

Wave Cruiser 2022



Manual Wave Cruiser kit.



A project of the Service Kring JOTA-JOTI.

Do you like Wave Cruiser, do you like any great ideas?

Let us know, read on the last page how.

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Remark:

We would like to advise the guidance on soldering to read this complete document carefully in advance. It is sufficient to print only pages 4 to 6 for the purpose of building itself.

TIP: Assembling a copy yourself for the construction activity is not only fun but also useful.

Introduction:

The Wave Cruiser is electronically a simple kit, the challenge will consist of the 3D construction.

It appears, and we only welcome this, that soldering activities are not only limited to the JOTA-JOTI but that there is also, for example, on group weekends, summer camps and schools, soldering is rampant. Due to the continuing demand for electronics projects, we think we have released a nice kit again. With sufficient guidance, soldering can even be done with children from the age of 5. For tips see the chapter "Soldering with children" on page 9. For more kits check out kitbuilding.org.

Have fun building the Wave Cruiser!

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Contents of the kit:

The table below can be used to check the contents of the kit. Solder and a CR2032 battery must be taken care of themselves.

Component	Value	QTY	Position on PCB	Comments
Resistor	47 Ω	1	R1	yellow, purple, black, gold
Resistor	470 Ω	2	R2, R3	yellow, purple, brown, gold
Resistor	1.5 K Ω	2	R4, R7	brown, green, red, gold
Resistor	470 K Ω	1	R5	yellow, purple, yellow, gold
Resistor	47 K Ω	1	R6	yellow, purple, orange, gold
Condensator	220 μ F	1	C1	blue, pay attention to polarity,
LED	white	1	D1	pay attention to polarity
LED	red	1	D2	pay attention to polarity
LED	green	1	D3	pay attention to polarity
Transistor	BC33725	1	Q1	pay attention to correct placement
switch		2	SW1, SW2	
Battery holder	CR2032	1	BT1	pay attention to correct placement
PCB		1		

Component numbering and component values:

Imprint	Component	PCB	Imprint	Component	PCB
R1	47 Ω	mast	D1	LED white	mast
R2	470 Ω	mast	D2	LED red	navigation lights
R3	470 Ω	mast	D3	LED green	navigation lights
R4	1.5 K Ω	hull	Q1	BC33725	hull
R5	470 K Ω	hull	SW1	switch	sword
R6	47 K Ω	hull	SW2	switch	sword
R7	1.5 K Ω	hull	BT1	Battery holder	romp
C1	220 μ F	hull			

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Construction description of the Wave Cruiser:

Normally we assemble the parts from low to high. In this case, that is a bit more difficult because it is a 3D kit. The assembly order below works well, but it is difficult to describe a uniform way for this. More ways of assembly are possible. The PCB also contains 2 solder supports, which can be used during construction. Furthermore, a small vice, clothespins or "sticky gums" for posters can be of good service. **The resistors in this kit are different than in the photo, the tables and the text have been adjusted on the included resistors!**



The resistors are mounted horizontally. To do this, bend both wires at an angle of 90 degrees taking into account the distance between the holes on the PCB. Insert the resistance through the pcb and gently bend the wires on the bottom of the PCB slightly apart. The PCB can now be turned over to solder without the resistance falling out of the PCB. After soldering, cut off the legs just above the soldering. Do this also for all other components with longer legs such as the LEDs and capacitors. If in doubt about the correct placement, look at the photos.

Tip 1: The dots at the beginning of the line can be colored to indicate which parts have already been assembled.

Tip 2: When in doubt about the assembly of a component, look at the photo of the built-up PCB, once soldered incorrectly, repair can sometimes be very difficult.

Tip 3: For the resistors, a component bending mold can do good service.

Mounting order:

The loose PCBs are stuck in the large PCBs by means of small "bridges", by applying force at the place of the bridges the PCBs can be carefully broken loose. If necessary, the place where the bridge was located can be finished smoothly with a small file or some sandpaper.

- Break the hull loose from the large PCB.
- Mount the battery holder at the bottom of the fuselage.

Take a good look at the PCB to see how it should be mounted. The easiest way is to secure it on one side with a drop of tin. Then heat the solder again and carefully bring the battery holder into the right position with tweezers. Then solder the other side and then the first side tightly.



Mount the following resistors successively:

- R4, R7: 1.5 K Ω (brown, green, red, gold)
- R5: 470 K Ω (yellow, purple, yellow, gold)
- R6: 47 K Ω (yellow, purple, orange, gold)



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- Break the mast with sails loose from the large PCB.

Assemble in sequence the following resistors:

- R1: 47 Ω (yellow, purple, black, gold)
- R2, R3 470 Ω (yellow, purple, brown, gold)

We are now going to assemble the boat:

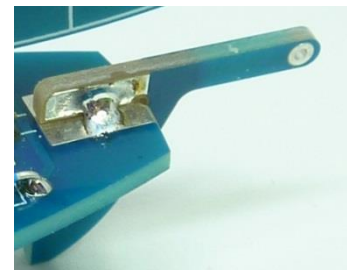
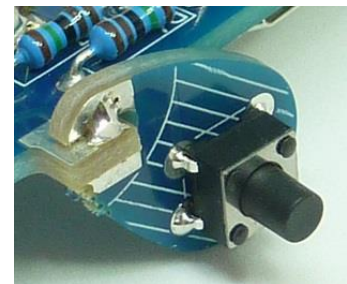
- Mount the mast on the hull, it is slid in from the top.

Attach it to one of the four surfaces at the top with a drop of solder. By making this warm every time, the mast can be positioned properly.

If it is in good condition, the mast can be soldered to the top and bottom. Let the PCB cool down well after soldering a surface. The other parts are assembled in the same way.

TIP: To prevent the solder from flowing down through the hull, it is advisable to place the boat with the sail on a box or a block of wood horizontally during soldering.

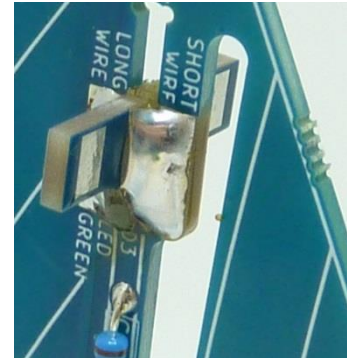
- Break both swords loose from the PCB.
- Mount a pressure switch (SW1 and SW2) on each sword.
- Secure both swords to the torso with a small drop of tin.
The letter on the back of the sword should match the letter on the bottom of the hull.
- Break the bow out of the PCB.
- Secure the bow to the hull with a small drop of tin.
- Break the rudder out of the PCB.
- Secure the rudder to the hull with a small drop of tin.
- The boat must now remain standing itself.
- By heating the soldering of one of the swords, bow or rudder each time and repositioning the part, the ship can be straightened.
- After that, all surfaces (top and bottom) on the swords, bow and rudder can be soldered permanently.



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- Break the boards for the navigation lights out of the large board.
- Slide the PCB with the slot to the bottom of the mast. The front and back are the same so it doesn't matter how you mount this PCB.
- Solder the PCB neatly straight to all 4 places to the mast.



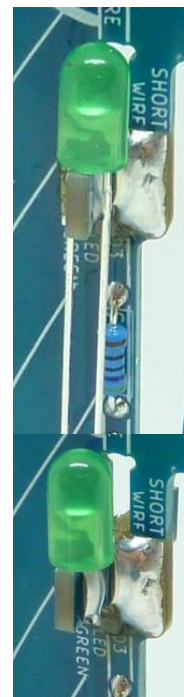
We are now going to assemble the remaining parts.

- Mount C1 (220 μ F) on the hull, the long connection comes into the hole at the + on the PCB.
- Mount Q1 (BC337/25) on the hull, pay close attention to how it should be mounted, the shape of Q1 is drawn on the board



Now the LEDs can be mounted, they have a short and a long leg. Pay close attention to the placement of this! This is also indicated on the PCB.

- Place the green LED on the right (starboard) on the pcb for the navigation lights. The short connection comes on the bow side.
- Solder it neatly on both sides and cut the wires under the PCB.
- Do the same with the red LED on the left side (port side), the short connection also comes back on the bow side.
- Mount the top, which is the white LED. Of these, the legs must first be shortened a bit. Cut the short leg a little shorter than the long one, then you always know how to sit. The long leg comes on the starboard side, near the green LED.



- To complete the boat, mount a cut wire from the bow to the jib.
- Slide the battery (CR2032) into the battery holder under the fuselage, pay attention to the + and -!



The Wave Cruiser is now ready to use!

When pressing the switch on the starboard sword, the navigation lights turn on.

When pressing the switch on the port side, the top duty turns on and after a certain time automatically turns off again.

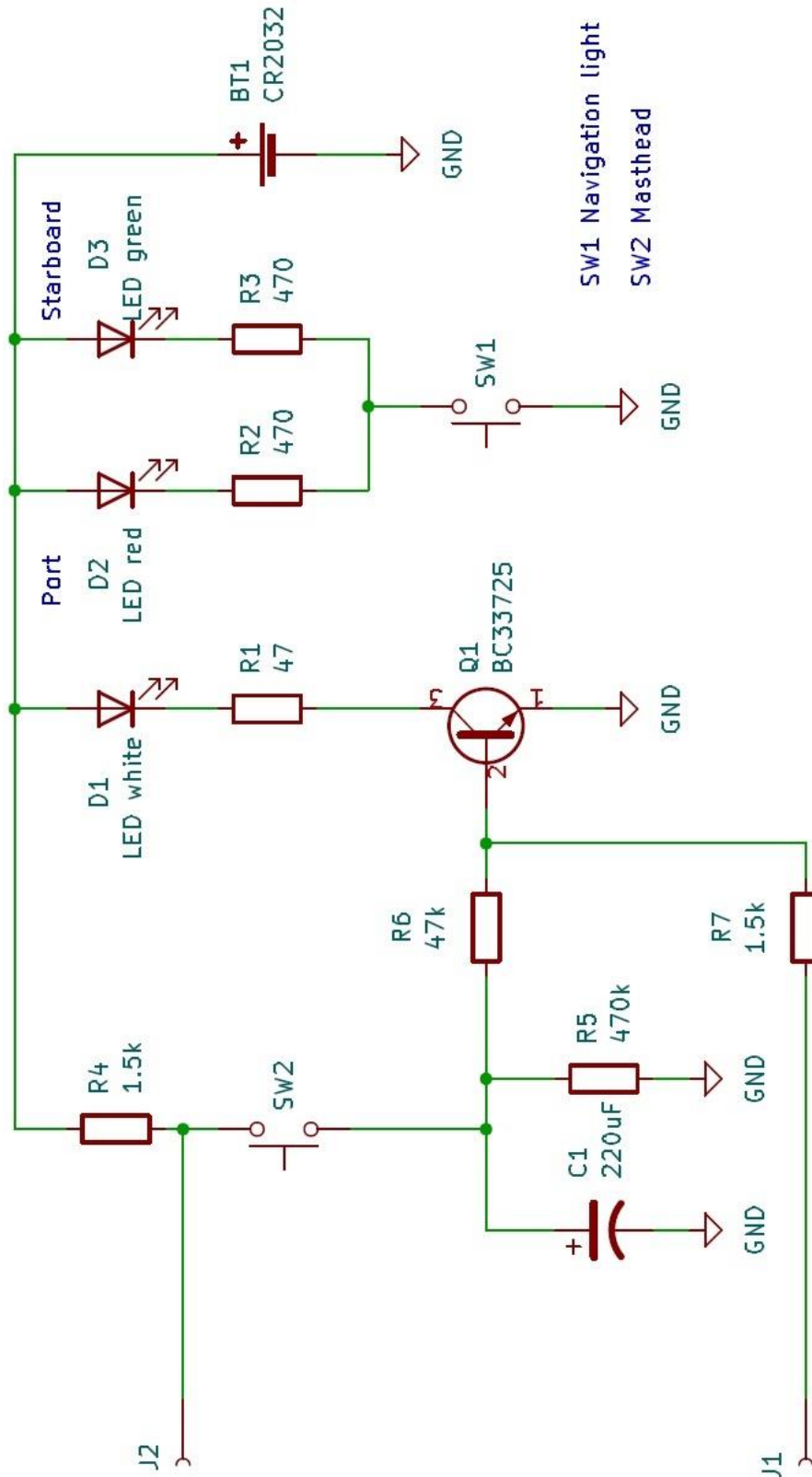
By touching the 2 silver-colored surfaces next to the rudder with wet fingers, the top obligation also turns on! Connect a Morse key to this and you can signal with THE top duty!



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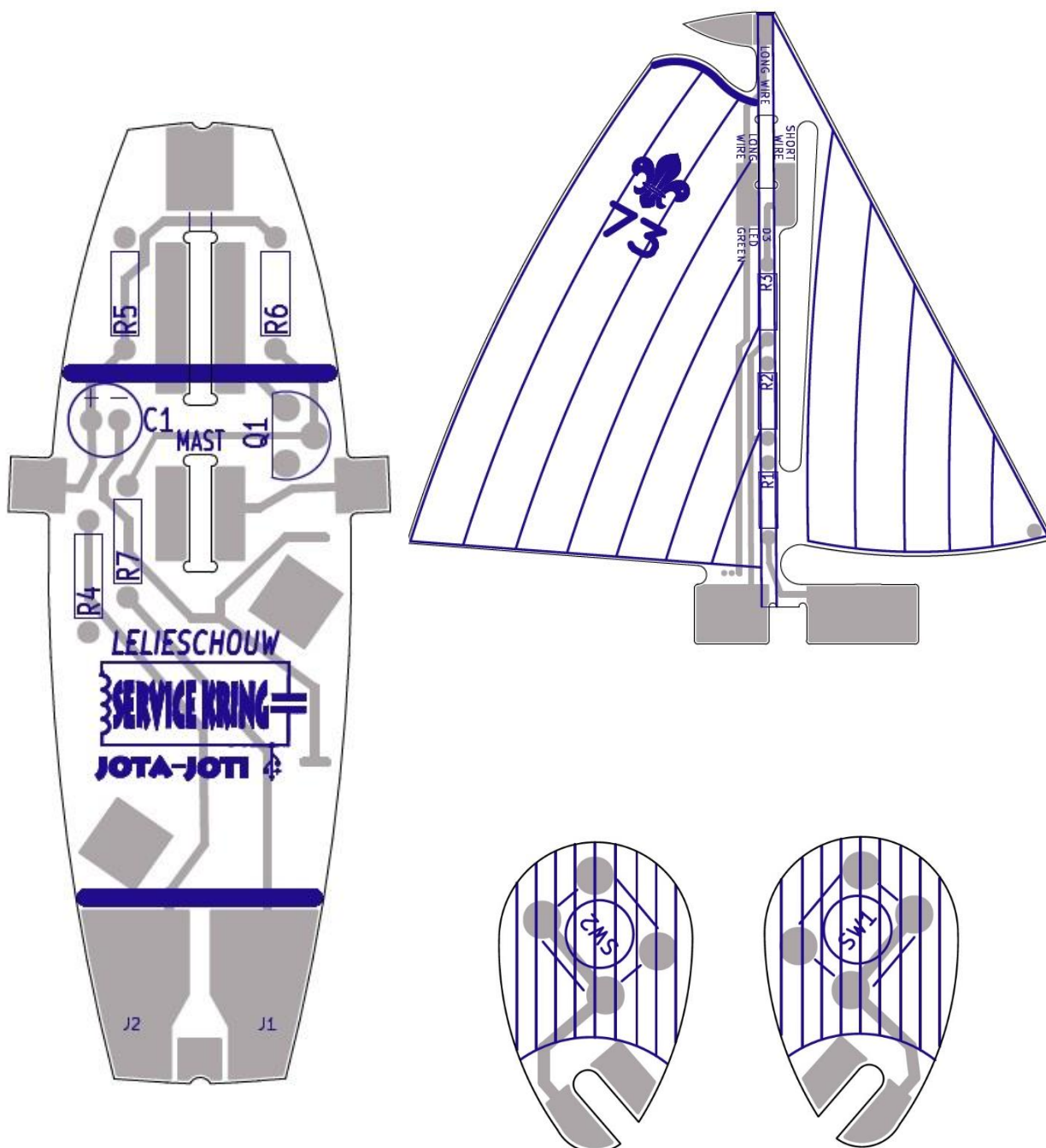
Schematic:



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Component arrangement, not to scale:



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Fully assembled kit:



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Soldering with children:

There are a number of pitfalls conceivable when soldering with children, by avoiding these the chance increases that the project will be successfully completed.

We regularly come across the following things:

- Making the solder connection takes (much) too long, normally a solder connection is made in about 3 seconds. Preheat for about 1.5 seconds (with a little solder at the tip for good heat conduction), add solder, remove solder and soldering iron. Children do not yet have this dexterity and the materials are heated for too long and therefore too hot.
- Children often have the tendency to put solder on the soldering iron and then "stick" it on the PCB the flux is already burned and a bad soldering is then the result. In an attempt to get it right, the soldering place is then heated for an extra-long time with a chance of defects of components, etc.
- Temperature-controlled soldering irons are set to too high a temperature, for lead-containing solder, about 320 °C is an excellent temperature for soldering.
- Non-temperature controlled soldering irons often have too high a power, the pin temperature can rise to 450 – 500 °C. A bolt with a power of about 15 – 20 W is most suitable for this type.
- The guidance has not read the manual in advance and does not know exactly what needs to be done.
- There is too little guidance compared to the number of participants. Especially the youngest children need a lot of guidance. A guideline is to assume 1 companion on 1 beaver, in cubs / gnomes 1 supervisor per soldering station (2 scout members per soldering station). At Scouts and parent 1 supervisor on 4 members. As the members are more experienced, this can of course be adjusted.
- It is advisable, in addition to the solder guidance, to have one supervisor who checks the PCB and (if applicable) places the ICs etc. In the quiet moments, it can therefore focus on PCB that do not work immediately.

Feedback:

Do you have any comments or would you like to give feedback about the Wave Cruiser?

Do you have any comments or questions about the Jota-JOTI Service Circle?

Please contact us via the contact form on the site www.kitbuilding.org.

On behalf of the Service KRING JOTA-JOTI we wish everyone a lot of building fun with the Wave Cruiser!