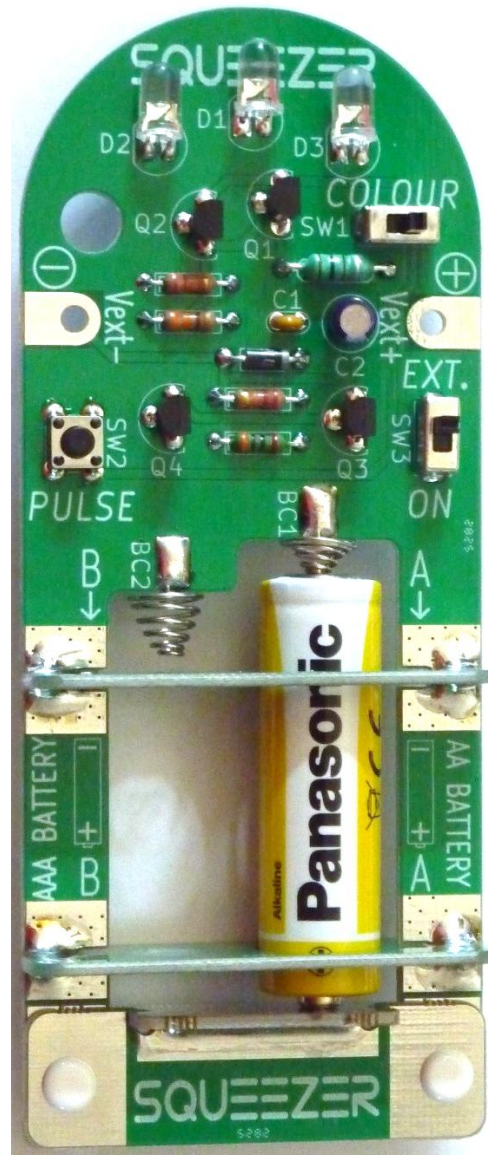


Squeezer

Manual Squeezer kit.



A project of the Service Kring JOTA-JOTI.

Do you like Squeezer, do you have any great ideas?
Let us know, read how on the last page.

Squeezer



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Remark:

We would like to advise you to read this entire document carefully in advance. It is sufficient to print only pages 5 to 8 for the purpose of building itself.

TIP: Assembling a copy yourself before the construction activity is not only fun but also useful. You already gain experience and this Squeezer can immediately serve as an example for the construction activity.

Introduction:

It turns out, and we only applaud this, that soldering activities are not only limited to the JOTA-JOTI, but that soldering is also done furiously on group weekends, summer camps and schools. Because of the continuing demand for electronics projects, we think we have released another nice kit. 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 12. For more kits, check out kitbuilding.org. The "Squeezer" as described here is a handy light that takes the last bit of energy out of your already empty battery. Therefore, do not throw your empty batteries (AA & AAA) in the recycling bin immediately, but use them in your "Squeezer" first! This one really squeezes out the last bit of energy!

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Have fun building the Squeezer!

What is a Squeezer?

We all use battery-powered devices. Sometimes you can charge them, but often you can't. And those batteries? Of course, we hand them in neatly at a collection point. But did you know that many batteries that seem 'empty' actually have a little energy left? Too little for your remote control or flashlight, but just enough to do something cool with.

And that's where the Squeezer comes in!

With the Squeezer, you squeeze the very last bit of energy out of your battery. And what does he do with it? It lights up a bright LED, so the Squeezer is just a kind of flashlight! You can choose between white light and red light. Super handy when you walk in the dark: white light on the front, red on the back. This way you stand out and you can see where you are walking. But red light is also perfect when you go stargazing. Your eyes are used to the dark, and if you suddenly use white light... well, then you have to get used to it all over again. With red light, you just keep seeing your stars! The Squeezer also has a button with which you can give light signals. Think of Morse code, so you can even send light messages. Handy and cool.

It fits AA and AAA batteries, so you can get started right away. But are you a bit of a tinkerer? Then you can also use other energy sources via two extra connections: a 4.5V or 9V battery, a solar cell or even a supercapacitor. Just fix some threads and you're ready to experiment!

Are you a real researcher?

Then it gets really fun! You can also connect your own battery to the Squeezer. How about a lemon or a cola battery? With this and with a galvanized nail and a piece of copper wire, you can really make your own battery! Connect your creation to the Squeezer and find out if you can generate enough energy to keep the light on.

Now that's science in action!

Before you get started, **two important tips:**

🔋 Do not use rechargeable batteries in the Squeezer.

They don't like being completely drained at all. As a result, they damage and you can charge them less well or even not at all. So only use regular alkaline (disposable) batteries.

⚡ No empty battery at hand?

No problem! You can also just use a full one. Then your Squeezer will last extra long and you will immediately see how bright it can shine!

With the Squeezer, you as a Scout are not only smart and creative, but also energy-efficient, environmentally conscious and ready for the future. Go green, go bright, go Squeezer! 🌍 🔧 💡

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Contents of the kit:

The table below can be used to check the contents of the kit. Solder and an "empty" battery must be taken care of yourself.

Component	Value	Number	Place on print	Comments
Resistor	22 k Ω	2	R1, R3	red, red, orange, gold
Resistor	330 Ω	1	R2	orange, orange, brown, gold
Resistor	30 Ω	1	R4	orange, black, black, red
LED	white	1	D1	Pay attention to polarity
LED	red	2	D2, D3	Pay attention to polarity
Diode	1N4007	1	D4	Pay attention to polarity
Capacitor	220 pF	1	C1	inscription 221
Capacitor	47 μ F	1	C2	Pay attention to polarity
Spool	100 μ H	1	L1	brown, black, brown, silver
Transistor	BC547C	4	Q1, Q2, Q3, Q4	Pay attention to correct placement
Slider		2	SW1, SW3	
Pressure switch		1	SW2	
Battery contact		2	BC1, BC2	
Pressure nail		2	Rivet	
Circuit board		1		consists of 5 smaller PCBs

Component numbering and component values:

Txt on PCB	Component	Txt on PCB	Component	Txt on PCB	Component
R1	22 k Ω	D1	LED wit	SW1	Slider
R2	330 Ω	D2	LED red	SW2	Pressure switch
R3	22 k Ω	D3	LED red	SW3	Slider
R4	30 Ω	D4	1N4007		
				BC1	Battery contact
C1	220 pF	Q1	BC547C	BC2	Battery contact
C2	47 μ F	Q2	BC547C		
		Q3	BC547C	Rivet	Pressure nail
L1	100 μ H	Q4	BC547C	Rivet	Pressure nail

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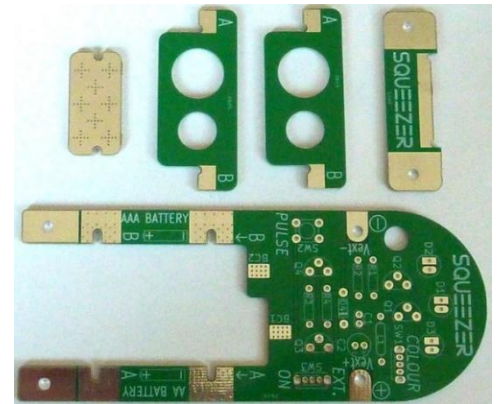
Construction description of the Squeezer:

As is often the case with our kits, the Squeezer is not a flat print with parts but a 3D project. It may be a bit more difficult to assemble but it does look much tougher than a flat print. We solder the battery holder together ourselves, which is of course much more fun than a ready-made battery holder. You can also see more quickly if a battery is going to leak.

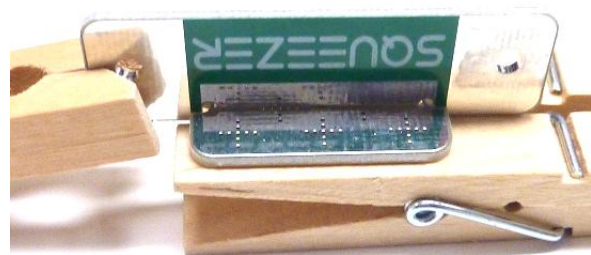
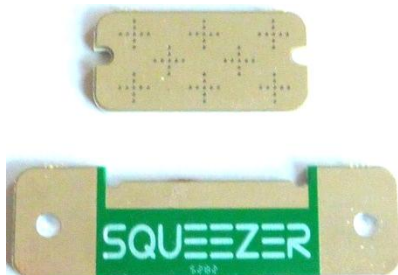
To prevent damage to parts during soldering the PCBs together, we only mount them later.

The large print that comes with the kit contains 5 separate prints, 1 large and 4 smaller. Carefully break off the PCBs, any rough edges can be removed with pliers or neatly sanded or filed.

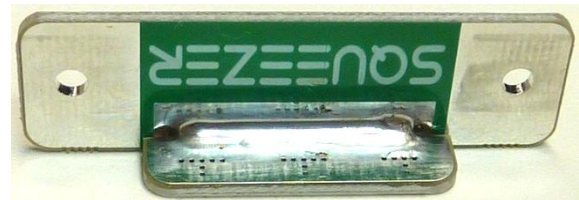
You will then be left with the PCBs as shown above in the photo.



We start by assembling the back of the Squeezer, for this we use 2 PCBs. The following photos show how this is the easiest. We put the small PCB on 2 pegs, the long PCB comes on top of that and we can hold it with a peg so that we can easily solder it.



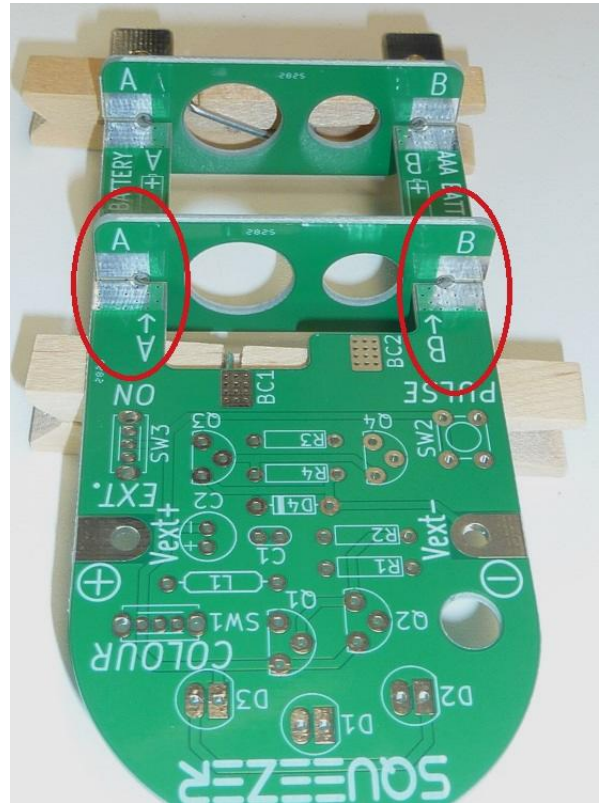
Now solder the PCBs to one point and check if the PCBs are straight on top of each other, to check that a protractor, square or a broken corner of the large PCB can be used. To correct the position, just warm the soldering again, adjust the position and let it cool down again. If we are satisfied with that, the PCBs can be soldered on both sides. Start on the other side, so don't where the soldering is otherwise everything will come loose again. You can see both steps clearly in the photos below.



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We are now going to solder the remaining 3 PCBs together so that we can also put batteries in the Squeezer later. Place the large print on 2 pegs, now place the other two prints in this print from above as shown in the photo. **NOTE:** these must be placed correctly, the sides marked with A together and the sides marked with B together, this is indicated in the photo. Do this with both prints! Now the PCBs can be fixed with a drop of solder, if they are well perpendicular to each other they can be soldered permanently.

Next step is to mount the battery springs, the easiest way is to first tin the ends of these and the place on the PCB where they should be. For the springs, this can be done by securing them in a peg. Holding it with your fingers is a painful experience because the springs get quite hot during soldering! The photo below clearly shows how the springs should be mounted.



Assembly of the parts:

When the Squeezer is that far put together, we can start with the parts. We mount the parts from low to high, the resistors, diode and coil are mounted horizontally. To do this, bend both wires at a 90-degree angle, taking into account the distance between the holes on the PCB. Insert the part through the PCB and carefully bend the wires at the bottom of the PCB slightly apart. Not completely flat because that is difficult if a part is mounted incorrectly and has to be removed, moreover this can cause a short circuit. The PCB can now be flipped over for soldering without the part falling out of the PCB. After soldering, cut off the legs just above the soldering. Do the same for all other components with longer legs. If in doubt about the correct placement, look at the photo of the built Squeezer in this building description.



Squeezer



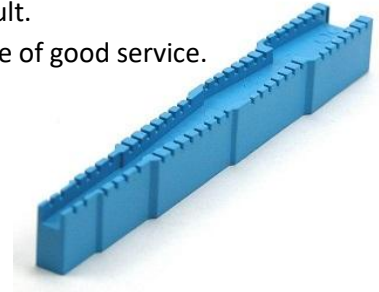
Tip 1: The dots at the beginning of the line can be colored in to indicate which parts have already been assembled.

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

Tip 3: For the resistors, among other things, a component bending jig can be of good service.

Install the resistors:

- R1, R3: 22 k Ω (red, red, orange, gold)
- R2: 330 Ω (orange, orange, brown, gold)
- R4: 30 Ω (orange, black, black, red)



Diode mount:

- D4: 1N4007 (black oblong)

Pay close attention to the placement (look carefully at the white stripe on the PCB and on the diode).

Monteer de spoel:

- L1: 100 μ H (brown, black, brown, silver)

This resembles a thicker resistor.

Monteer de ceramic condenser:

- C1: 220 pF (heading 221)

Install the pressure switch:

- SW2

Monteer de transistoren:

- Q1, Q2, Q3, Q4: BC547C

PLEASE NOTE: This must be assembled correctly. Take a good look at the drawing on the print. The flat side of the transistor is easily recognizable.

Monteer de electrolytic condenser:

- C2: 47 μ F

NOTE: this may only be mounted in one way. The long leg must be in the hole on the PCB that says +. On the capacitor the – pole is indicated on the housing.

Install the slide switches:

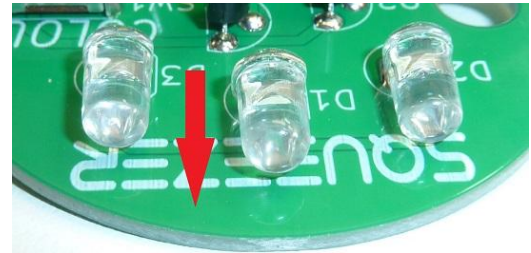
- SW1, SW3

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LED van mounting:

To do this, **first** read the text below carefully:

- There are 2 different colors of LEDs in the kit, white and red. At first glance, they all look the same, transparent. However, if you look into the LEDs from above, you will see that there is one that has a light yellow area inside, which is the white LED D1 and comes in the middle. The photo on the right shows the difference.
- LEDs may only be mounted in one way or they will not work. Take a good look at the drawing on the print. The LED has a flat side, this flat side also has the short leg. The short leg must therefore be in the hole on the PCB on the flat side of the LED. Take a good look at the drawing on the print!
- In order for the Squeezer to provide the best light when used as a flashlight, the LEDs must shine forward. We do this by mounting the LEDs flat on the PCB. Look carefully at how the LED should be soldered into the PCB, short leg on the flat side on the drawing and then bend the legs. In the photos in this building instruction, the LEDs are mounted in such a way that the LEDs are above the PCB. You can also leave the legs longer and bend them so that the LEDs are in front of the PCB, so they move in the direction of the arrow. This will give better light but they are more vulnerable!



If you have read the above correctly, mount the LEDs:

- D1: white
- D2, D3: red

Your Squeezer is now ready to use!

Click the back with one of the "pressure nails" on the large PCB, push it into the holes on the PCB and then push through gently, the "pressure nail" will get stuck. You can now take an old AA (penlight) or AAA (mini-penlight) battery, slide it into the Squeezer and "close" the back and secure it with the 2nd "pressure nail". The positive of the battery points to the back of the Squeezer. If you ever lose a "pressure nail", you can also use an M3 bolt with nut. Many nuts can even be soldered onto the PCB. If the above is not quite clear yet, take a look at the photo below and it should work! Of course, it also works with a new battery



Squeezer



Use of the Squeezer:

There are 3 switches on the Squeezer.

SW1: With this switch you can choose between red or white light.

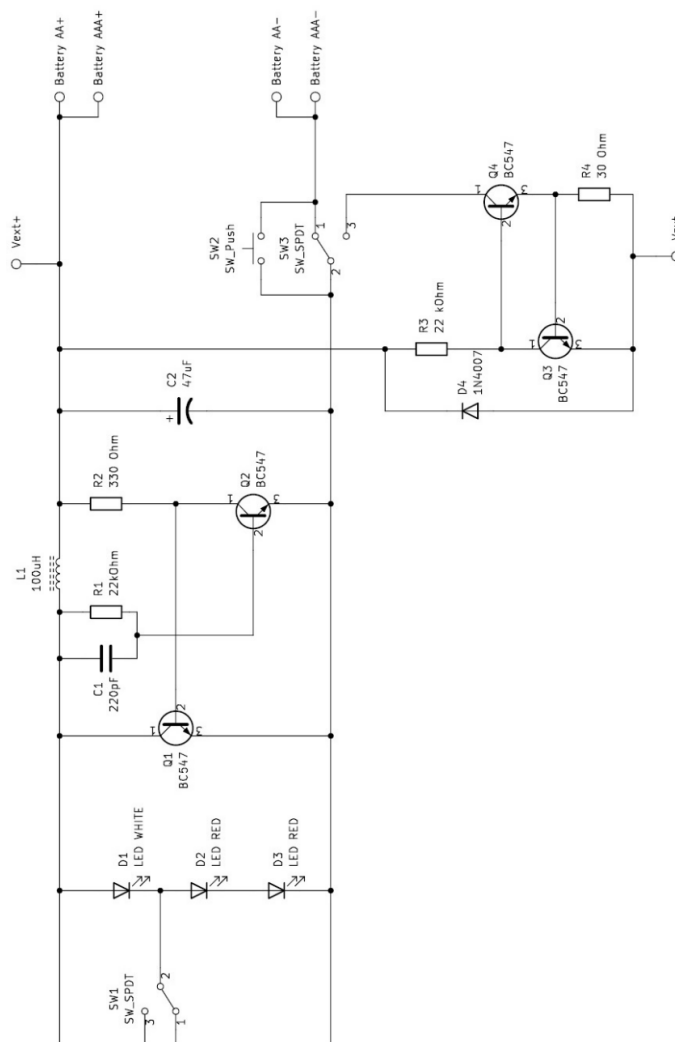
SW2: You can use this push button to signal with the Squeezer.

SW3: With this switch you turn on the Squeezer.

If you have looked closely you will see that there are 2 more connections on the Squeezer PCB, these are called Vext+ and Vext-. You can also connect external voltage to these points, for example an "empty" 9 Volt battery. Even your empty 9 Volt battery turns out to have enough energy to light your Squeezer. This connection is suitable for voltages between 2 and 12 Volts. **Never use leaking batteries in your Squeezer, they must be disposed of immediately!**

Next to Q2 on the PCB is a hole, you can put a string through it to hang the Squeezer.

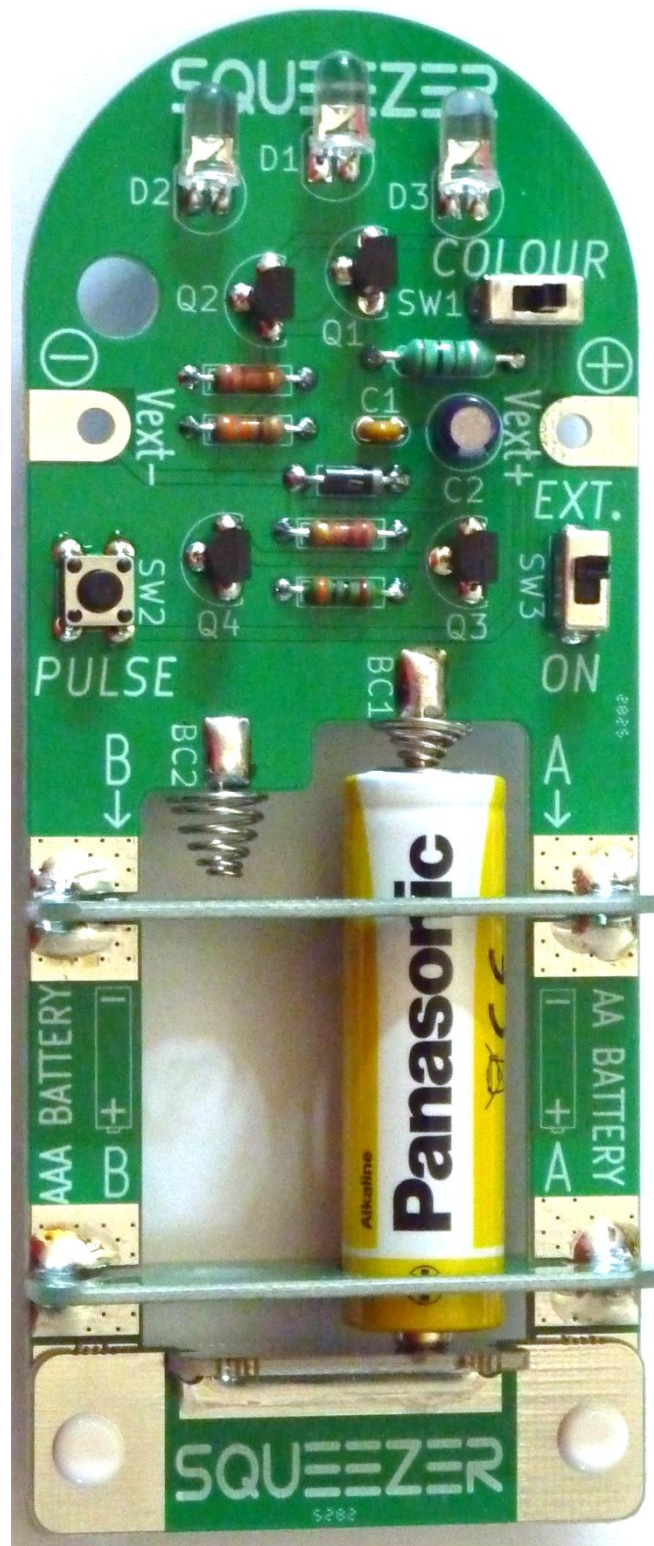
Scheme:



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Squeezer

Complete built-up PCB:



Squeezer



Soldering with children:

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

We regularly come across the following issues:

- Making the solder joint 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 skill and the materials are heated for too long and therefore too hot.
- Children often tend to put solder on the soldering iron and then "stick" it on the PCB, the flux is already burnt and bad soldering is the result. In an attempt to get it right, the soldering place is then heated for an extra long time with a risk of component defects, etc.
- Temperature-controlled soldering irons are set to too high a temperature, for lead-containing solder about 320 °C is a great temperature for soldering.
- Non-temperature-controlled soldering irons often have too high a power, the tip temperature can reach 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 beforehand and does not know exactly what to do.
- There is too little guidance in relation to the number of participants. Especially the youngest children need a lot of guidance. A guideline is to assume 1 supervisor to 1 beaver, for cubs/gnomes 1 supervisor per soldering station (2 scout members per soldering station). With Scouts and older 1 supervisor for 4 members. As the members become more experienced, this can of course be adjusted.
- It is recommended, in addition to the soldering guidance, to have one supervisor who checks the PCBs and (if applicable) places the ICs etc. In the quiet moments, he can also focus on prints that do not work immediately.

Feedback:

Do you have any comments or want to give feedback about the Squeezer?

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, we wish everyone a lot of building and playing fun with the Squeezer!