.

**Important: When gluing, please note that polystyrene (i.e. the deck) cannot be glued using the ABS adhesive.** The adhesive will not solve this material. In order to connect ABS with polystyrene, "UHU allplast" or an epoxy adhesive should be used. Please make absolutely sure that you use this.

### **Cutting out the ABS Components:**

In order to find the correct cutting edge, please look very closely at the drawings in these instructions. Black-and-white triangular arrows show exactly from which side any edge should be cut with the knife. The remainder is always shown as hatched on the drawing. Carefully score the edge several times, then carefully break off the components. If large residues remain around the component, first cut off the steep walls of the residues before getting to the actual component. Take particular care on corners. It is better to score several times until the material is almost cut through otherwise cracks could develop into the components which are uncontrollable because plastic does not have a structure or directional fibres. Keep the remaining scrap bits, in particular the long straight strips of the hull components. This is not waste material, some components are actually made from the strips of this residue.

### **The Dive and Drive Kit (Order no. 20311):**

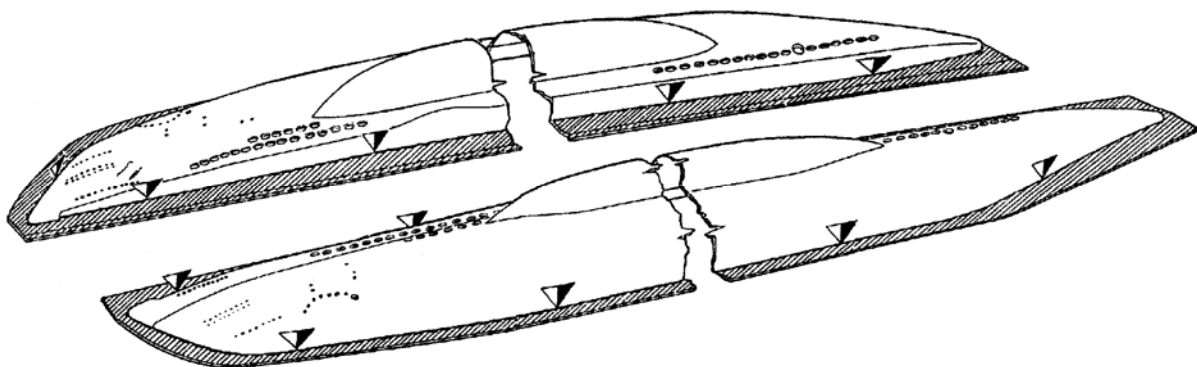
This kit contains all the parts you need to build a functional diving model, except the radio remote control, drive control and batteries. Some parts are also found in the basic kit which are put there simply because it is easier to pack them there. You can quite easily tell which parts are in which kit by the markings in the item list at the end of these instructions.

Besides the drive and dive kit, you also need the following items for the operation with remote control:

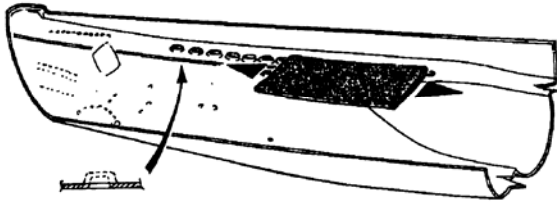
- Remote radio control, minimum 4 channels
- Drive control 12 V, 30 Amp, forward-reverse
- Drive control or forward-reverse switch to operate the pump
- Battery pack of 10 NiCd cells (recommended: min. 1300 mAh). Two battery packs of 2 times 5 cells, or 4 and 6 cells have proven to be better for easier installation and removal.

### **Step 1**

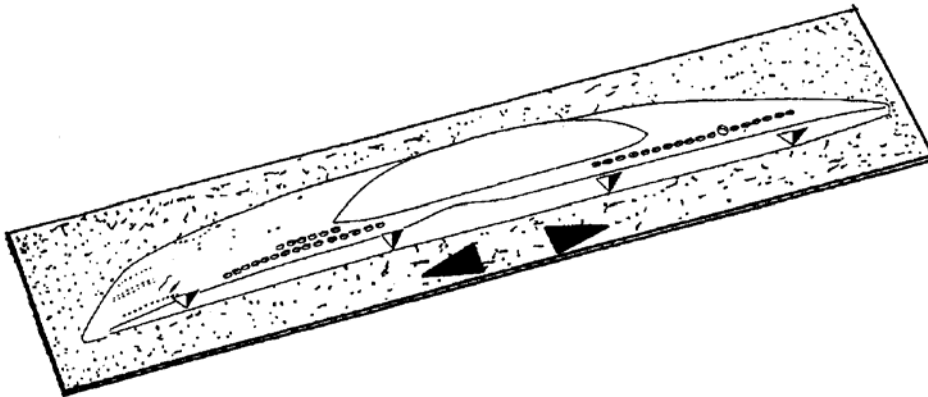
Cut out the hull halves (1 & 2) from the outside, as shown. First you cut off the large side walls of the remaining material in order to obtain pieces that are easier to handle. Then score from the outside of the hull in the edge of the hull component as per the drawing and carefully bend off the remaining material.



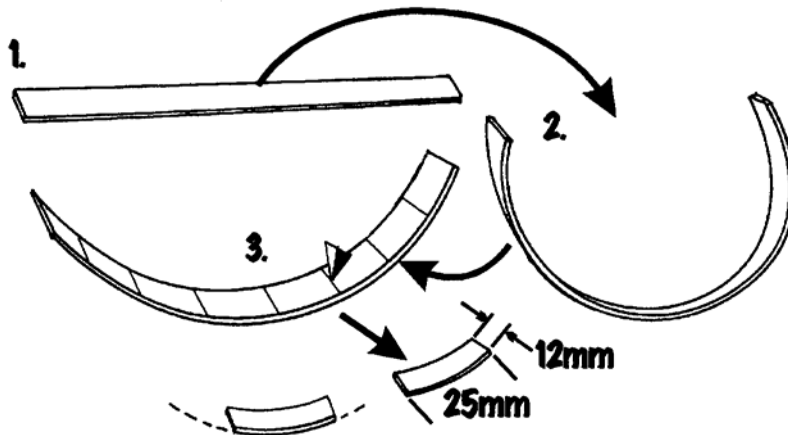
Using first fine and then coarse sanding paper, sand the flood apertures that are raised from the inside and the details. Sand down to the wall. When building the display models, we also recommend sanding the apertures, but unlike in the powered model where they are to remain open, they are then closed again from the rear using a black lacquered component. This, in our view, makes the apertures look tidier rather than just leaving them closed and only painting them over.



Using fine sandpaper that is glued to a larger level plate, sand the edges absolutely level so that the two hull halves fit precisely when glued together. Use this technique on all cut-out components.

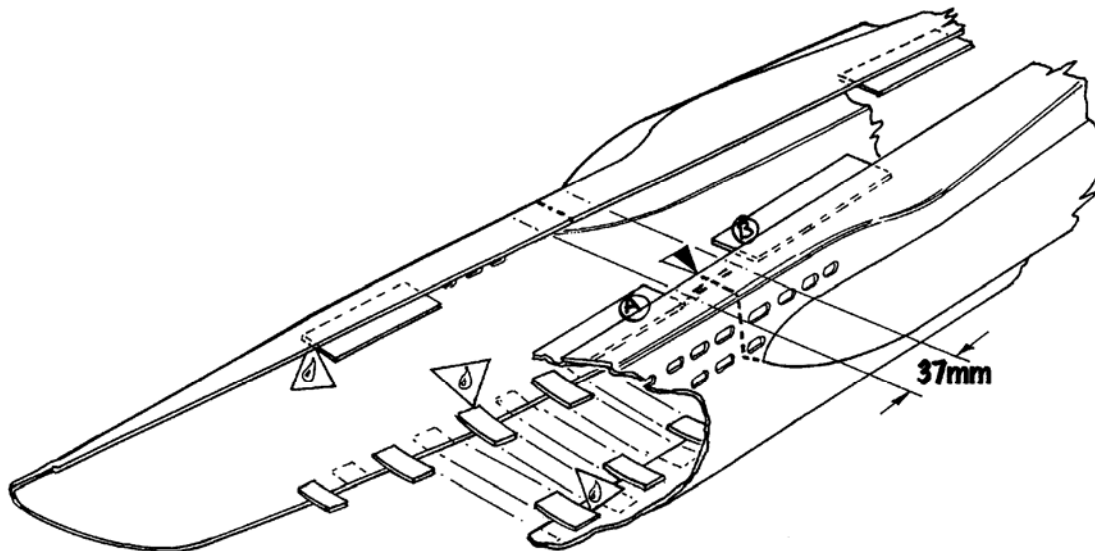


Bend some strips of 12 x 1.5 mm ABS so as to follow the contours of the hull radius. Cut these into 40 pieces of 25 mm length each (3). They will be glued to the interior of the lower hull half.

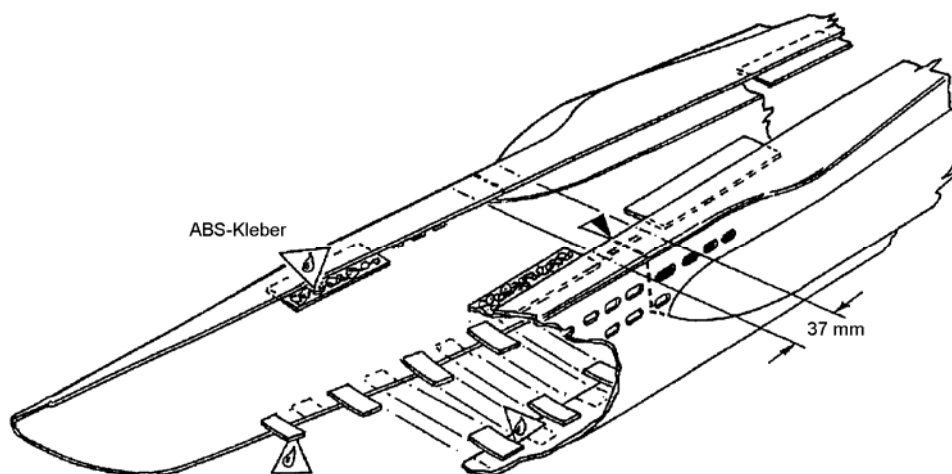


**Tip!** To bend the plastic strips, pull them over the edge of the table of your workbench until they roll up. Repeat this until the correct radius is achieved.

Cut 9 strips of 50 x 10 mm (4). They are used to connect the upper side of the hull - 2 pieces in the area of the bow before the removable section, 5 in the central removable part. Leave a gap of at least 37 mm in the area of the cut of the removable part (see drawing).



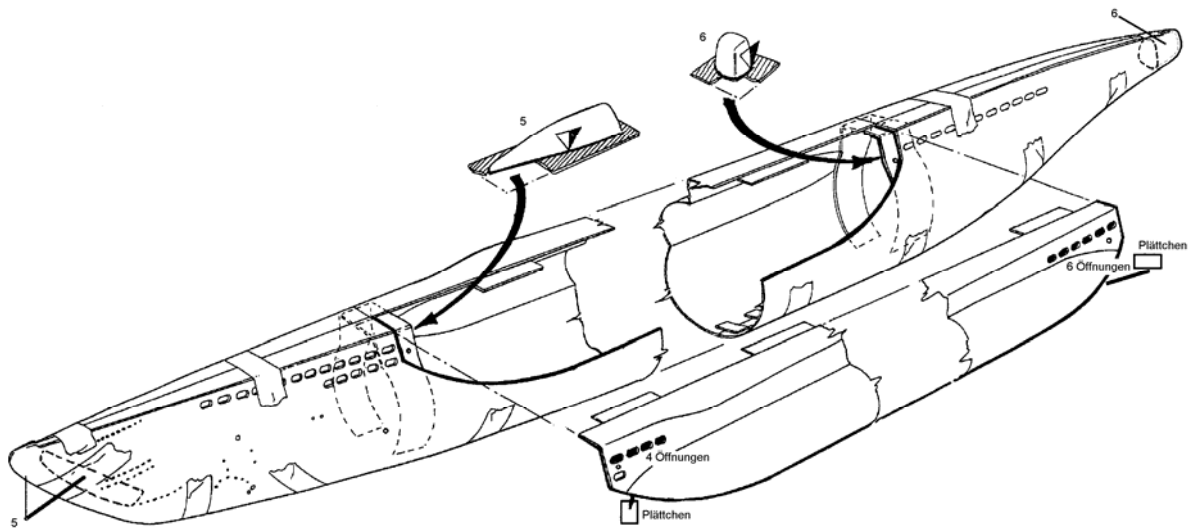
Start by gluing 20 bent strips (3) in the area of the floor onto each hull half at a distance of ca. 35 mm between each component, so that they interlock with each other. Glue two strips of 10 mm (4) into the area of the bow and then a further 5 in the central area as shown. Make sure that there remains a gap of 37 mm on the cut line for the form pieces (7). Put together the hull halves without glue to check that the connecting strips do not interfere with each other. Once they fit well, put some ABS adhesive on all the connections and also along the hull edges except for the central piece. Hold these pieces together with adhesive tape and let the adhesive dry overnight.



Once dry, sand down the overlapping glue with wet sanding paper until the connecting edge is smooth. Any gaps can now be filled with plastic putty. You can also make your own putty in a small jam jar with ABS adhesive and ABS chippings. However, it will take some time until the plastic has dissolved in the glue enough so that it can be used.

Draw the cutting line for the removable central part with a pencil following the drawing. Four flood apertures at the bow and 6 apertures at the stern remain in the central part. Score and then cut out only the left (backboard) side.

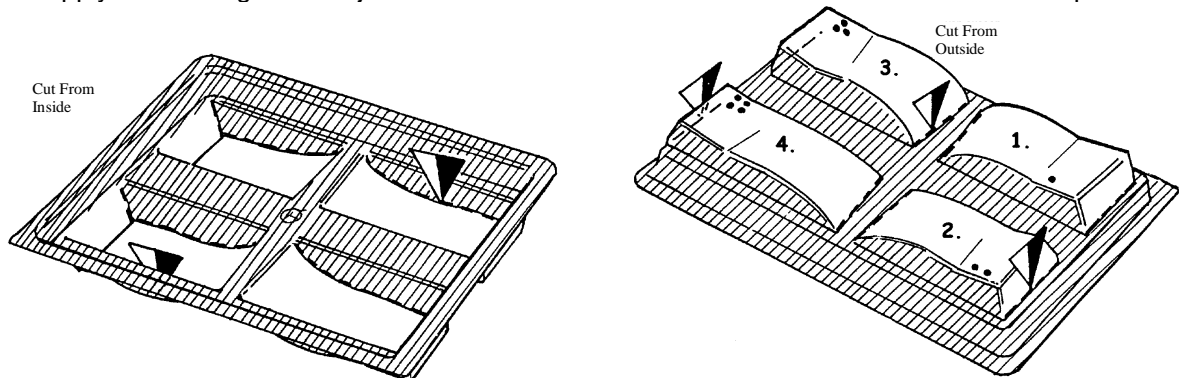
Cut out the internal filler pieces for the bow (5) and the stern (6) as shown. Using a suitable rod that is fitted with some double-sided adhesive tape, the filler pieces, already glued, can then be inserted and pressed in as per the drawing.



Now put some ABS glue on the 5 linking pieces of the central part and re-insert the backboard central part. Let the adhesive dry.

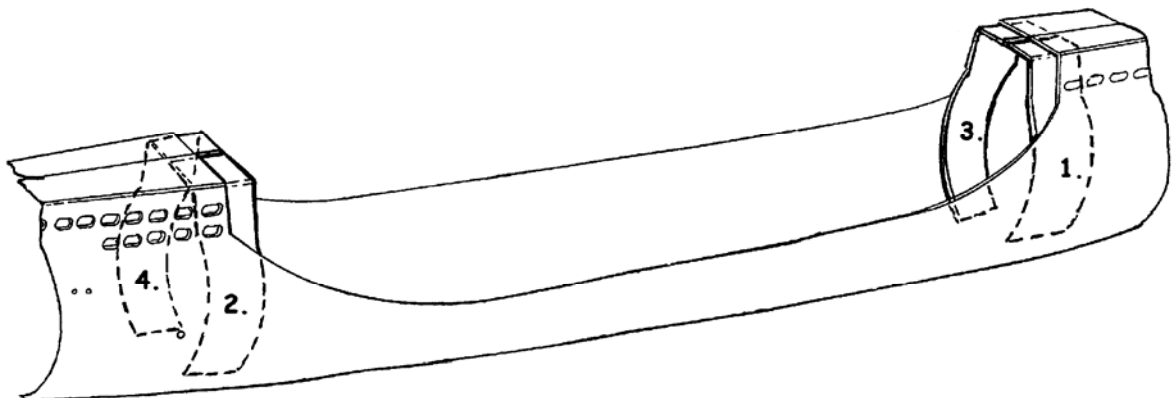
Once dry, score and cut the right (starboard) central part so that the whole section can be removed. Fasten 4 small link pieces (small plates) made from scrap material, as per the drawing, to the central part so that it sits flush and hooks up in the hull when closing the cover.

Now apply a bead of glue to all joints from the inside in order to stabilise the hull and central part.

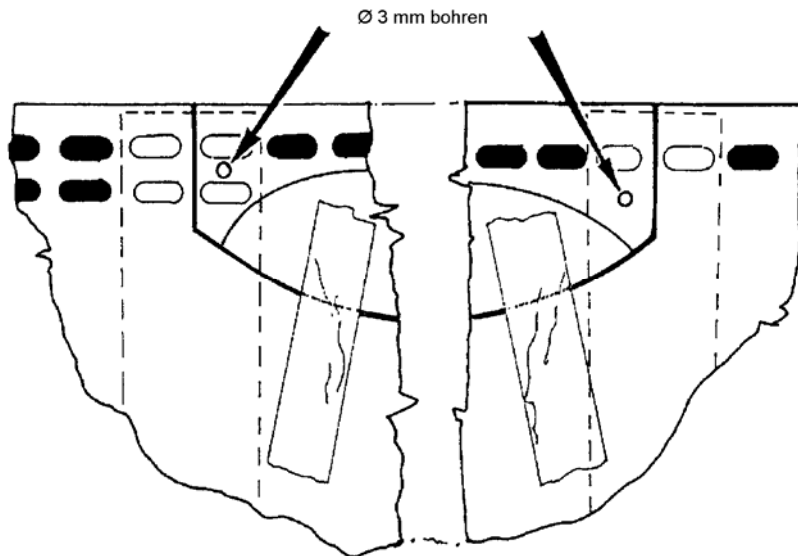


Now cut out the 4 cover fastening braces. For this, first cut along the wavy lines from the inside and then the cross lines from the outside. The parts are marked with dots from 1 to 4.

First fit the braces without glue into the hull. The part with one dot is aft backboard, with 2 dots is fore backboard, 3 dots is aft starboard and 4 dots is fore starboard. Once the parts cleanly fit together, glue them in ensuring that the glue does not touch the central part.

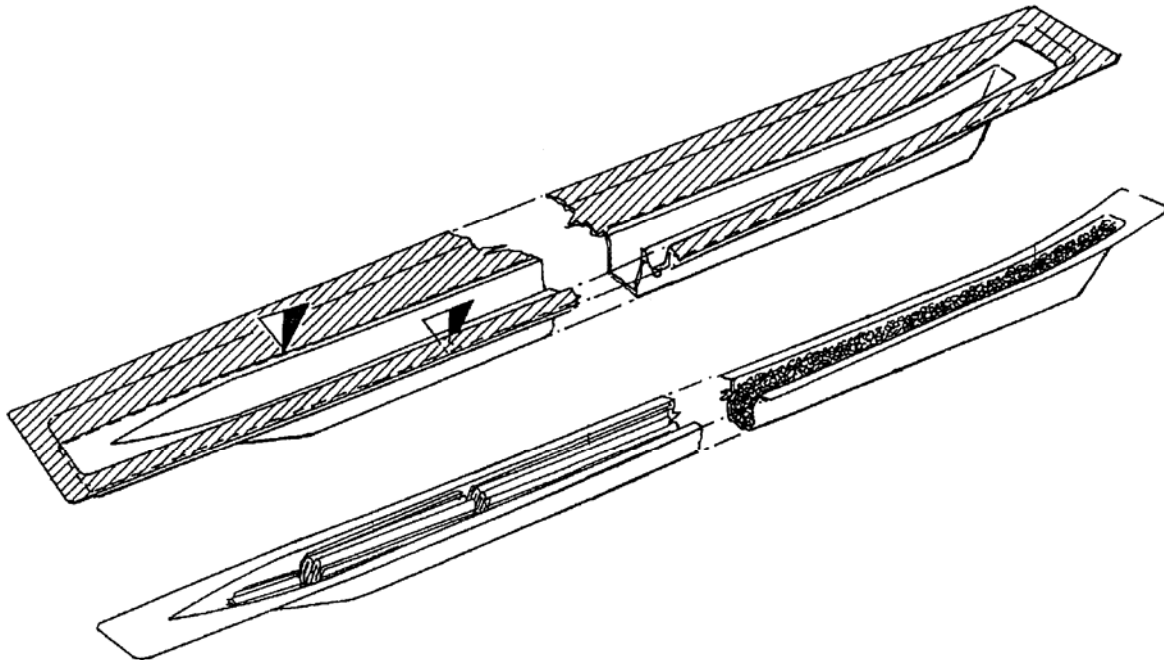


Fixing with nuts and bolts: Set the central part back on the hull and hold it with adhesive tape. Drill 4 holes of 3 mm diameter through the central part into the braces. Remove the central part again.



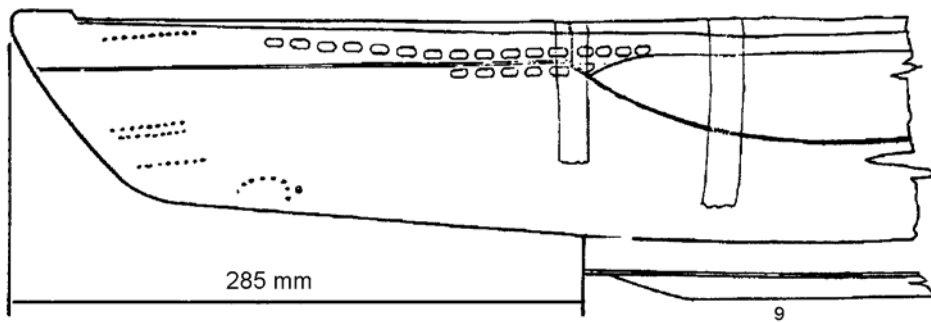
Push screw (104) through the hole in the hull and tighten the cover-fastening nut (8) on the inside and check that the face of the nut is touching the braces well. Then seal the nut using "UHU plus" without getting any adhesive onto the thread. Whilst doing this, firmly hold the nut with the screw until the glue has set. Let everything dry before removing the screw again.

Cut the keel out of the deep draw component from the inside. Make sure it fits well to the underside of the hull. The pointed end is facing the bow. Do not glue the keel to the hull yet. Fill the keel with rolled lead or lead balls (our order no. 60108) until it has a weight of 350 to 400 grams. Rolled lead can be glued in with some epoxy adhesive. Lead balls can be mixed with some epoxy adhesive and then filled into the keel. Please note that epoxy adhesive becomes warm. Heat develops particularly when the adhesive layer is too thick which could deform and destroy your keel. Be careful not to let any lead be proud of the edge so that the keel can later be attached under the hull without problems. Finally, there should be no air left in the keel as it could cause uplift.

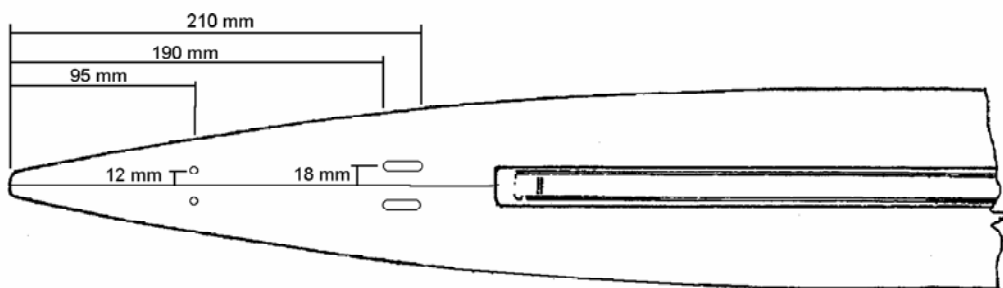


Re-fasten the central part to the hull and place it upside down. Draw the dimensions shown on the hull and glue the keel along the centre line to the hull. Let everything dry well. The edge of the facing area

of the keel on the hull can then be sanded and filled to a chamfer.

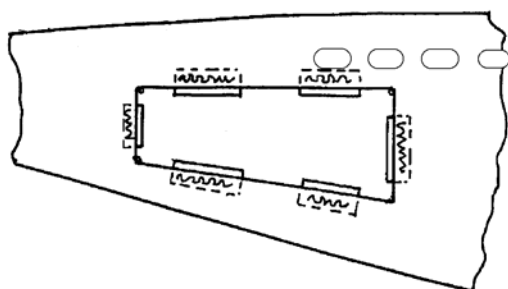


Now measure and mark all other parts cut out from the build plan and the following drawings and mark these dimensions on the hull.

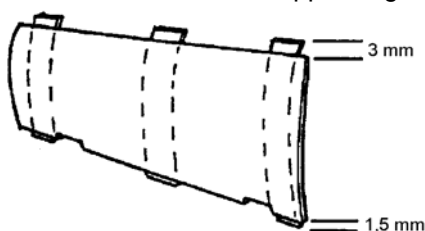


Use a straight edge for attachment and place it vertically at the stern. For drilling the two holes for the rudder tubes first use a 2mm drill bit, then open it up to 4mm. For the space for the stern tubes, we also recommend starting off drilling the end point with a small drill bit and gradually opening it up to 7mm and filing it.

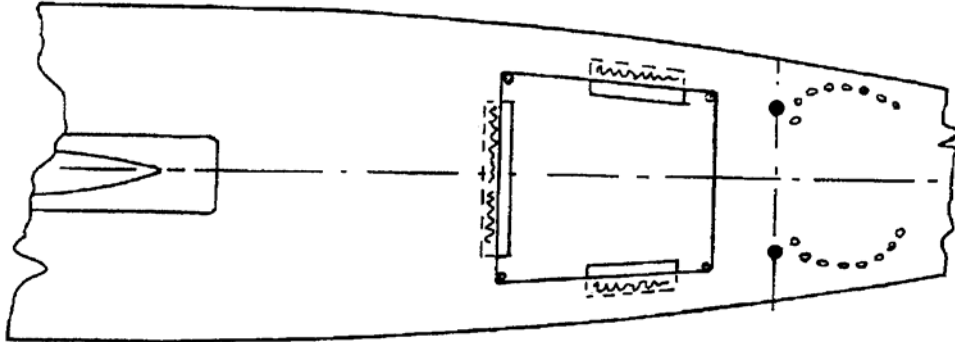
Now draw the lateral hatch for the rudder unit on the hull's starboard side, as per the build plan. If you are left-handed, it would be sensible to attach this hatch on the backboard side. Drill into the corners of the hatch with a 1.5mm drill, link the bore holes with a ruler and score several times with a knife along this line until the plastic is cut through. File the cut edges smooth and, using the scrap material, attach 6 small pieces around the edge on the inside of the hull so that the hatch cannot fall in.



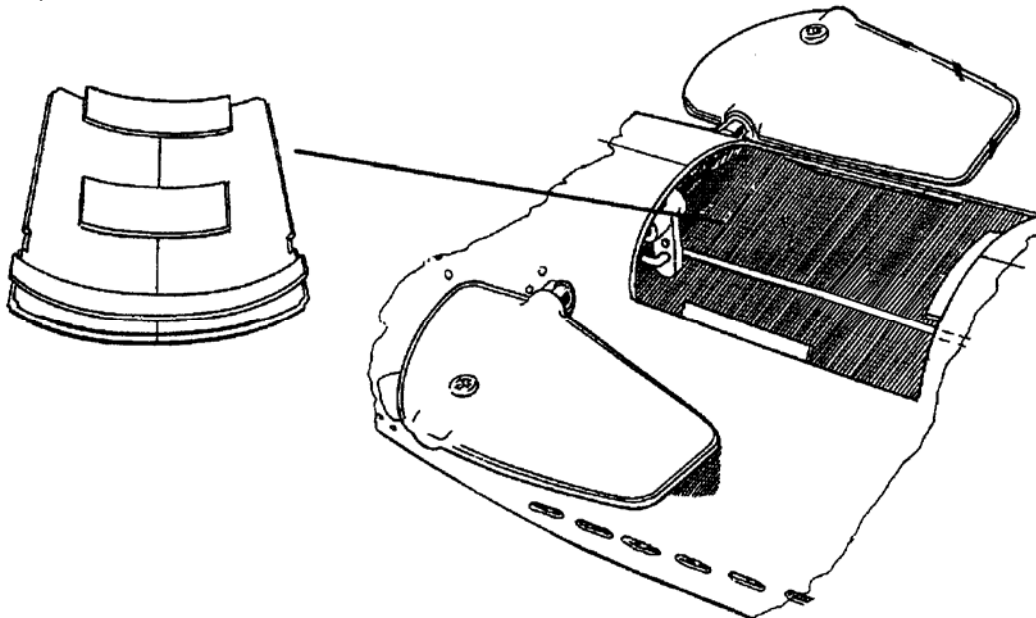
Cut out 3 strips for the cover which you then glue vertically to the inside of the cover. The cover should then be hooked in with its upper edge into the hull and slot into the lower edge by lifting it up and over.



Now you can cut out the hatch for the front fins in the floor of the hull. The measurements for this please take out of the building plan or make the size yourself that you can fit your hand in to make adjustments. Cut it out along the fat line and lay it over the hull floor so that the two fat black dots lie exactly on the large markings for the fin shaft. Then clearly mark with a drill the corner points of the hatch and drill these through with a 1.5mm bit. Then link these corner holes, as with the stern hatch, and cut them out the same way. As with the stern hatch, apply scrap pieces on the inside of the hull to the edge of the hatch so that the hatch lid cannot fall in.



Then you apply scrap pieces to the lid, as per the drawings below, so that it can be hooked up and clamped in like the stern hatch.



The fins and connections will be fitted later.

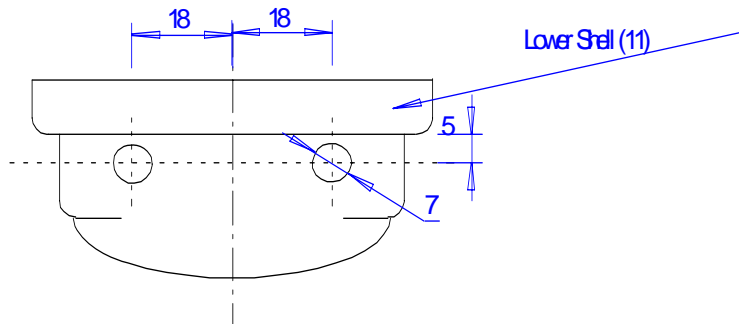
### Assembly of Pressure Tank

Before the two half shells of the pressure tank are glued together, they need some preparatory work which is a lot easier when done beforehand.

#### Preparation of Lower Shell (11)

First cut off the rough edge of the lower shell. Make sure you know which are the front and the rear of this part. The end with the slightly rounded floor is the rear, the end with the wedge-shaped bulge is the front. Now the holes for both stern tubes are marked and drilled out to 7mm diameter. For this, first of all mark a vertical centre line on the outside of the rear wall. Then draw a line parallel to and 5 mm from the upper adhesive edge and mark the centre points of your holes on this parallel line at a distance of 18mm from the central vertical line. Start drilling with a 2mm bit and increase the hole gradually whilst ensuring that the central point of the hole is maintained. [*“Unterschale” =lower shell*]





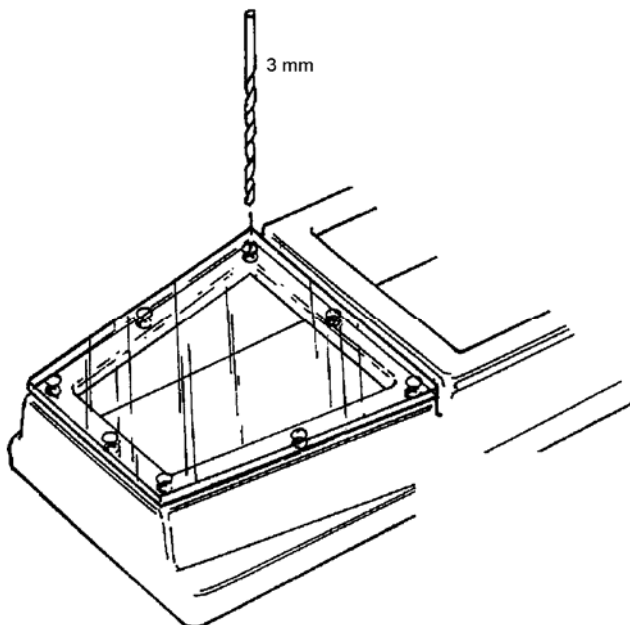
Now place the lower shell into the hull as per the plan without gluing it into place. Glue together the motor carrier (27), which is made up of its two plates, and fit it into the lower shell. Fit the two electric motors to the carrier and both universal joints to the motors. Push the stern tubes and shafts with screws through the hull and apertures of the lower shell and adjust everything carefully. Once everything is positioned straight and without tension, fasten the motor frame with fast acting glue and then carefully glue it with ABS adhesive. Then you can remove the lower shell from the hull. At this point, it is recommended to equip the motors with interference suppressors and connecting cables. Once the upper shell is fitted, this job would be much more difficult.

### Preparation of Upper Shell:

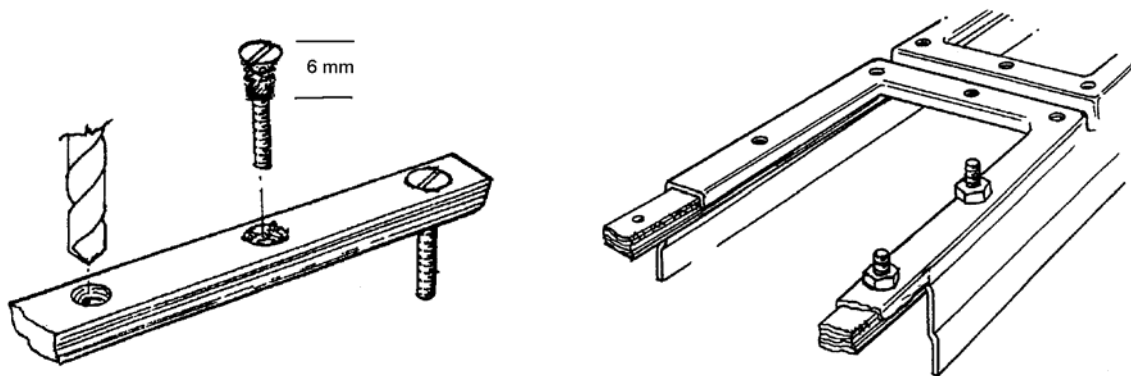
Cut out the cover areas for the pressure tank upper shell (12) from the outside at the innermost edge so that the resulting 10mm edge remains as a sealing area. Also cut off the rough edges.

Turn the upper shell over and fit precise pieces of the pine batten (20) into the apertures provided along the sealing edge. Using the pre-drilled cover, ensure that the joints of the battens do not sit where the drill holes will be later. Apply the ABS adhesive over the whole of the battens, glue them into place and press them down with weights until the adhesive is well cured. Thereafter, apply clear lacquer to the wood.

The pre-drilled covers from the dive set are now used as a template for the holes for the screws in the upper shell. Attach the covers with adhesive tape to the upper shell so that they cannot shift but leave all holes free. Now drill the first hole into one corner of the cover and through the upper shell and carefully through the wood. The best way is to start at a corner, insert a screw to prevent the cover from shifting, then drill a hole in the diagonally opposite corner and also insert a screw. Drill all remaining holes in this fashion.



Turn the upper shell over again and countersink all holes from below using an 8mm bit so that the screw heads are flush. Using epoxy adhesive, glue in the countersunk screws (21) from below. For this purpose, apply some epoxy adhesive to the underside of the screw head and to the upper 6mm of the thread, stick the screw into the wooden batten from below and tighten the screw from above using an M3 nut. Take care that the aperture is well sealed with adhesive. However, no adhesive should emerge from the top as it could inadvertently glue the nut fast, too.



Next, the pressure tank is assembled using the lower shell (11) and the upper shell (12). First of all, there are two points to be considered: the pressure tank should not be too high, otherwise the water tank will not fit on top later on. Before finally gluing the shells together, place the assembled shells into the hull and measure from the upper edge of the upper shell (12) to the upper edge of the brace (8). This dimension must not be smaller than 27mm, neither fore nor aft.

When assembling, please note which way round the upper shell is placed on the lower shell. The upper shell has three cover areas. The smallest of these is at the front. You can see it in the drawing on the lower side view.

Now apply a thin bead of ABS adhesive to the outside of the cutting edge of the upper shell. It should be continuous. Put the shells together and hold them together with adhesive tape. Once the adhesive has cured, you can put some more adhesive into the gap between upper and lower shells, in order to seal it properly.

#### Leakage test:

Now you can carry out a leakage test: Put the foam rubber gaskets (16) in place and screw the covers on. Carefully and evenly tighten the nuts with an Allen key (but not too tight) so that the gasket is slightly squeezed and touching everywhere. Seal the two holes of the stern tubes with insulating tape and immerse the tank in water. Test the gaskets carefully and repair any leaks before commencing with the task.

### Installation of Bowden Cables and Tube Pieces

To control the aft side rudders and the fore fins, two Bowden cables consisting of an outer and an inner tube are used. The outer tube must now be installed into the pressure tank and sealed with an epoxy adhesive. To achieve a good seal between outer and inner tube, the Bowden cables were deliberately left as long as possible. That is why the Servo for the aft side rudder is right at the front and the servo for the fore fin is right at the back. Cut the external tube to length according to the build plan. To strengthen the dive tank, it is double-skinned with scrap pieces (15) and ABS adhesive at the places where the Bowden cables (14) and the pieces of tube (13) for the pump hoses are fed through. Now you drill a 3mm hole through the tank for each of the Bowden cables and a 5mm hole for each of the two pieces of tube. This is easily done with a hand chuck. Mark the place on the Bowden cable that is to be at the exit place as per the build plan and roughen this area a little with sandpaper. Then glue the Bowden cables (14) and the pieces of tube that have also been roughened (15) into the pressure tank and take care that the adhesive is flowing completely around the tube both on the outside and the inside of the tank and fuses with the plastic.

### Installing the Pressure Tank in the Hull

As a next step, you can place the prepared pressure tank into the hull. Take particular care of the height dimension of 27mm as per the build plan. Re-insert the stern tubes into the hull and pressure tank and check that the dimension from the end of the stern tube to the stern of the hull is as per the plan. The pressure tank is seated correctly if 3 to 4mm of the stern tubes in the pressure tank are still visible so that they can be cleanly glued into place. Attach the shafts and coupling to the motors and correct any cut-outs if the course is not quite correct so that everything can run freely. Mark the position of the pressure tank in the hull. Now remove the pressure tank from the hull, apply ABS adhesive to the contact areas on the floor and replace it precisely in the same marked position. Re-

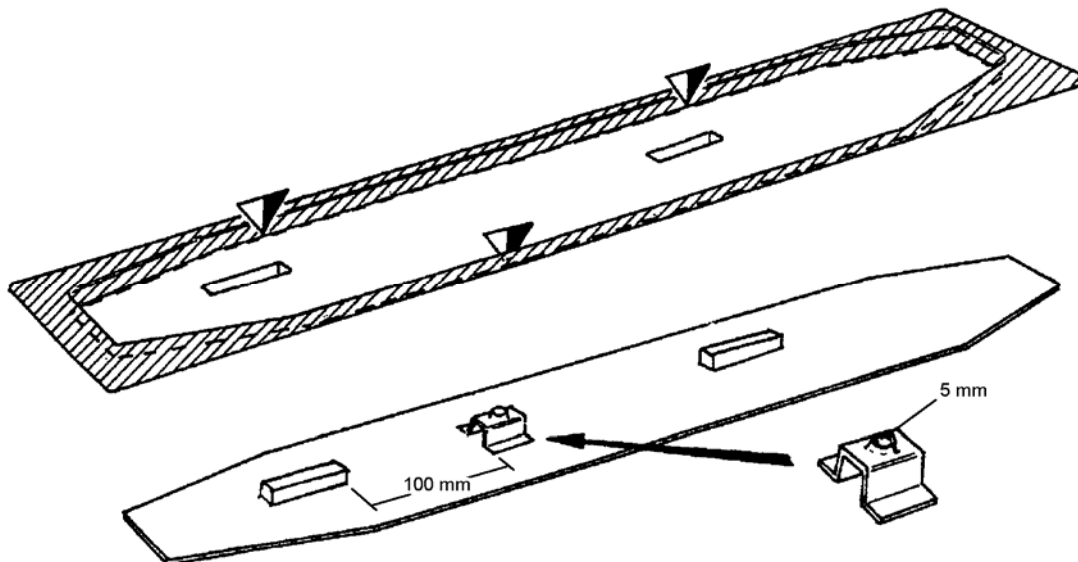
insert the stern tubes and glue them into place carefully with "UHU acrylit" both from the outside and inside at the pressure tank and also on the hull with the small wedges made from scrap material.

### Keel, Aft Diving Stabiliser

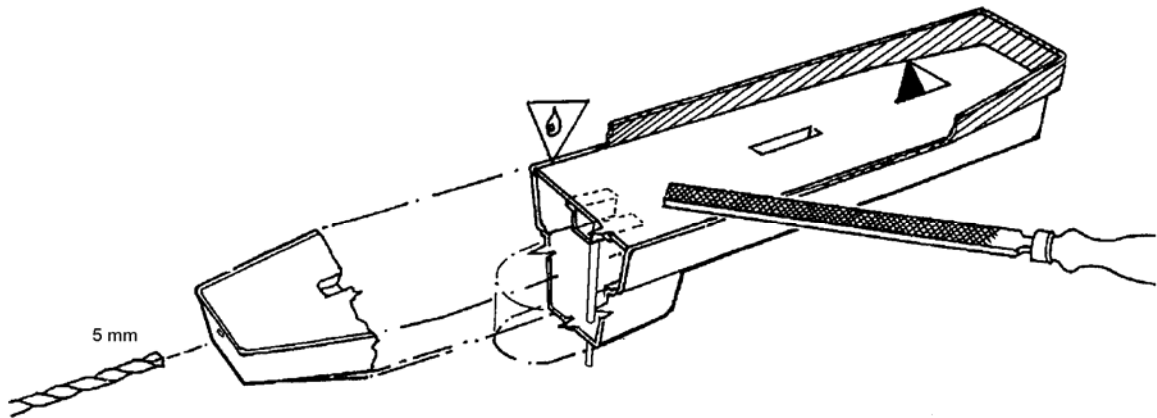
Glue the halves of the keel triangle (10) and of the diving stabilisers (43a, or 32 for the display model) together. Sand the stabilisers to a point towards the rear and round off the front edge so that the profile will look like that of the plan. Now glue the keel triangle with ABS adhesive to the link line of the hull and ensure that the distance to each ship's screw is the same and that the triangle is vertical. Attach it to the hull with adhesive tape until the adhesive has dried. When gluing the diving stabilisers, make sure they are adjusted well. For this purpose, look at the hull from the rear and check that the stabilisers are not only vertical to the keel triangle but also to the line of the whole ship otherwise your submarine will not dive or go straight on. The stabilisers are glued to the keel triangle with ABS adhesive. Finally, the braces (25) and depth rudder fins (43, or 31 on the display model) can be glued to the stern tubes with epoxy adhesive.

### Assembly of the Flood Tank

The flood tank is assembled from the floor (53) and upper part (52). Cut out the floor from the underside. Cut out the support (55) for the ventilation pipe, drill a 5mm hole in it and glue it centrally to the floor 100mm behind the front recess.



At the same place in the upper part, drill a 5mm hole for the ventilation pipe. Glue the pipe into the upper shell and holder using epoxy adhesive and simultaneously glue the floor with ABS adhesive into the upper part. Cut off the edge of the upper part and sand it level with the floor. Drill a 5mm hole each fore and aft into the front very close to the floor for the connection pipes (56) and glue these into place.



Now drill 8 small holes of 2mm diameter around the ventilation pipe and one each fore and aft into the tower roof of the flood tank.

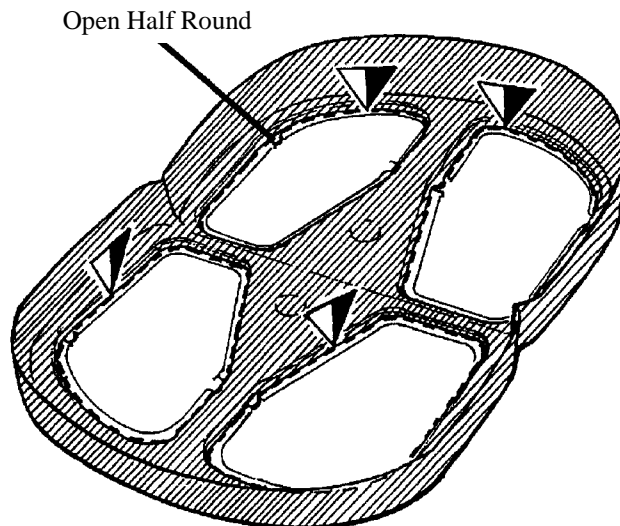
### Installation of the Trunk Tubes

Drill the position for the fore fins in the hull out to 4mm and glue both trunk tubes (47) from the inside with epoxy adhesive leaving approximately 3 to 4mm reaching out. Push the diving rudder shaft (48) through the trunk for adjustment until the glue has set.

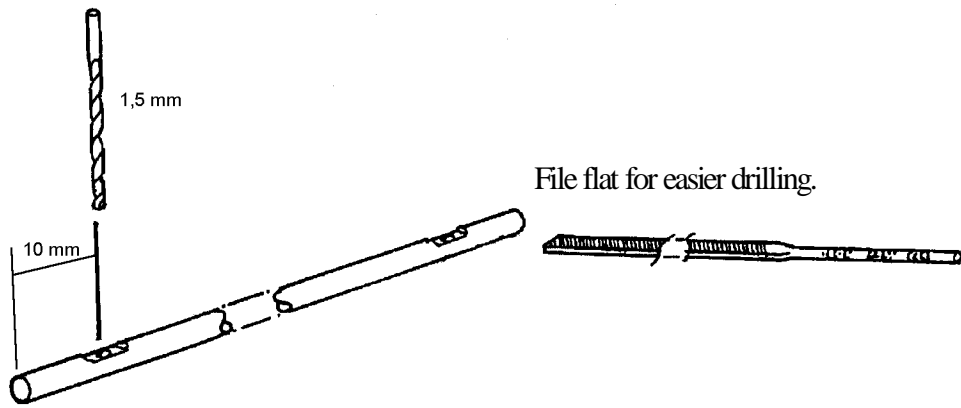
Then you glue the aft side rudder trunks into the hull. It is recommended to place the hull precisely on its side into matching cushions, to push the two side rudders 34 through the trunks and then to support these precisely with timbers from the floor to the lower rudder and between the lower and upper rudder so that the trunks can be glued into place precisely and horizontally. A fast setting epoxy adhesive is recommended for this, for example "UHU plus sofortfest".

### Assembly of the Fore Diving Rudder (Fin)

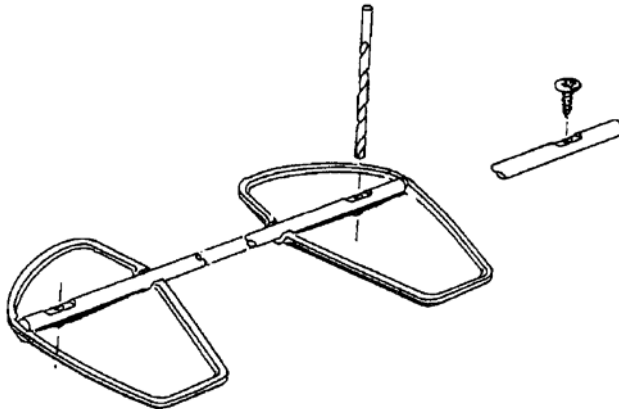
The fins drawn from the half shells are provided for the mobile model. Cut these out from the inside and sand them flat. Open the half-round apertures for the rudder shaft.



The rudder shaft (48) is flattened at both ends 10mm from the end with a file to ease drilling. Now drill 1.5mm holes at the same angle at both ends. If these holes are not drilled at the same angle, the rudders will not be the same either.



Drill through the half fins with the ends of the shaft positioned right on the outside.

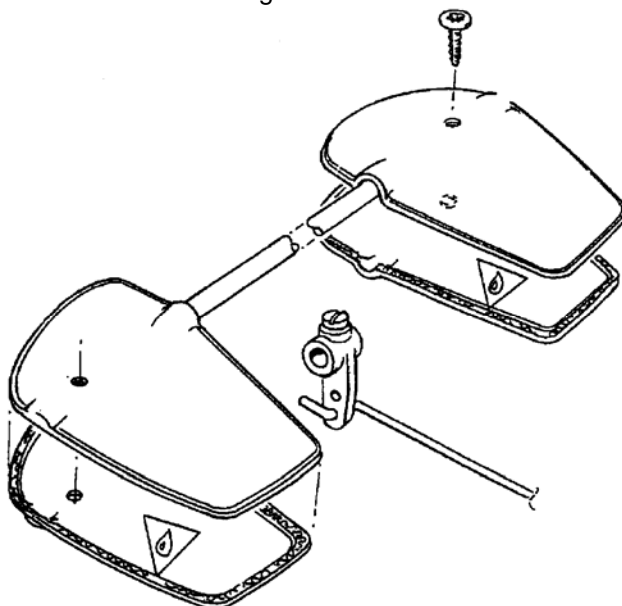


Glue the half rudders together and let them dry. Check the alignment of the fins by placing them on a level surface. Carefully sand the glued edges.

The small fins for the display model (44) are glued together from the pre-cut parts. A 3mm hole is drilled from the side and glued to the rudder shaft (46). First sand the profile form carefully to shape. The second fin may only be glued after assembly.

### Inserting the Rudders

The fore fin of the mobile model is assembled in the following order. Ready assemble one fin, then stick through one side of the vessel, push on the fin lever (51) with the already hooked-up wire (37), then stick the shaft through the second side of the vessel and mount the second fin there.



After a piece of tubing (39) and a set collar (38) have been pushed on, the wire (37) can be pushed into the inner tube of the Bowden cable. Please consult the build plan for this step. The adjustment is carried out later.

To fasten both the side rudders (34), the three rudder levers (35) have to be shortened according to the plan and be drilled with a 1mm hole. Both the rudder levers pointing aft should be chamfered on their outside so that the rudder throw is not too restricted by the outer side. Now suspend the link 36 in both rudder levers and mount these in the hull on the rudder shafts. Only then should you suspend the wire (37) in the third rudder lever and mount this on a rudder shaft. As with the fore fin, connect the wire with the inner Bowden cable tube with a piece of tubing (39) and set collar (38).

### **Inserting Servos**

The positions of the servos are marked exactly in the build plan. The front servo for the side rudder is held in place with two battens (20). First fit the battens into the pressure tank. Prepare the two hoses from the connecting pieces (13) to the pump (P) and find the best position for the servo so that the hoses do not kink. Screw the battens together with the servo and then set the whole unit into place and glue the sides with ABS adhesive.

The aft servo for the fore fins is fixed with the double strength braces (42). Fit and glue these initially within the pressure tank and then fasten the servo with double sided adhesive tape to the floor and to the brace.

### **Control of the Rudders**

Set both servos to the middle position using the remote control and then attach the rudder levers vertically to the Bowden cable as shown on the plan. Then set the rudders to the central position and cut the Bowden cables to length so that the correct length is achieved with the aid of the yoke (40) and solder connector (41). Then glue the inner cable of the Bowden cable with a little epoxy adhesive into the solder connector. Now you can carry out the first rudder tests by connecting your remote control. You can carry out the fine adjustment on the screwed-on clevises. If the rudders prove to be too sluggish due to the silicone hose (39), grease the Bowden cables a little. The external Bowden cable tubes have to be connected to the wall of the pressure tank or the hull at several places in order to avoid excessive lateral movement. Do this at the end when you are sure about how the battery, receiver and controller are to be positioned, installed and removed so that you do not obstruct any access points.

### **Connecting the Motors**

As the ship's screws counter-rotate to each other, the motors also have to be connected to counter-rotate. The positive connection of the motors has a red dot. Therefore, solder a length of cable to each connection on the motors that is long enough to reach to your desired position of the drive controller. Now solder together each positive pole and each negative pole of the motors and solder this connection to the plug to your drive controller. Now you can carry out the first motor tests after the remote control and batteries have been connected.

### **Connecting the Pump and Hoses**

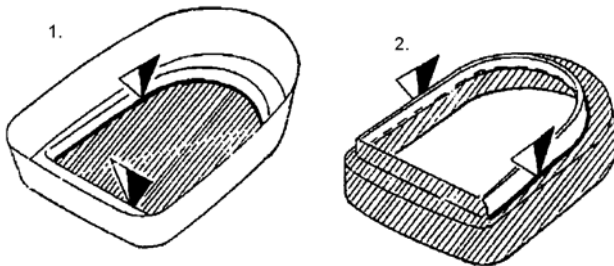
The pump hoses are now connected to the connector pieces (13). A connector piece is fitted with a hose of approx. 10cm length which has a surplus piece of brass tube fitted at its other end so that it always hangs down in the forward hull area and thus can always suck up water. The second connector piece is connected with a long piece of hose to the rear connector of the flood tank. The front connection of the flood tank is really not required. As many model builders like to conduct their own tests and would like to make their boats dive even more effectively and faster, we have incorporated the idea of another model builder here. However, we recommend for the first tests fitting a piece of hose to this connection and screwing a 5mm screw or a stopper into the other end of the hose. This concludes the technical installation. The batteries really should be fixed to the floor with pieces of batten or velcro straps to prevent them moving about. Do this before your final trimming of the boat in your bath.

## Attaching the Ornamental Deck

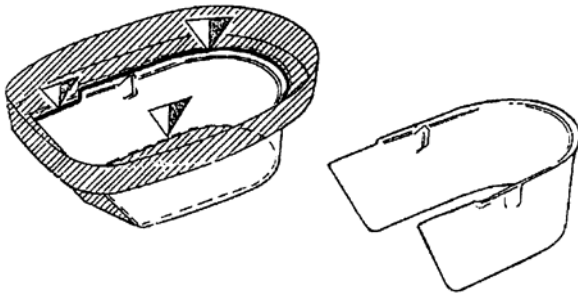
The ornamental deck is assembled from the 4 deep-drawn thin polystyrene parts. Carefully cut these out with a pair of scissors and fit the transfer passages carefully to the cutting areas of the cover and the hull. Carefully cut out the section for the tower (64) so that this tower part fits precisely into the cut-out of the deck. Then glue together the decks with the hull using "UHU allplast" (IMPORTANT! Do not use ABS adhesive, as it does not bond the polystyrene.) The laterally visible slots between hull and decks can be filled with putty or "UHU allplast". When the glue is dry carefully make the cutout in the lower deck for the flood tank, but this should be little smaller that the tower can sit upon this deck.

## Assembly of the Tower

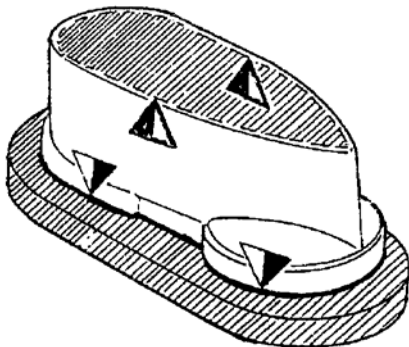
First cut out the upper deflection edge (66) inside from the inner side of the form part. Then cut it from the outside, as shown.



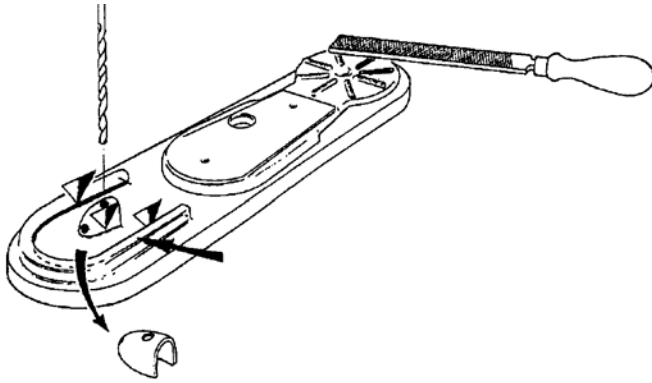
The upper side panel (65) is cut out from the inside.



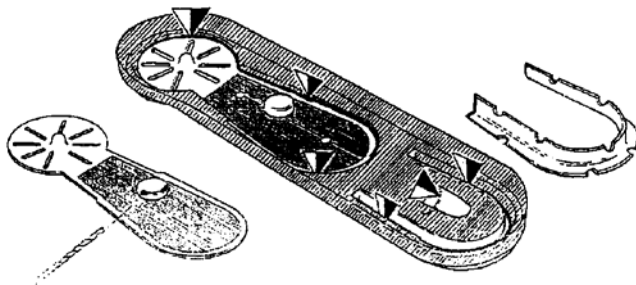
Cut out the lower tower part - below from the inside and above from the outside. The illustration shows it upside down.



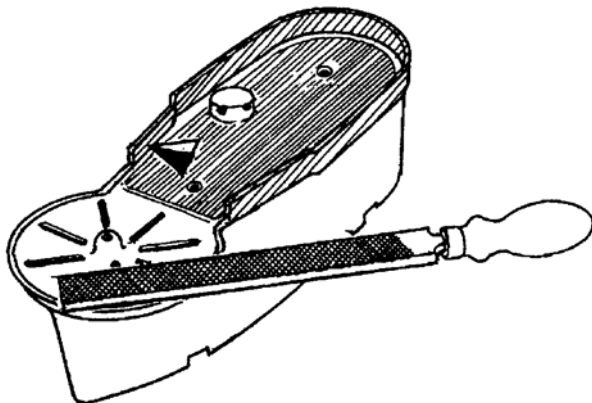
In the tower deck (67), first of all file the 8 raised strips flush with the deck. Then cut out the inner frame (69) from outside starting from the outer side. Drill the compass (68) initially with 3mm, then cut it out from the outside. The rear of the compass is then cut out from the inside.



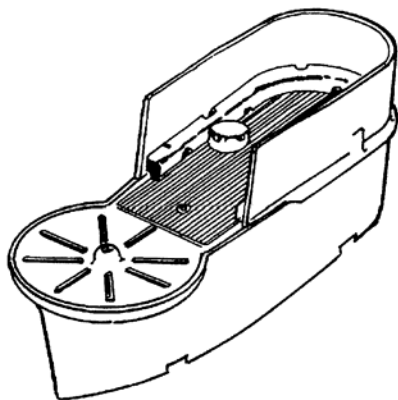
Then turn the form part around and cut out the tower deck from the inside. Repeat this with the inner frame (69) and use a small round file to work out the semi circular apertures. Drill 4 x 3mm holes in the raise for the periscope in the middle of the deck.



Sand the edges until the deck fits cleanly into the lower tower part. Now glue it into the tower and let it dry. File the edge down to deck level but be careful that you do not file any detail. Cut apertures into the floor of the lower tower part 4 as shown.

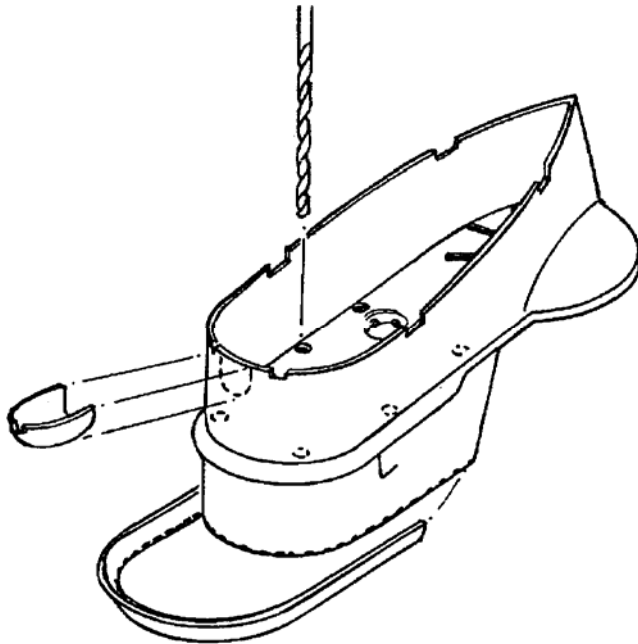


Glue the upper part (65) to the lower part (64) with the deck (67). Then glue in the inner step (69).

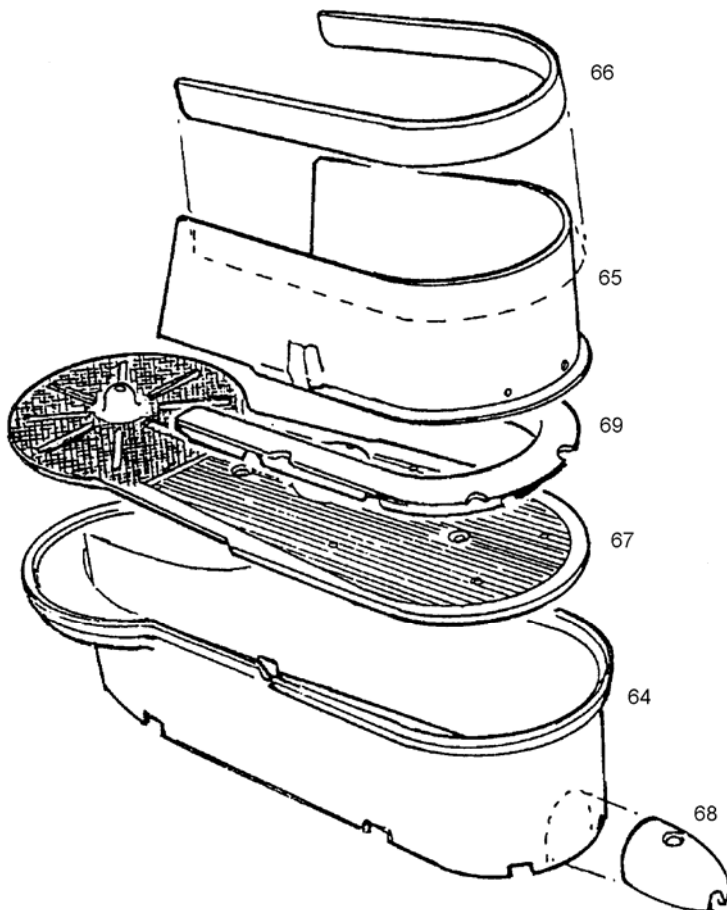




Drill 6 x 3mm holes from below into the deck (but not into the inner step) so that they are not visible from the outside. Glue the compass part (68) into place.



Shown here is the whole assembly. Glue the top edge (66) flush with the upper edge.

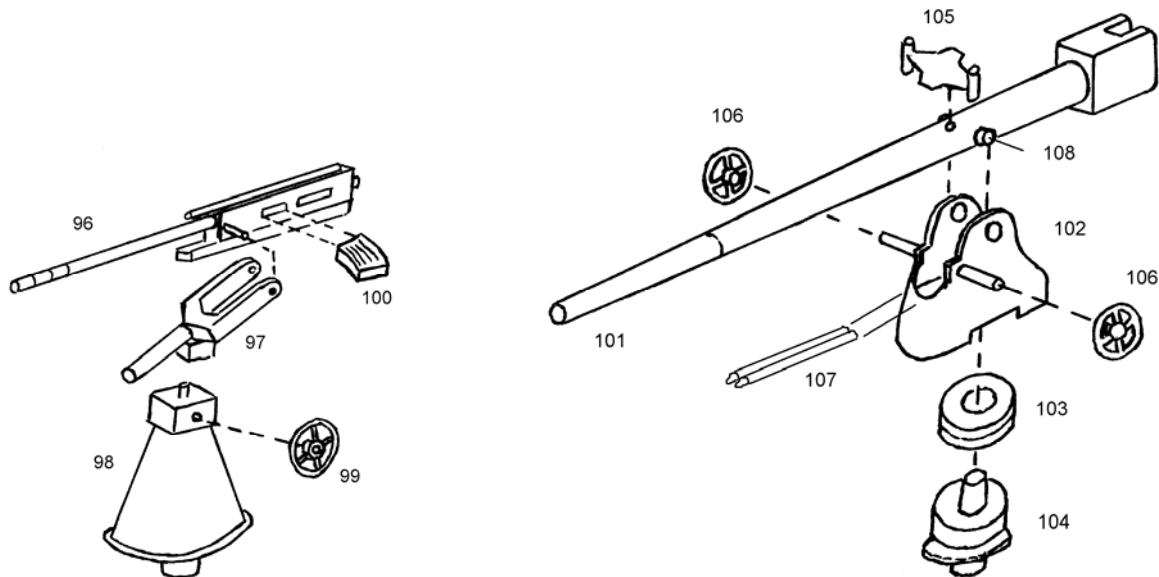


Now pre-bend the steps (83) from brass wire according to the plan and drill the holes for them into the tower. Before gluing them into place, make a strip from 2mm ABS that you can push as a distance piece between the steps and the tower wall. Do the same for the handrail supports (79) and the handrails (78). Bend the balcony railing of the tower carefully around a round object of a suitable diameter and solder it to the supports. Now drill the 1mm holes for the supports into the floor of the

tower and glue them into place with epoxy adhesive. Finally, glue the tower well and fast into place on deck.

### Assembly of the Weapons

Now assemble both guns as per the following drawings. The most suitable adhesive for the white metal components is an epoxy adhesive. A fast-acting glue could dissolve again if in contact with water over a longer time.



Fasten the two guns safely with epoxy adhesive on the decks so that you do not lose them when diving.

### Attaching the Remaining Fittings

Finally, manufacture the remaining deck fittings and attach them to the deck according to the build plan. You can achieve a good visual effect when you lacquer the fittings with a slightly darker grey like the deck.

### Water Line and Trimming the Model

Mark the fore water line of the model 30mm below the bow and aft 7mm below deck level. This line can be the border for a darker paint scheme of the lower hull below the water line as shown on the illustration on the box. This line is also approximately our waterline when we trim the boat in the bath. The self-adhesive lead ballast strips (order no. 60110) have proven to be the ideal ballast for precise trimming. You insert these in the bow or stern area through the hatches and you can glue them laterally left and right for vertical trimming. Remember that all remote control and battery items should be in place when trimming. The flood tank should also be empty when trimming. If your boat is lying along this water line and if its lateral trim is also correct, there should be nothing to stop you running your first tests. Press the model under water and move it to and fro so that all air can escape. Even now, the boat should be lying along its water line.

### First Tests

First, check in the bath whether all remote control functions operate properly in the bath, whether the motors and pumps are rotating in the right direction and that the rudders are moving in the appropriate directions. You can also carry out a careful power test of the batteries and motors. When the flood tank is filled, the model's stern should already be below water and the bow area should be approximately 1cm above the water. It is important, however, that the boat does not tilt sideways otherwise it means that your tank is not placed centrally. The tank can be jammed between the cover fastening nuts using wedges and once you are sure about the final position in the deck, you can glue it into place there using double-sided adhesive tape.

During your first test run on a lake, or even better a large swimming pool, we recommend during diving tests, to test the flooding of the tank and then to dive using the dive rudders separately. You will develop a certain feeling to find out when you have to counter-steer using the dive rudders in order to maintain a steady depth. Only after you have fully familiarised yourself with the controls of the dive rudders can you combine flooding and dive rudders to simulate an original, faithful diving manoeuvre. All these trials make submarine diving so enjoyable. We wish you a lot of fun with these tests and plenty of success.

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### Item list for submarine type VIIb

This item list contains both the parts of the construction box (order no. 20310) and of the diving set (order no. 20311)

Part no.	Description	reqd. for dive model	reqd. for display model	Qty.	Material	contained in basic set 20310	contained in dive set 20311
1	Hull side, right	x	x	1	ABS deep drawn part 2 mm	x	
2	Hull side, left	x	x	1	ABS deep drawn part 2 mm	x	
3	Connecting strips hull floor	x	x	40	ABS residual material approx. 25x12x2 mm	x	
4	Connecting strips deck	x	x	9	ABS residual material approx. 50x12x2 mm	x	
5	Connecting piece bow	x	x	1	ABS deep drawn part 1.5 mm	x	
6	Connecting piece stern	x	x	1	ABS deep drawn part 1.5 mm	x	
7	Cover fastening braces	x		4	ABS deep drawn part 1.5 mm	x	
8	Cover fastening nuts	x		4	Sealing nuts M3	x	
9	Keel	x	x	1	ABS deep drawn part, 2 mm	x	
10	Keel triangle	x	x	2	ABS cut component 2 mm	x	
11	Pressure tank lower part	x		1	ABS deep drawn part, 2 mm	x	
12	Pressure tank upper part	x		1	ABS deep drawn part, 2 mm	x	
13	Hose aperture for pressure tank	x		2	Brass tube 5x0.45x25 mm		x
14	Bowden cables	x		2	3 mm plastic tube with 2 mm inner tube	x	
15	Pressure tank reinforcement	x		8	ABS residues	x	
16	Cover gasket for pressure tank	x		1 set	Punched foam rubber 3 mm		x
17	Cover, front, pressure tank	x		1	Transparent plastic		x
18	Cover, centre, pressure tank	x		1	Transparent plastic		x
19	Cover, rear, pressure tank	x		1	Transparent plastic		x
20	Pine batten	x		1	5x8x2000 mm in total	x	
21	Screws for pressure tank	x		38	Countersunk screw, M3x12 mm		x
22	Nuts, pressure tank			38	Cap nuts M3		x
23	Stern tubes	x	x	2	Finished article	x	
24	Shaft with screw	x	x	2	Finished article	x	
25	Support brace for stern tube	x	x	2	ABS, cutting part 2 mm	x	

Part no.	Description	reqd. for dive model	reqd. for display model	Qty.	Material	contained in basic set 20310	contained in dive set 20311
26	Drive motors	x		2	Mabuchi 385 SH		x
27	Motor mount	x		2	ABS cutting part 2 mm	x	
28	Motor fastening screw	x		4	M 2.5x8 mm		x
29	Interference suppressors	x		2 set			x
30	Universal joint coupling	x		2	from 2.3 to 2 mm Ø		x
31	Dive rudder fin, aft, display model	x	x	2	ABS cutting part 2 mm	x	
32	Dive rudder, aft, display model		x	4	ABS cutting part 2 mm	x	
32a	Dive rudder, aft, dive model		x	4	ABS cutting part 2 mm	x	
33	Trunk tube for side rudder	x	x	2	Brass tube 4 x 0.45 x 10 mm	x	
34	Side rudder	x	x	2	Finished article	x	
35	Rudder lever, side rudder	x		3	Finished article		x
36	Connecting wire for side rudder lever	x	1	1	Steel wire 0.8 x 40 mm		x
37	Control wire for Bowden cables	x		2	Steel wire 0.8 x 150 mm		x
38	Setting ring for Bowden cables	x		2	Setting ring 2 mm with grub screw		x
39	Bowden cable seal	x		2	Silicon hose total 2x5x40 mm		x
40	Yoke	x		2	Steel M2		x
41	Solder connectors	x		2	Steel M2/2.1 mm		x
42	Servo holder	x		2	ABS cutting part 2 mm	x	
43	Dive rudder fin, aft, dive model	x		4	ABS cutting part 2 mm	x	
43a	Dive rudder, aft, dive model	x		4	ABS cutting part 2 mm	x	
44	Dive rudder blade, fore, display model		x	4	ABS cutting part 2 mm	x	
45	Dive rudder fin, fore, display model		x	4	ABS cutting part 2 mm	x	
45a	Dive rudder fin, fore, dive model		x	4	ABS cutting part 2 mm	x	
46	Dive rudder shaft, display model		x	1	cut from round brass material 3x95 mm, part 48	x	
47	Trunk tube for dive rudder, fore	x	x	2	Brass tube 4x0.45x10 mm	x	
48	Dive rudder shaft, dive model	x		1	Round brass material 3x128 mm	x	
49	Screws for dive rudder	x		2	Tin screw 2.2x45 mm		x
50	Rudder blade halves, dive rudder, dive model	x		2	ABS deep drawn part 1.5 mm	x	
51	Rudder lever, dive rudder, fore	x		1	Finished article		x

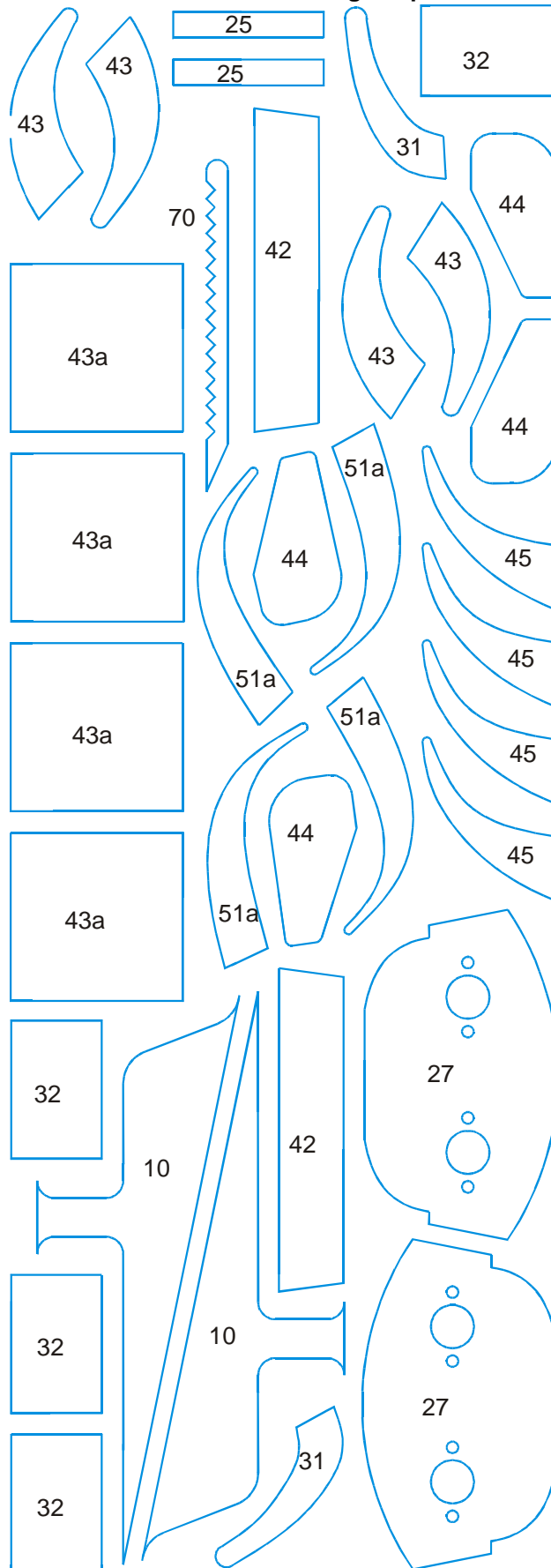
Part no.	Description	reqd. for dive model	reqd. for display model	Qty.	Material	contained in basic set 20310	contained in dive set 20311
51a	Dive rudder fin, fore, dive model	x		4	ABS cutting part 2 mm	x	
52	Flood tank, upper part	x		1	ABS deep drawn part, 2 mm	x	
53	Flood tank, lower part	x		1	ABS-deep drawn part, 2 mm	x	
54	Flood tank, ventilation pipe	x		1	Brass tube 4 x 0.45 x 80 mm		x
55	Flood tank, tube support	x		1	ABS deep drawn part, 1.5 mm	x	
56	Flood tank, apertures	x		2	Brass tube 5x0.45x25 mm		x
57	Pump	x		1	12 Volt		x
58	Silicon tube	x		1	6x1x1000 mm		x
59	Vacuum piece	x		1	Brass tube 5x0.45x25 mm		x
60	Deck detail, bow	x	x	1	Polystyrene, deep drawn part, 1 mm	x	
61	Deck detail, tower	x	x	1	Polystyrene, deep drawn part, 1 mm	x	
62	Deck detail behind tower	x	x	1	Polystyrene, deep drawn part, 1 mm	x	
63	Deck detail, rear	x	x	1	Polystyrene, deep drawn part, 1 mm	x	
64	Tower, lower part	x	x	1	ABS deep drawn part, 1.5 mm	x	
65	Tower, upper part	x	x	1	ABS deep drawn part, 1.5 mm	x	
66	Tower deflector, top	x	x	1	ABS deep drawn part, 1.5 mm	x	
67	Tower, deck	x	x	1	ABS deep drawn part 1,5 mm	x	
68	Tower, compass cover	x	x	1	ABS deep drawn part, 1.5 mm	x	
69	Tower, interior step	x	x	1	ABS deep drawn part, 1.5 mm	x	
70	Saw tooth, bow	x	x	1	ABS cutting part, 2 mm	x	
71	Saw tooth, braces	x	x	3	Brass wire, 2x160 mm in total	x	
72	Periscope component	x	x	1	Brass tube, 4x0.45x30 mm	x	
73	Periscope component	x	x	1	Brass tube, 3x0.45x10 mm	x	
74	Periscope component	x	x	1	Brass tube, 2x0.2x30 mm	x	
75	Periscope component	x	x	1	Brass tube, 4x0.45x30 mm	x	
76	Periscope component	x	x	1	Brass tube, 3x0.45x30 mm	x	
77	Tower railing	x	x	1	Brass wire, 1x470 mm in total	x	
78	Tower, lower handrail	x	x	4	Brass wire, 1x200 mm in total	x	
79	Tower, handrail supports	x	x	16	Splint	x	

Part no.	Description	reqd. for dive model	reqd. for display model	Qty.	Material	contained in basic set 20310	contained in dive set 20311
80	Railing at the tower	x	x	2	Brass wire 1x220 mm in total	x	
81	Railing supports, deck	x	x	8	Brass, Finished article	x	
82	Railing at stern	x	x	2	Brass wire 1x100 mm in total	x	
83	Tower ladder	x	x	10	Brass wire 1x150 mm in total	x	
84	Eye bolt	x	x	2	Ø 3x10 mm	x	
85	Eye bolt, tower	x	x	2	Ø 3x10 mm	x	
86	Ring hook	x	x	3	Brass wire 1x80 mm in total	x	
87	Aerial	x	x	3	Rubber band 1x1300 mm	x	
88	Isolators (Blocks)	x	x	12	Blocks, 3 mm	x	
89	Hatch cover	x	x	2	Metal casting	x	
90	Bollard	x	x	10	Metal casting	x	
91	Large bollard	x	x	1	Metal casting	x	
92	Rudder protection wire	x	x	1	Brass wire 2x240 mm in total	x	
93	Anchor	x	x	1	Metal casting	x	
94	"Shark" adhesive label	x	x	2	adhesive label	x	

Part no.	Description	reqd. for dive model	reqd. for display model	Qty.	Material	contained in basic set 20310	contained in dive set 20311
95	Cover fastening screws	x		4	Cylinder screw M3 x 10 mm	x	
96	Gun, tower, barrel	x	x	1	Metal casting	x	
97	Gun, tower, joint	x	x	1	Metal casting	x	
98	Gun, Tower, plinth	x	x	1	Metal casting	x	
99	Gun, Tower, hand wheel	x	x	1	Plastic	x	
100	Gun, Tower, magazine	x	x	1	Metal casting	x	
101	Gun, bow, barrel	x	x	1	Metal casting	x	
102	Gun, bow, housing	x	x	1	Metal casting	x	
103	Gun, bow, ring	x	x	1	Metal casting	x	
104	Gun. bow, plinth	x	x	2	Plastic	x	
105	Gun, bow, visor	x	x	1	Metal casting	x	
106	Gun, bow, hand wheel	x	x	2	Metal casting	x	
107	Gun, bow, double barrel	x	x	1	Metal casting	x	
108	Gun, bow, axle	x	x	1	Brass wire 2x10 mm	x	
A	Drive battery	x		1	12 Volt NiCd not included		
E	Receiver	x		1	Min. 4 channel, not included		
A-E	Receiver battery	x		1	not included		
R-M	Drive controller for motors	x		1	30A, not included		
R-P	Controller/switch for pump	x		1	not included		
S	Servo	x		2	not included		
P	Pump, see part 57						



**Part numbers of cutting template:**



## **Builders Notes:**