Modell UBOOT Spezialitäten

instructions

conversion kit U552

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NORBERT BRÜGGEN

Entwicklung und Vertrieb von elektronischen und mechanischen Bauteilen

Benderstraße 39

41065 Mönchengladbach

Germany

Tel.: +49 2161 48 18 51

mail@modelluboot.de

Revell's VIIc„U552"

conversion into a static diving RC-model

Concept

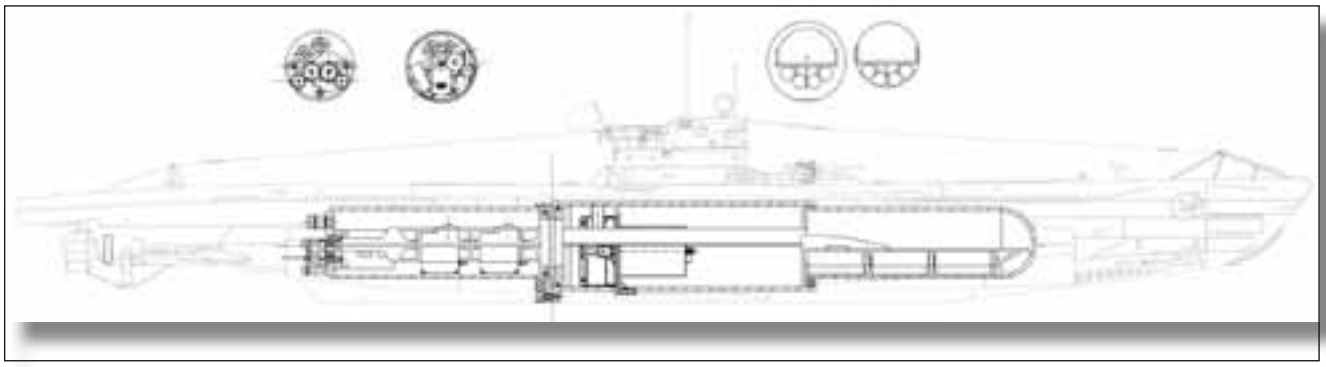
In scale 1:72 the VIIc Uboat is 93 cm (36.6") long. It's scale buoyancy would be 2867 g.(101 ounces)

That is plenty of room !

The surface buoyancy is 1,91 kg only. When you take into account that the pressure hull of the model will be smaller (e.g. thicker walls, not optimal space usage) 1,5 kg is a good estimation. This is still enough when using modern miniaturized RC-components.

Thinking about access to the narrow hull led to adding a real pressure hull and cutting the hull vertical on a frame. Hiding the cut is tricky, but pressure resistance and accessibility are excellent. Maintenance of the U-boat is very easy.

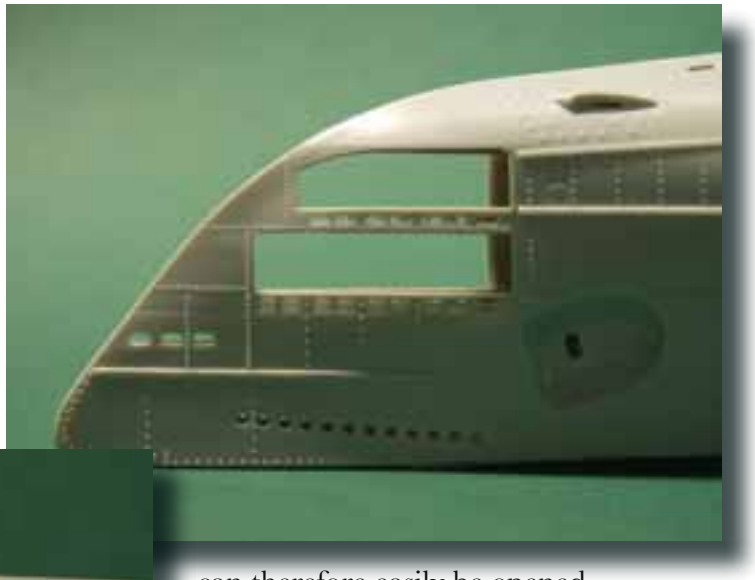
The deck of a type VII U-boat is very narrow in any scale.

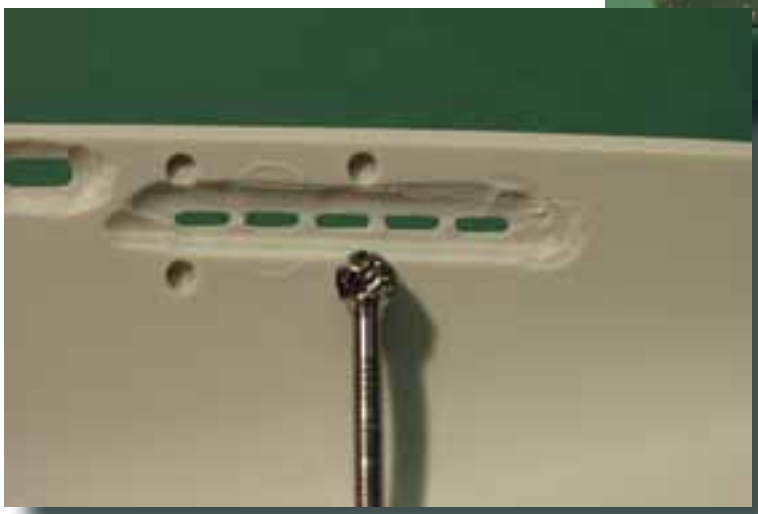


Changes to the model

The fantastically detailed polystyrene kit from Revell still has potential for some enhancements. This gives a challenge even to the routined modeller.

For the diving model the real working of the free flood ports is important. That means you have to open at least the ports in the upper hull section. That is not too difficult using a new and sharp cutter on your rotary tool (Dremel, Proxxon or any equivalent) at moderate revolutions. The ports are moulded half depth from the outside and can be seen from the inside when watched against the light. Just remove enough material to leave a thin skin. Proceed until it falls out. Then clean the edges with a cutter or small file.





can therefore easily be opened.

The ports near the keel are much more tricky and are not needed for the diving model. So leave them as they are. Or if you want to open them, be very, very careful.

The result will be a precisely moulded port with a low visible wall thickness. Both perfect for a static or a RC model.

The ports on the bow are produced the same way and

The deck ports are a different class. The remaining material is only 1/2 mm and therefore very brittle. On the other hand the ports are so small that they will be blocked by a thin film of water immediately.

So I would recommend to leave the deck untouched and vent the deck area through the tower and one 3 mm bore at the stern.

could be an alternative.

In any case the deck under the conning tower has to be removed. Inside the tower the invisible deck parts under the steps are removed and the venting boxes are opened.

Additionally you will need two not to scale venting holes: In the stern tip of the deck and in the „Wintergarten“ a ø 3 mm bore is needed.

For those unafraid enough (and confident about their skills) here is a way that has worked:

The deck parts are mounted downside up on plastic clay (Mastic or similar Polyisobutylene clay). They are then sanded down very carefully - either by hand and wet sand paper or with a Rotex sander which works very cool. The remains are finished with a fine cutter by hand.

Maybe freezing the deck parts in ice blocks

At least some parts of the deck need to be removable to access the driving gear and rudder linkages and to place ballast to fine trim the model.

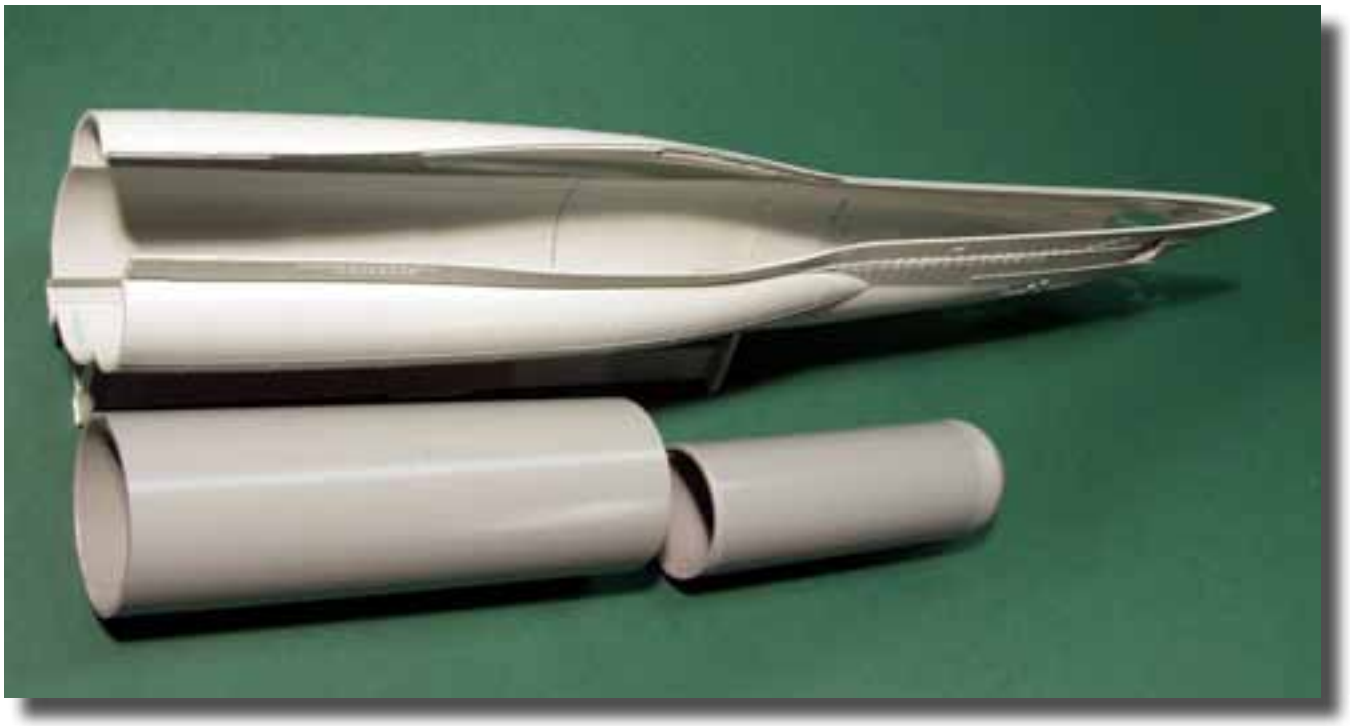
Cut

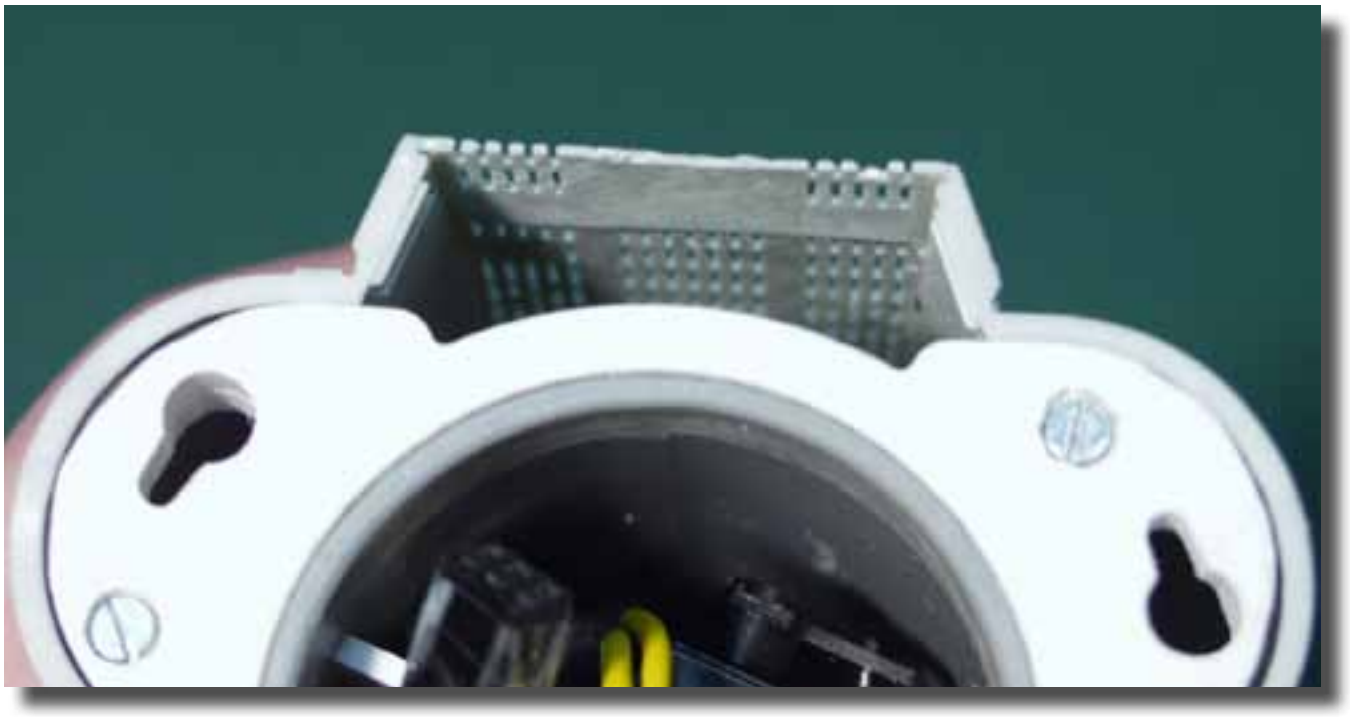
Inside the hull two frames are planned. Although the frames are not used in the converted model their marking is used as a guide for cutting.

Attention:
In newer kits the frames were changed. Always check the position with the plan!

The cut will be in front of the double line of the stern frame. Cut with a thin saw like a jigsaw and sand the hull parts to plane on a piece of sandpaper on the desk. When done carefully the cut will be less than 1mm wide.

The frame markings are removed finally.





Pressure hull

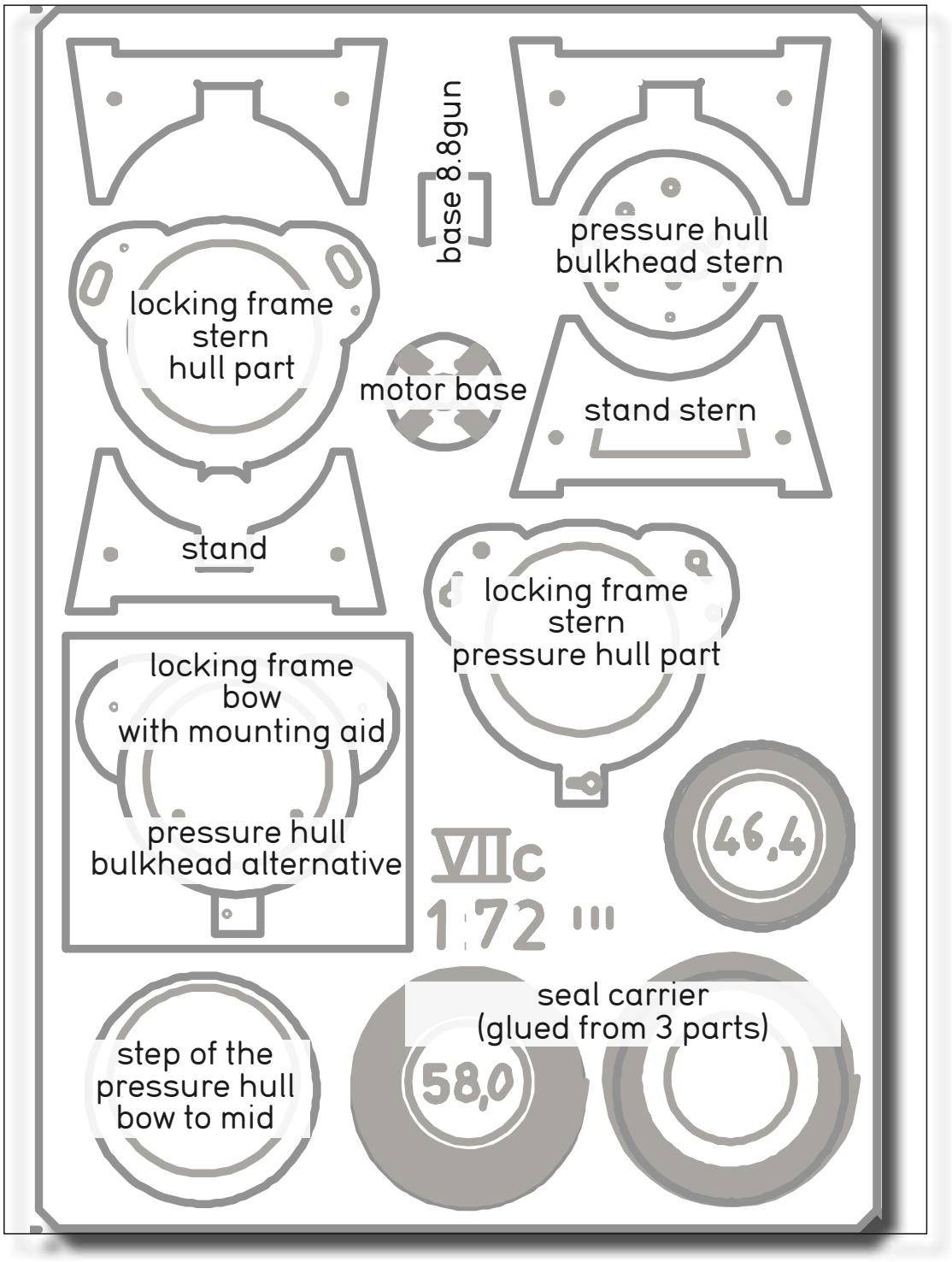
The pressure hull mainly consists of 3 pipes of different diameters. The middle and bow sections are glued to the bow section of the hull. The stern section, which contains servos and the motor remains demountable.

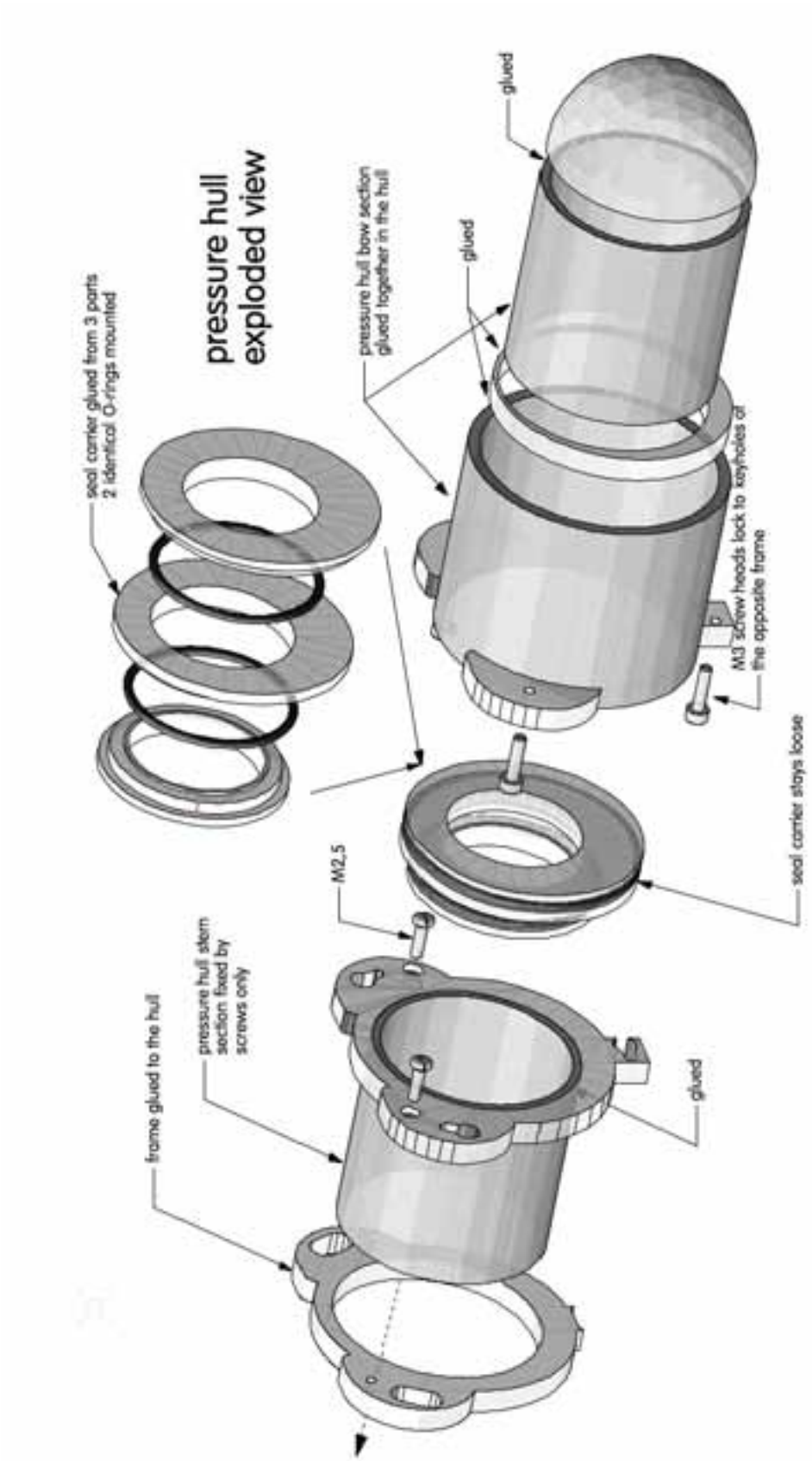
The sections are joint and sealed with a special kind of bayonet lock. The seal carrier is a loose ring between the parts. This way the full access diameter to both sections stays open. The locking is done by 3 screw heads and keyholes.

The pipes and milled parts are made from polystyrene. Gluing them can be done with „Uhu acrylit“, „Loctite 406“, „Stabilit Express“ or any slow curing (> 20 min) Epoxy glue. The usual polystyrene glue used for plastic models will work too.

The mounting of the pressure hull bow section should be done „in one heat“. That means try if everything fits without glue (especially the deck, although mounted later), eventually file some corners and then mount all parts and let dry.

The stern pressure hull has only one frame glued to it. This frame fits tight into the hull, but is not glued to it. It is mounted to a second hull connected frame by screws. This way the gear and propeller shafts remain serviceable.



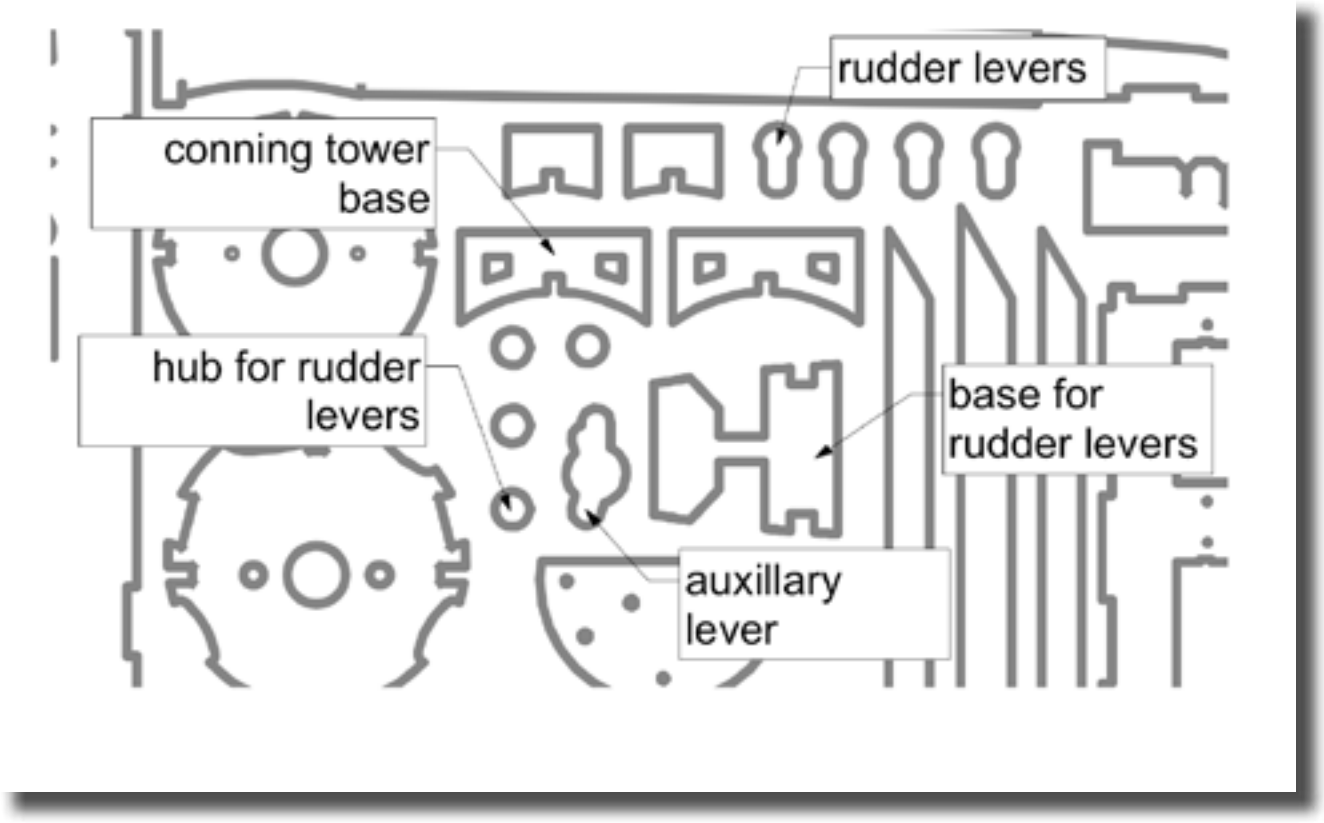

pressure hull
exploded view
seal carrier glued from 3 parts
2 identical O-rings mounted
pressure hull bow section
glued together in the hull
glued
glued
M3 screw heads lock to keyholes of
the opposite frame
seal carrier stays loose
M2.5
pressure hull stern
section fixed by
screws only
frame glued to the hull
glued

Servo linkages

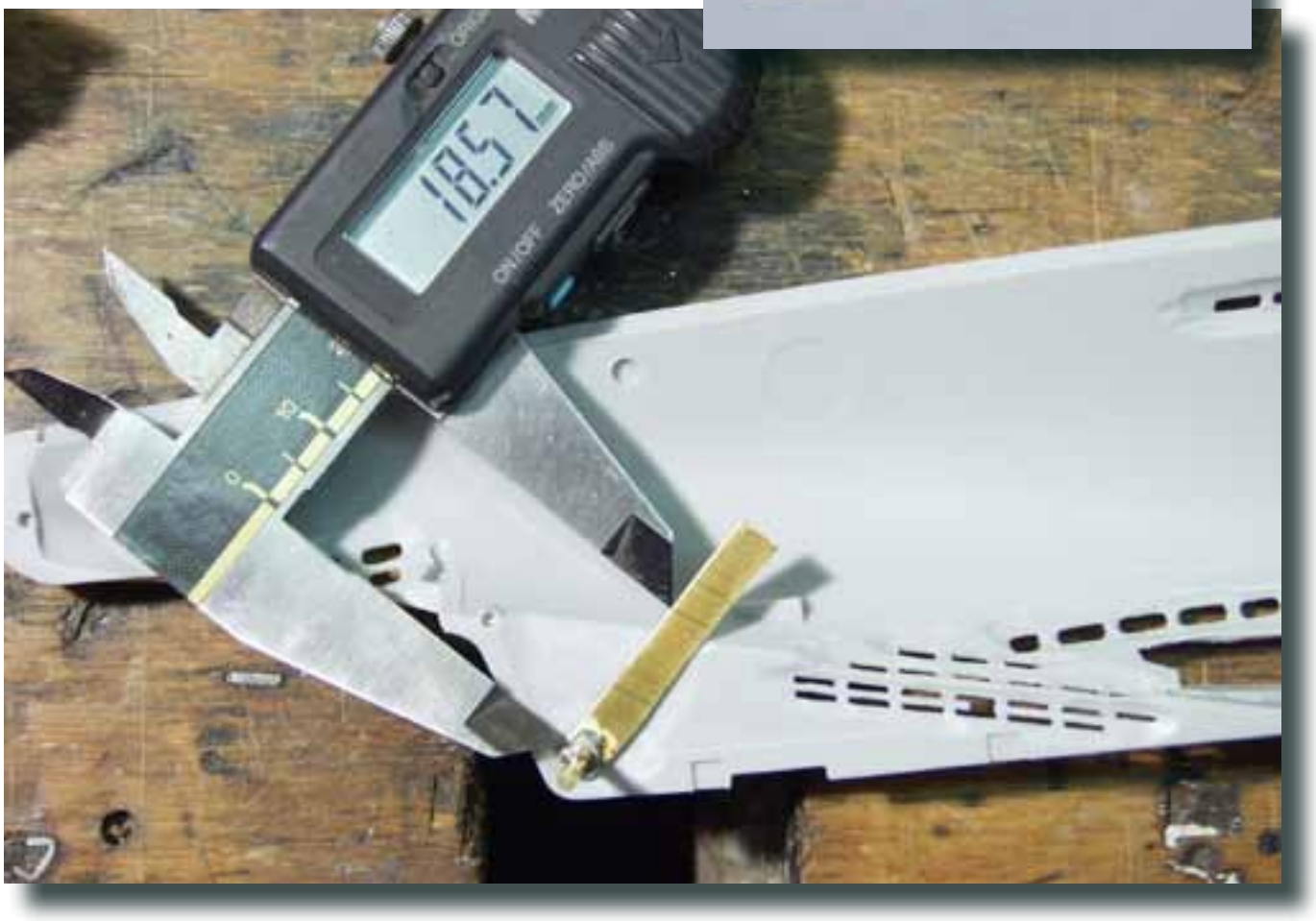
The stern contains all rudder linkages. Because of this the deck in this area should be removable.

The rudders are actuated via a auxiliary lever,

just as in the original U-boat. Levers and base-plate can be found in the 2mm cut plate. The rudder shafts are 2mm brass and the linkages ø 1 mm St/St. The corresponding holes have to be bored following the markings on the parts.



The most difficult problem in this area is the lever for the depth plane. The lever is located in the narrow keel. The lever is made from 0,5 mm brass plate and soldered to the plane shaft. The keel must be grinded on the inside to make room for the lever, so it can run freely.



Gear

One mayor problem with small submarine models are the seals for the motor shafts. Industrial seals at reasonable prices are only available for ≥ ø 3mm. Their friction will stop small motors completely.

A practical concept for this VIIc uboat uses one relatively big, slow turning motor with a ø 3 mm shaft seal. A gear in the free flood area distributes the power to the propellers and rises their revolutions. By this means the propellers turn higher than the seal.

The motor shaft is ø 2,35 mm and is thickened to ø 3 mm by a special made add on shaft. It is ø 4 mm at the tip to hold the gearwheel. The transitions are heavily rounded, so it can pass the seal without damaging it.

The gearwheels have ø 4 mm bores and are mounted to the ø 2 mm shafts by spacer sleeves. They are fixed by glue, or (better) by M3 grubscrews if you can make the threaded bores.

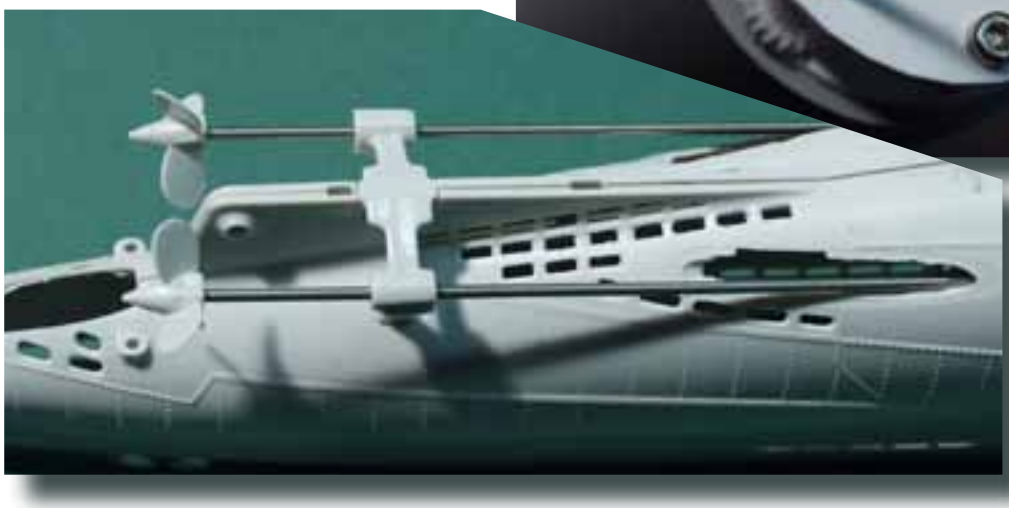
The bushings in the smaller gear plate are only used during mounting and testing. They should be removed later.

The prop shaft bushings can be bored to ø 3,5 mm and equipped with the bushings. These special plastic bushings have excellent wear resistance when used with water as lubricant.

The hull pass threw for the prop shafts are liberally machined to give enough clearance.

When the motor / gear unit runs satisfactory it is glued to the stern part of the pressure hull. This is done inside the hull, so all fits well.

The last thing to mount are the prop shaft housings (german: Wellenhose = trousers for the shafts). Their bore should be about 2,5 mm to give some clearance to the shafts.



Equipment tray

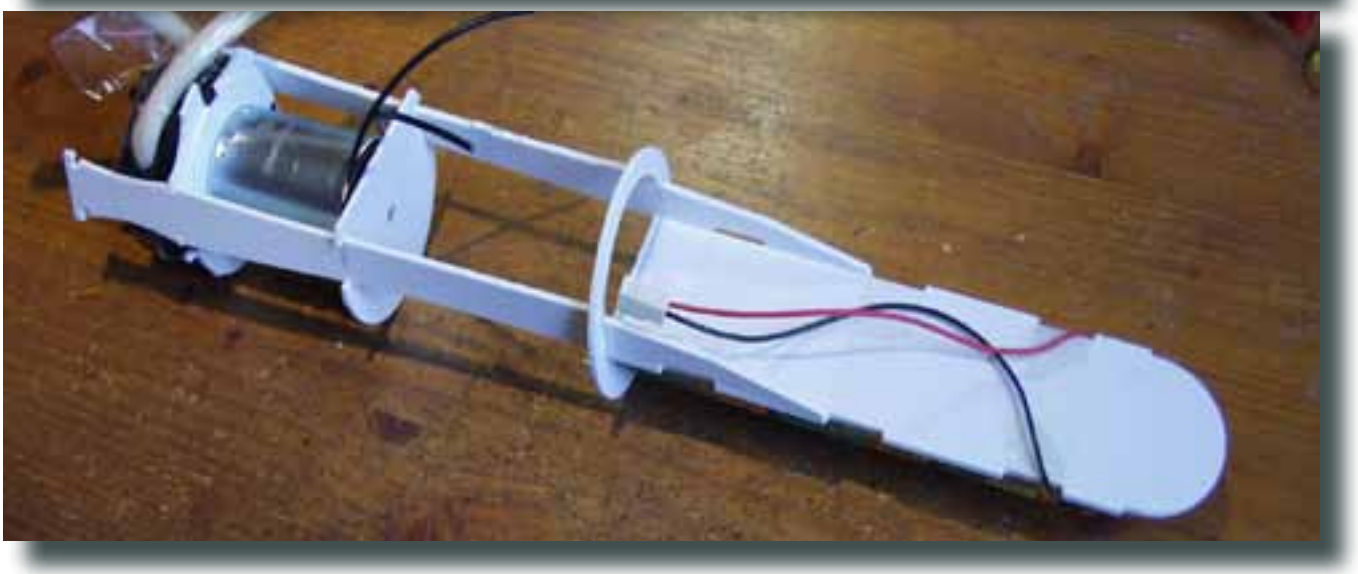
Stern

The equipment tray for the stern section holds the two servos. It is hold in place by a very long screw which is made from Threaded rod and a knurled nut. It fits into a M3x12 i/o elongation in the motor frame.

The rudder and plane linkages are from ø 1 mm stainless steel wire. To make them fit the push rod seals they are thickened to ø 3 mm in this area by gluing on a brass pipe.

Bow

The bow part of the equipment tray holds the batteries and the ballast system. Suggested batteries are 12 NiMh-cells of size AAA (ø10x43 mm)



Ballast system

The ballast system is a peristaltic pump / gummisack system, specially adapted to the small model.

The necessary ballast water weight is about 150 - 200 g. The Type VII U-boats were dedicated quick-divers. Taking this into account the biggest possible pump is installed into the model. It is tricky to mount, but will let the model dive within 30 sec.

The prototype had two balloons stuffed one into the other as diving tank. Although this definitively was a quick and dirty solution it proved to be quite durable. Inside the dark hull the balloons can stand 3 years before they become brittle. If you change them yearly you are on the safe side.

A full size BTS (BallastTankSwitch) will not fit into the small model. For the same reason there is no pressure switch to limit the tank fill. The pump is actuated by a small motor controller without any safety circuits. This is a trade-off you have to make in a miniaturized model.

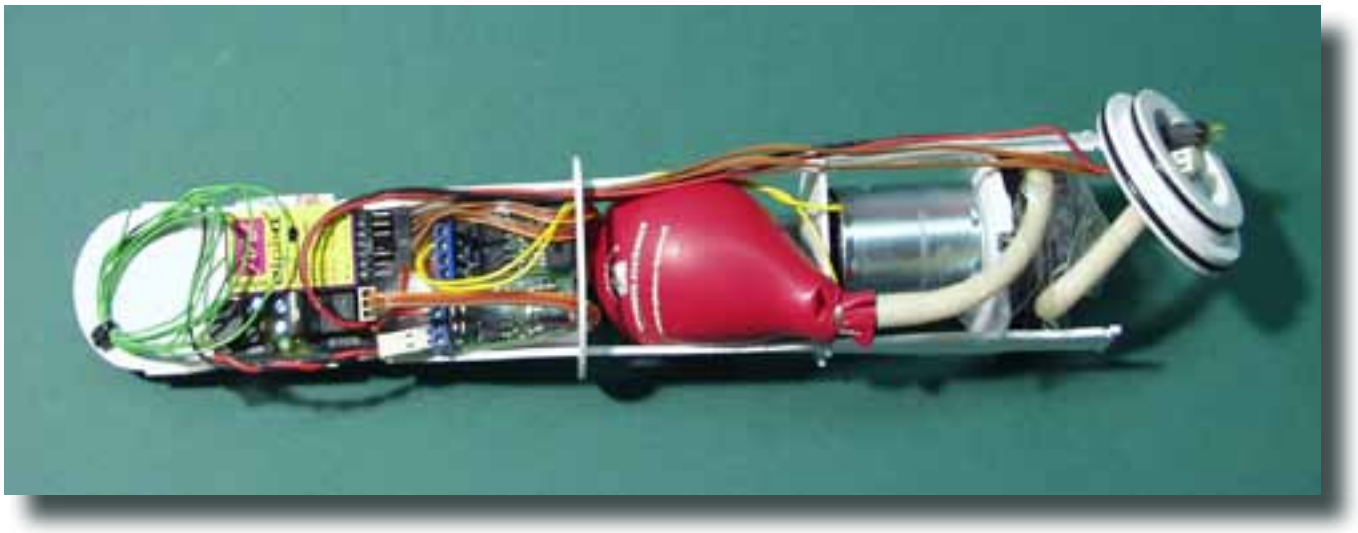
Electronics

Most of the recommended safety features for a RC submarine can be realised by using an „intelligent“ (= containing a microprocessor) receiver.

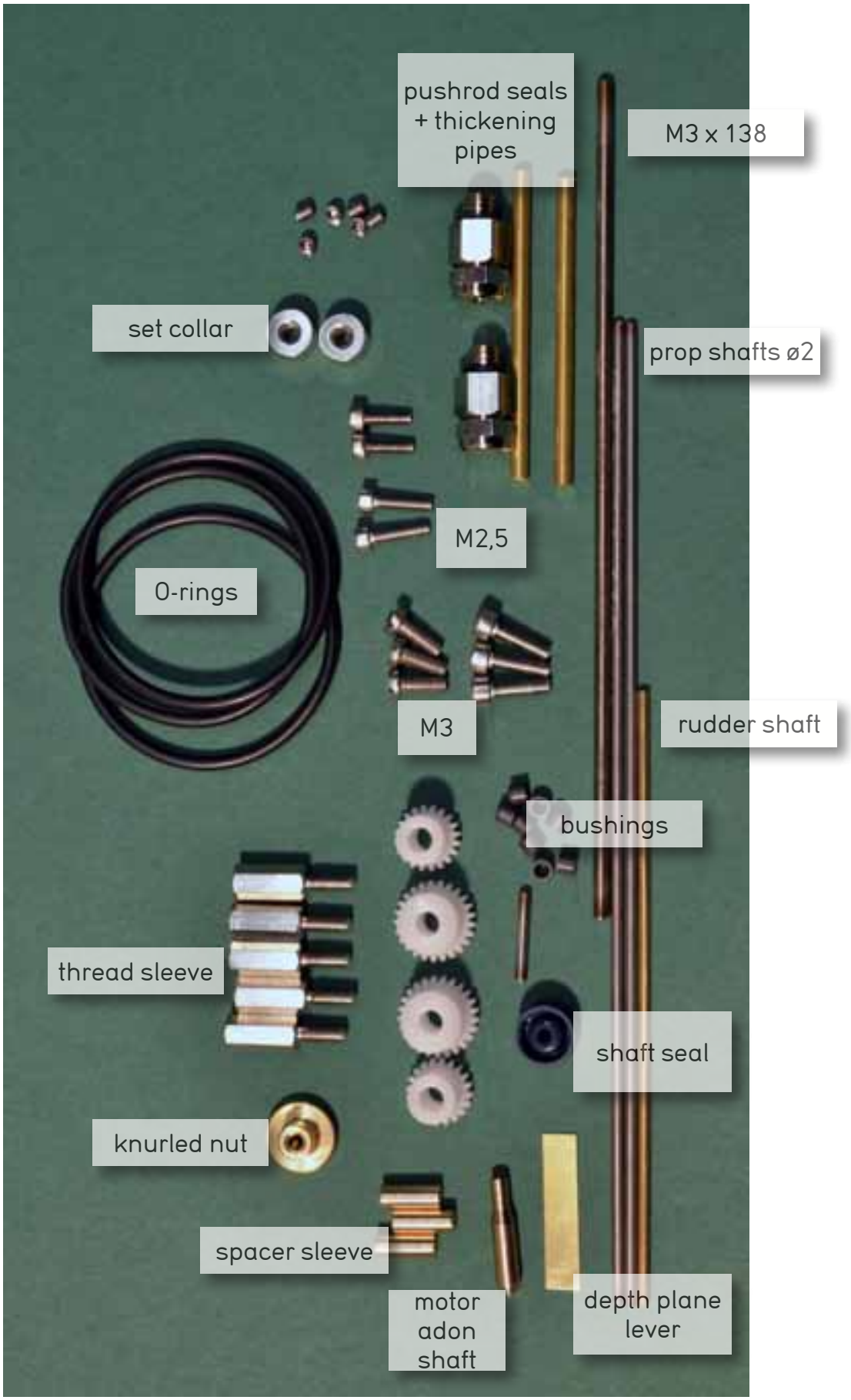
On the prototype this was „Schulze alpha 8.40“ with integrated Fail safe and programmable under voltage behaviour.

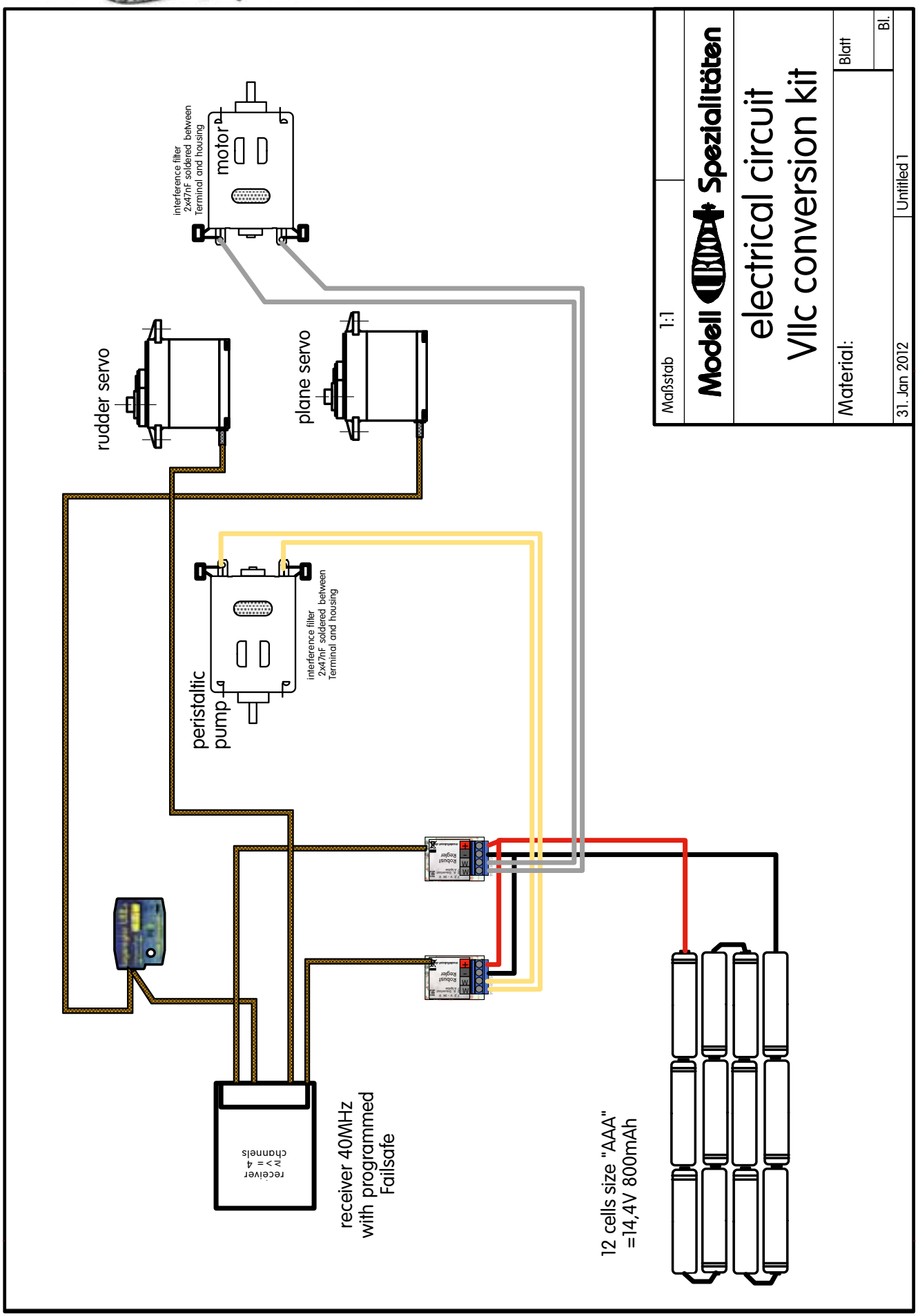
A recommended component is a pitch controller as the LR3. Without this the model will behave resistive when diving.

Further components on the prototype were 2 motor controllers „Robustregler 2A“ for motor and pump and a magnetic switch.



Pos.	num.	name	size/ material
		group: pressure hull	
1	1	pressure hull mid	ABS ø63,5 x 3,2 x 190mm long
2	1	pressure hull bow + stern	ABS ø50,8 x 2 x 160+140mm
3	1	hemispherical head	ABS ø50,8
4	1	PS cut plate (thick)	PS 318 x 218 x 6mm, 17 parts
5	1	PS cut plate (thin)	PS 319 x 229 x 2mm, 30 parts
6	3	O-ring (1xReserve)	ø40 x 2,5 55Shore
7	3	screw	M3x12 V2A Inbus
8	2	screw	M2,5x8
		motor assembly	
9	1	Motor 385 (600 /min V)	Igarashi 385 24V
10	2	gearwheel	m0,5 20Z Acetal
11	2	gearwheel	m0,5 25Z Acetal
12	3	space sleeve	ø4/ø2x10 Ms
13	1	ad on shaft ø3 / ø4	Drehteil ø4/ø2,37x20
14	2	screw	M2,5x10
15	3	screw	M3x8 DIN84 VA
16	5	threaded sleeve M3x12 in/out	M3 x12 Ms
17	8	bushing ø2	GSM-0203-03
18	4	grub screw	M3x3 VA
19	1	shaft	Ø2mm V2a x15
20	2	prop shaft	Ø2mm V2a x160
21	1	shaft seal	3-10-6 BAOF
22	2	pushrod seal	SW9x15 für 3mm
23	2	thickenning	MS-Rohr ø3/ø1,6x50
24	0,5 m	wire	St/St ø1mm
25	1	rudder shaft	bras ø2mm*100
26	1	depth plane lever	brass plate 25x6x0,4mm
27	2	set collar	ø3+VA grubscrew
28	1	threaded rod	M3x138
29	1	knurled nut	DIN 466 high M3 Ms
	1	instructions and plan	11 pages A4 +1x A0
30	1	Ballast	250g e.g. soldering tin Sn25Pb


pushrod seals + thickening pipes
M3 x 138
set collar
prop shafts ø2
M2,5
O-rings
M3
rudder shaft
bushings
thread sleeve
shaft seal
knurled nut
spacer sleeve
motor adon shaft
depth plane lever


Maßstab 1:1
Modell U-Boot Spezialitäten
electrical circuit
Vllc conversion kit
Material:
Blatt
Bl.
31. Jan 2012
Untitled 1
motor
interference filter
2x47nF soldered between
Terminal and housing
rudder servo
plane servo
peristaltic
pump
interference filter
2x47nF soldered between
Terminal and housing
receiver
2 > = 4
channels
receiver 40MHz
with programmed
Failsafe
12 cells size "AAA"
=14,4V 800mAh