Levitation Oscillator v2

Building Instructions

The Levitation Oscillator is a 10-voices **8-bit drone and noise synthesizer** based on the ATtiny861 microcontroller. With little assembly and soldering effort, an instrument with many sound options can be built from the kit.

Soldering the components and then assembling the housing can be completed in around 45 **minutes to 2 hours**, with or without previous experience.

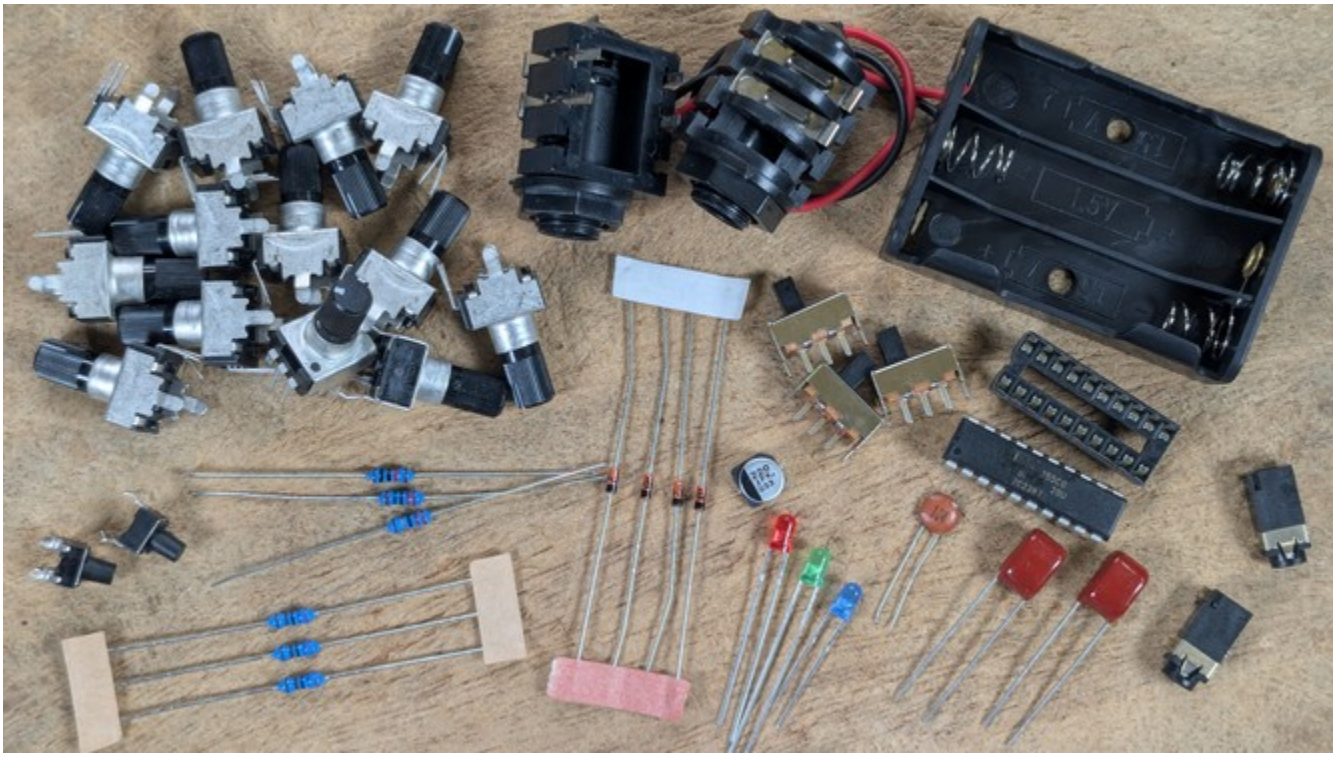
If you have little experience with soldering and electronics, you can find general and noisio **tips on soldering at this link**.

Overview of the kit components:

Quantity	Part	Value	Designation / Label
4	Schottky-Diode	Bat85	Bat85
3	Resistor	2,7 kOhm	RED VIOLET BLACK BROWN BROWN
1	Resistor	10 kOhm	BROWN BLACK BLACK RED BROWN
1	Resistor	220 Ohm	RED RED BLACK BLACK BROWN
1	Resistor	22 Ohm	RED RED BLACK GOLD BROWN
3	LED	Red + Blue + Green	
1	Ceramic-Capacitor	100 nF	104
2	Film-Capacitor	1 uF	105
1	Elektrolyt-Capacitor	220 uF	220
1	IC-Socket	20-Pin	
1	Microcontroller	ATtiny861	ATMEL Tiny 861
2	Mini-Button	TACT	
3	Slide Switch	Slide	
1	Potentiometer	1 kOhm	102 (marked with color)
12	Potentiometer	10 kOhm	103
2	Audio-Jack	TRS 3.5 mm	black
2	Audio-Jack	TRS 6.35 mm	Black with nut
1	USB-C Power Buchse	USB-C	SMD module, assembled
1	Battery-Holder	3x AAA	
1	Main PCB	ATPC PCB	
2	Side panels	PCB	
1	Front panel	PCB	
1	Back panel	PCB	LEVITATION OSC
1	Base plate	PCB	With quick guide

Tools & materials required:

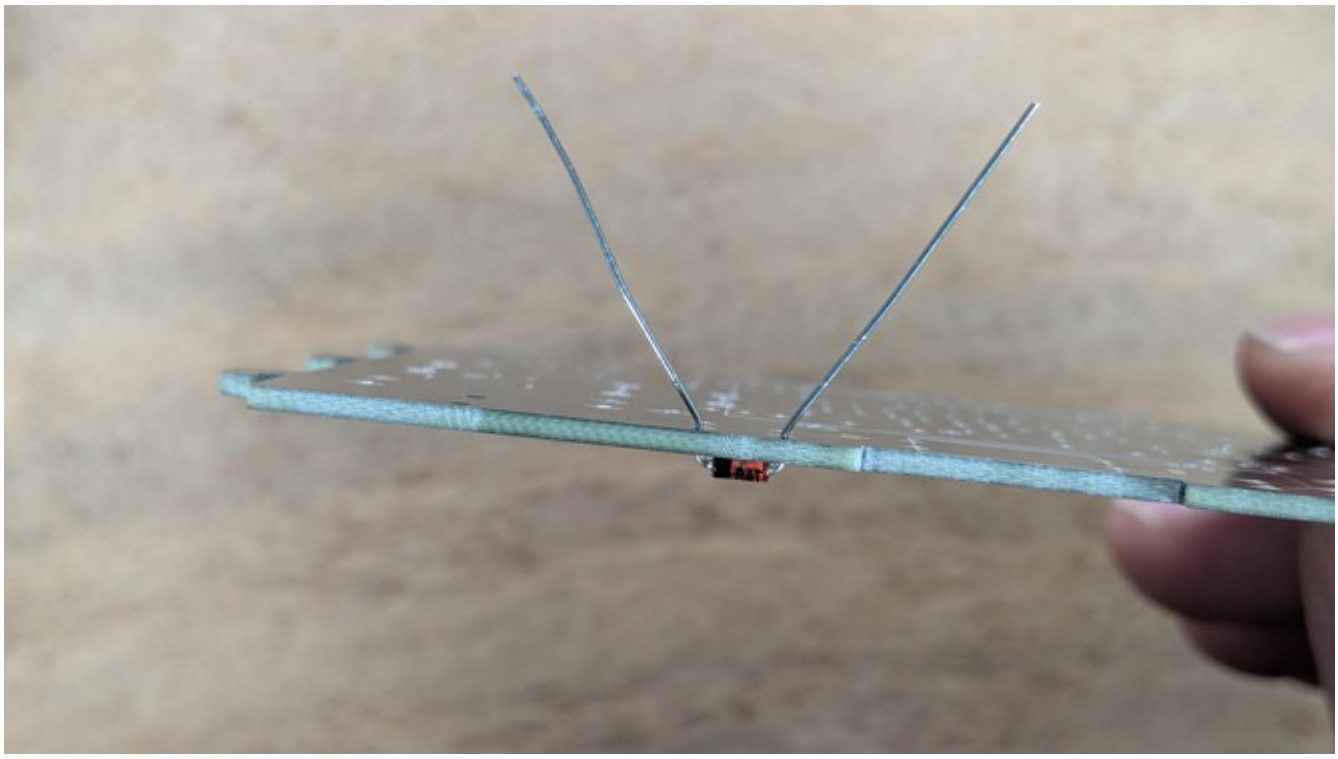
* Soldering iron (preferably one with more than 30W)
* Electronics side cutter
* Wire stripper
* Solder wire



GATE IN
LEVITATION
OSC
AUDIO OUT
WAVE
LEV
TONE
102
SYNC
OSC
RND
noisio

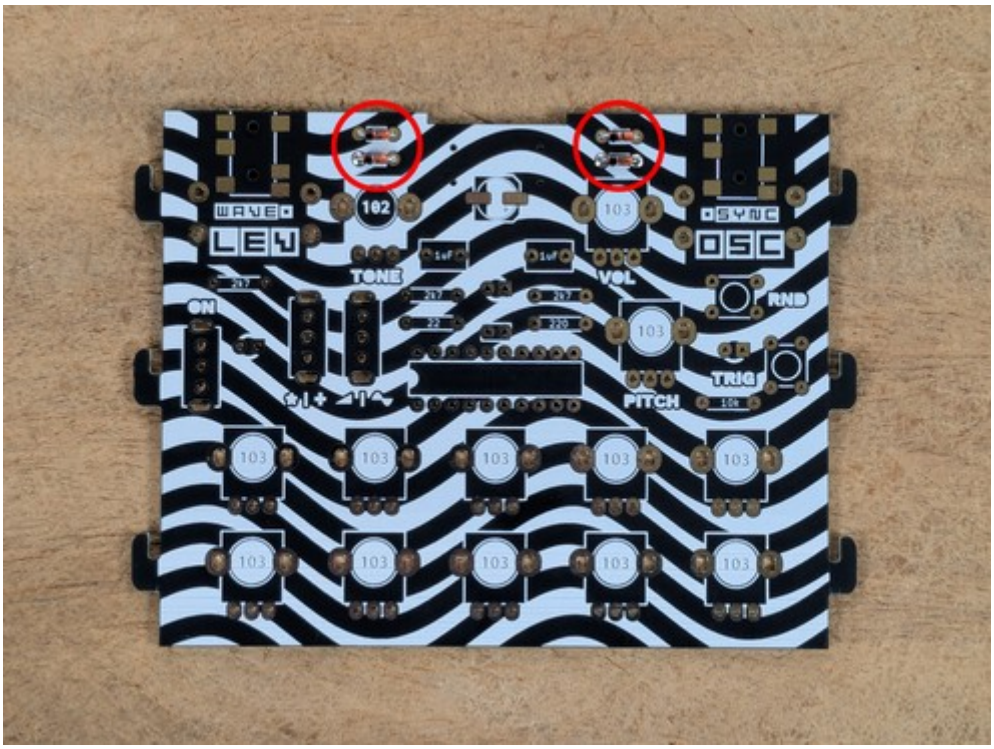
The sequence of the assembly instructions is structured in such a way that it **starts with the flattest and smallest components**. This means that the PCB can be turned upside down for soldering at any time without components hanging in the air.

The footprints on the PCB for diodes and resistors are designed so that the legs should be bent downwards at a 90° angle **as close as possible to the housing** before insertion.



After insertion, the legs of the THT components can be **bent slightly outwards**. This prevents them from falling out again.

The first step is to solder the **4 diodes**. These have the function of only allowing current to pass in one direction. It is therefore important to **pay attention to the direction**. The **black marking** on all 4 components must point **to the left**. This is also how it is marked on the circuit board.



The **resistors** can now be soldered in. These resist the current flow and limit it. For them, the **direction does not matter**.

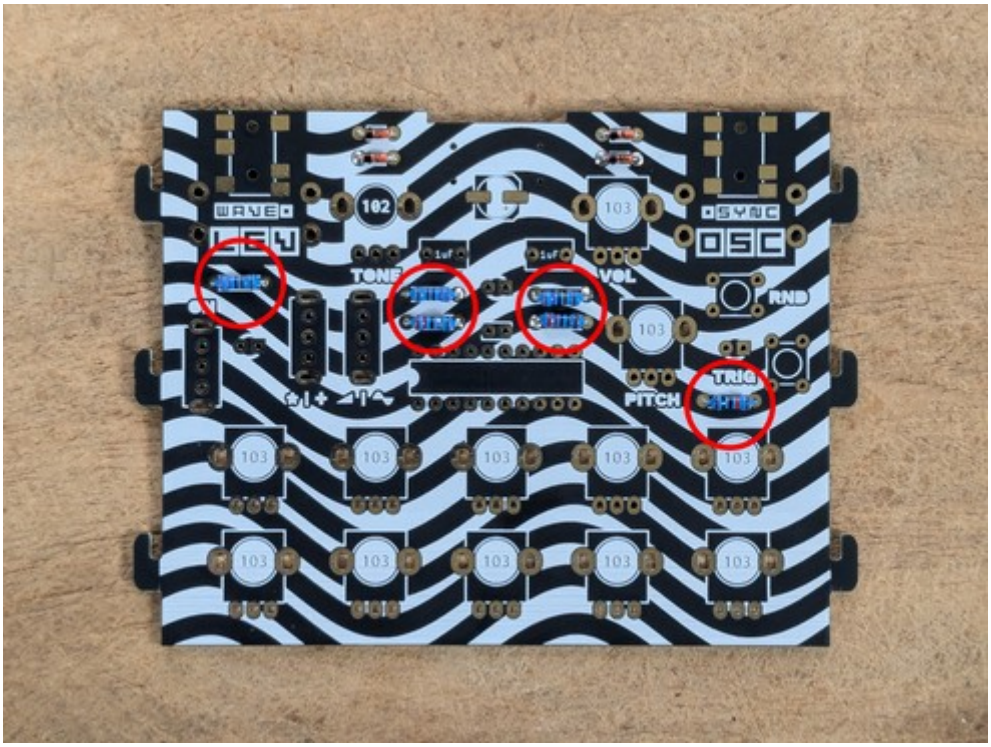
The values can be measured with a multimeter or determined using the **color codes** and must be matched to the printing on the PCB.

3x 2k7 = RED VIOLET BLACK BROWN BROWN

1x 22ohm = RED RED BLACK GOLD BROWN

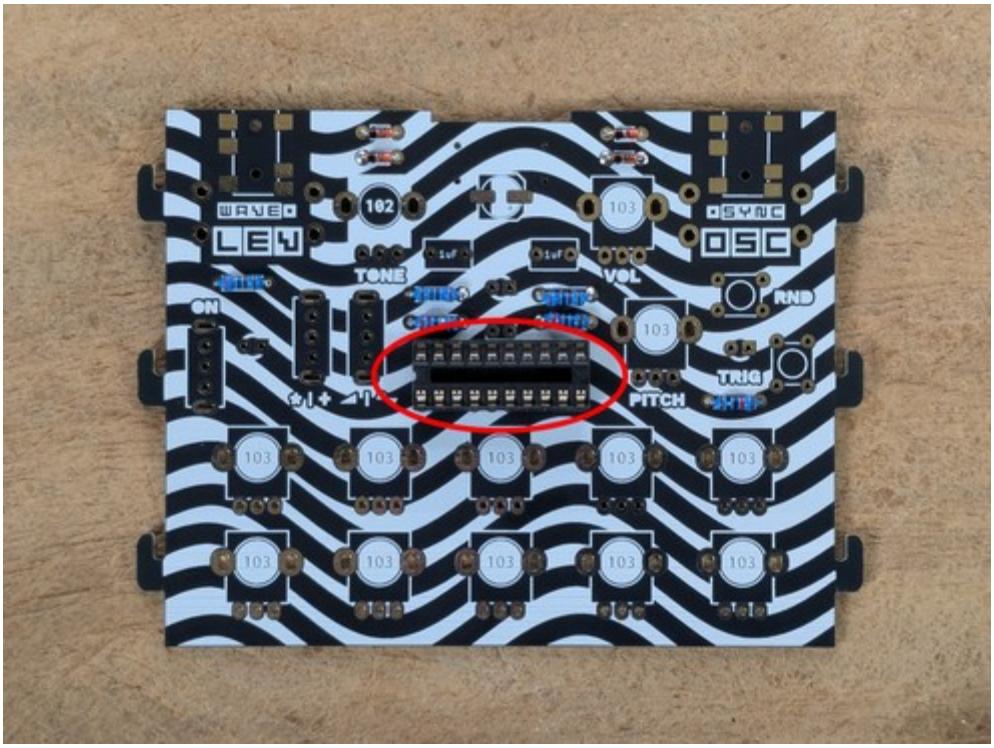
1x 220ohm = RED RED BLACK BLACK BROWN

1x 10k = BROWN BLACK BLACK RED BROWN

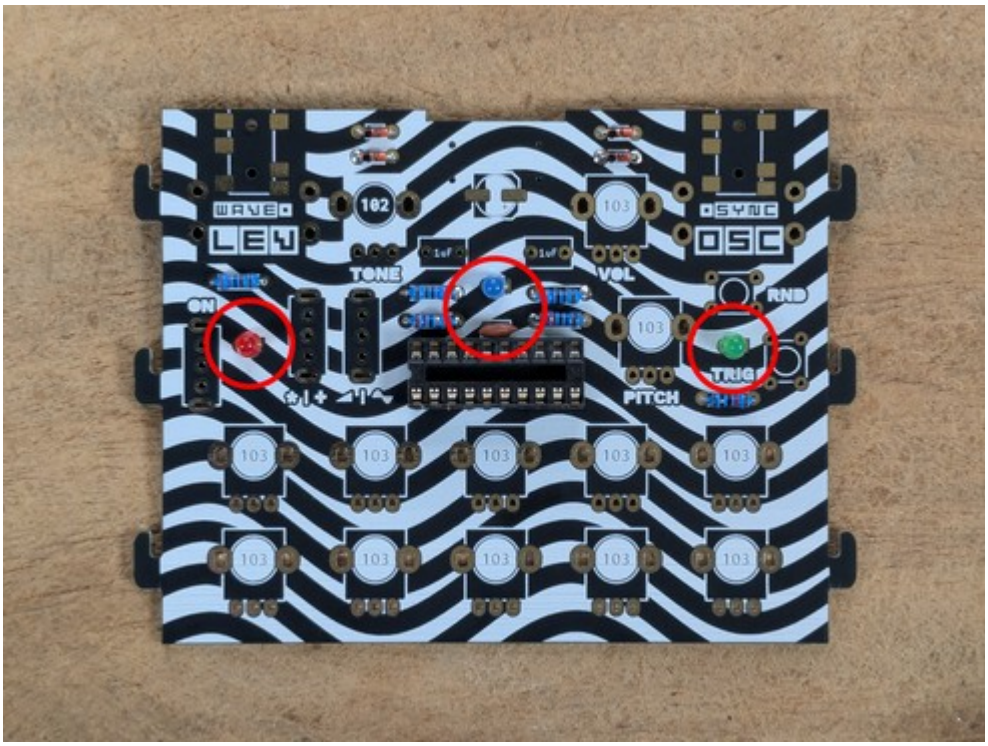


Now comes the **IC socket**. It has a small semi-circular marking which must point to the left.

For this and all subsequent **components with more than three legs**, it is advisable to **solder only a single middle leg first** and then check the top side to see whether the component is **aligned**. It can now be corrected. Subsequently, the other legs can be soldered on.



Now it's the turn of the **104 ceramic capacitor** above the socket. The direction does not matter.



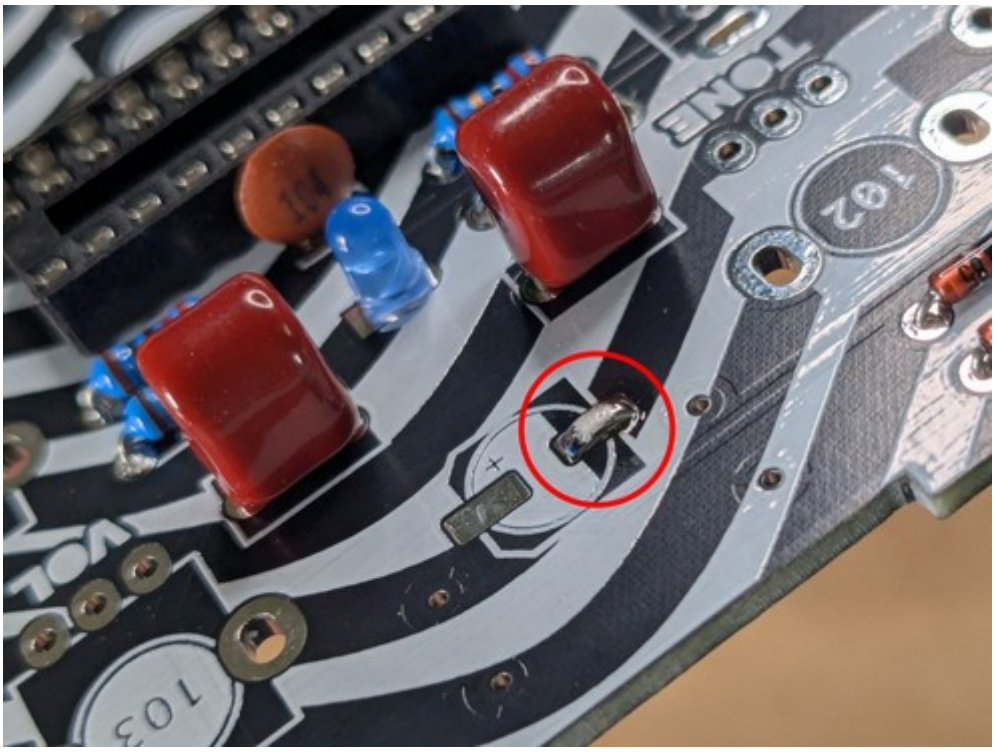
Next, the **LEDs**. From left to right: RED - BLUE - GREEN. Again, **the direction must be observed** when inserting.

The **shorter leg is minus (-)** and must be inserted into the **square soldering eye**. Plus (+) is also marked on the back for orientation.

The **1uF film capacitors** follow. No direction needs to be observed with them.

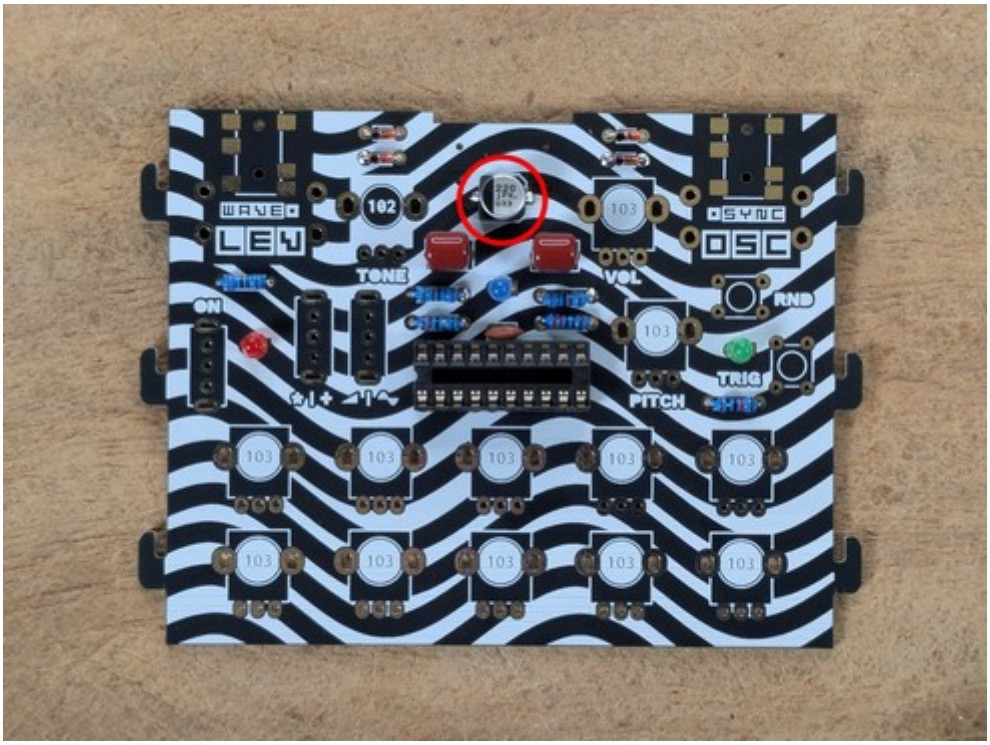
In **some of the following steps**, **SMD components** are now installed on the board surface. For some, it is important to align them precisely. This ensures that the sockets, for example, fit well into the housing later.

The easiest way to do this is to **first place a single (!) soldering point**. Just by heating it up again and slide the part onto it, the component is then attached and aligned first.



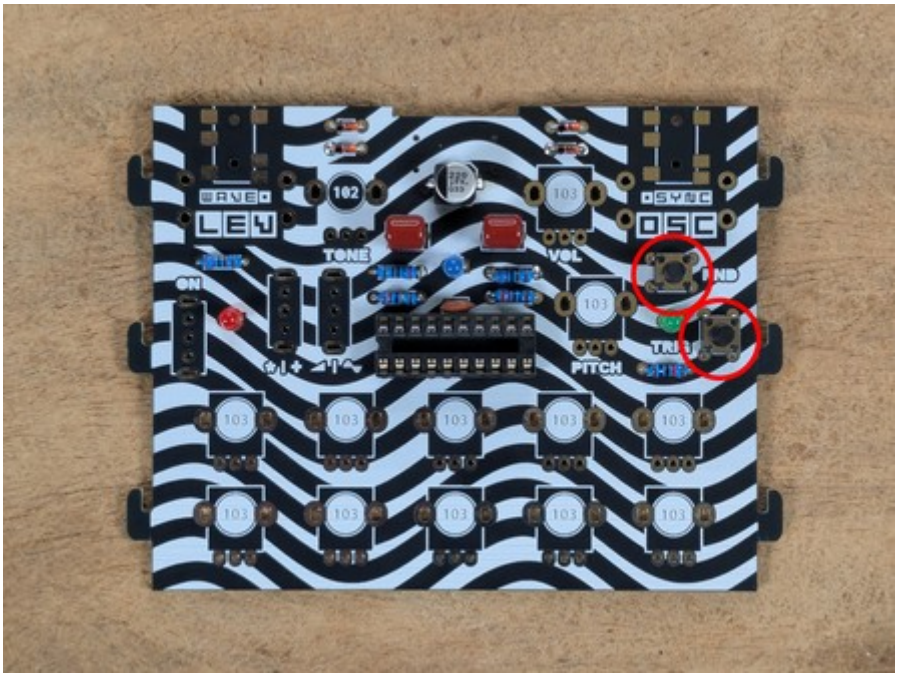
Only when it is perfectly seated should the other pins be attached with solder and connected to the component.

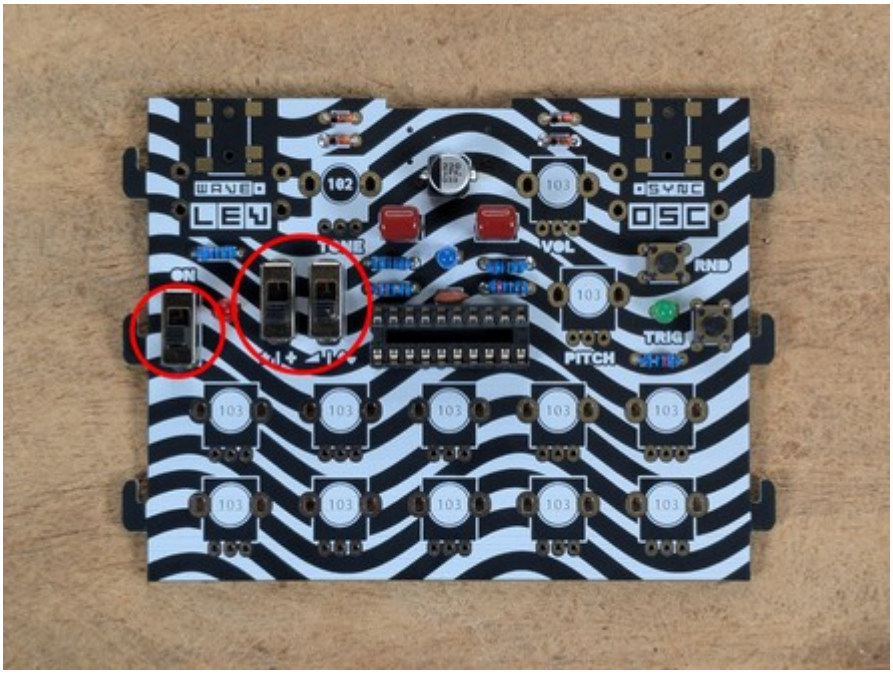
This can now be tried out on the top side with the **220uF capacitor**. It must be positioned according to the marking. First just place a soldering point > align > finish soldering.



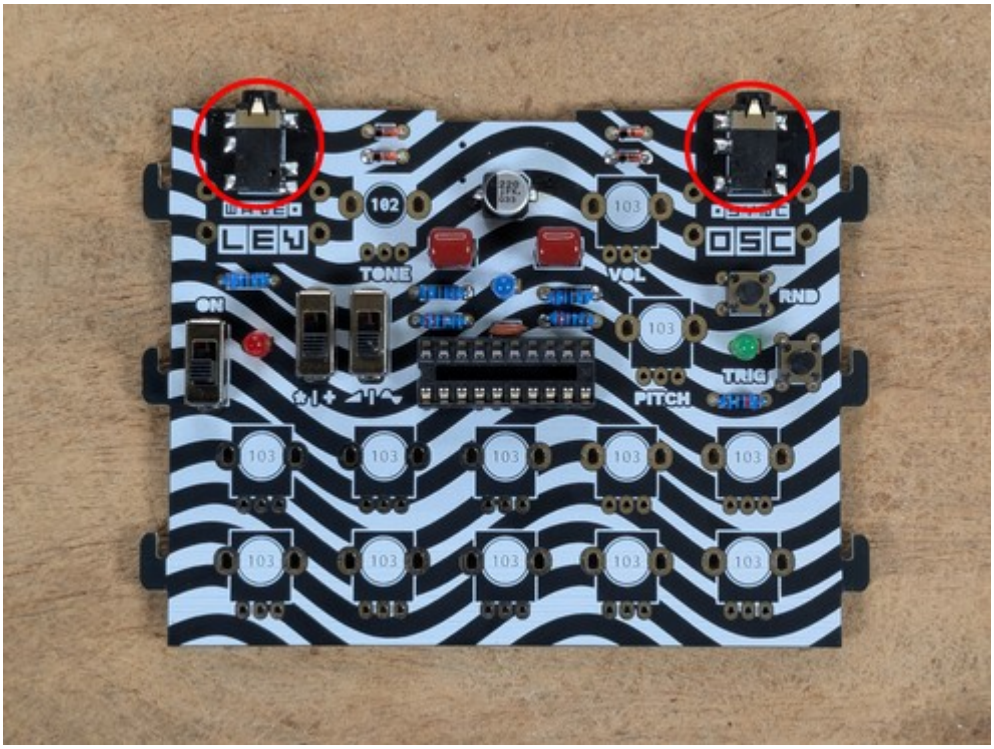
The **switch** and **button** can now be attached to the circuit board. For the switch on the left-hand side, it is advisable to connect only the middle leg first, then check whether it is well aligned - correct if necessary - and then solder the other legs.

The button on the right-hand side must be pushed in with a little pressure without bending the legs.

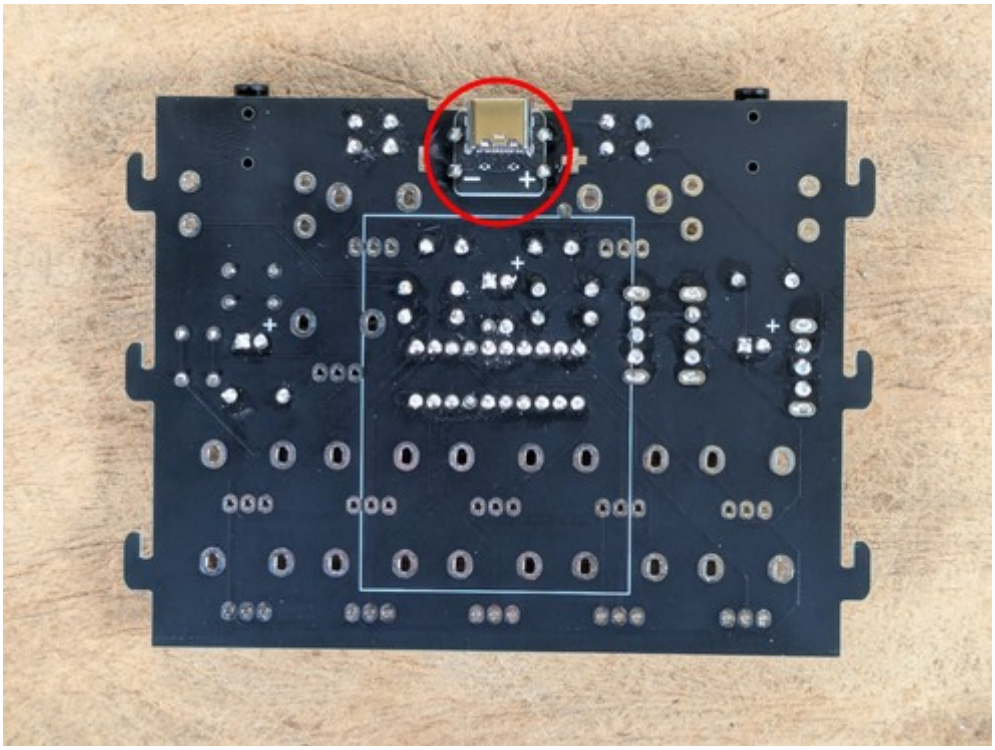




This is followed by the two **black 3.5mm jack sockets** on the top. The SMD technique should be used here again, where only a single soldering point is set first.

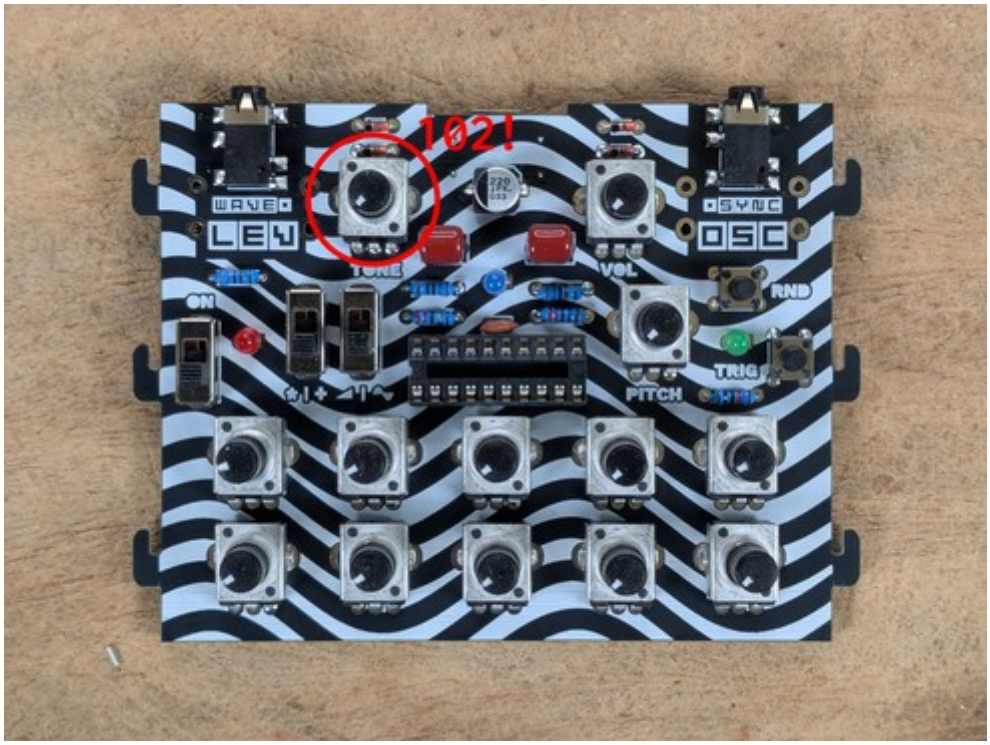


The **USB-C adapter board** can now be attached to the underside. **Precise alignment is very important** here to ensure a good fit with the housing later on. The module must end up exactly above the drawing.

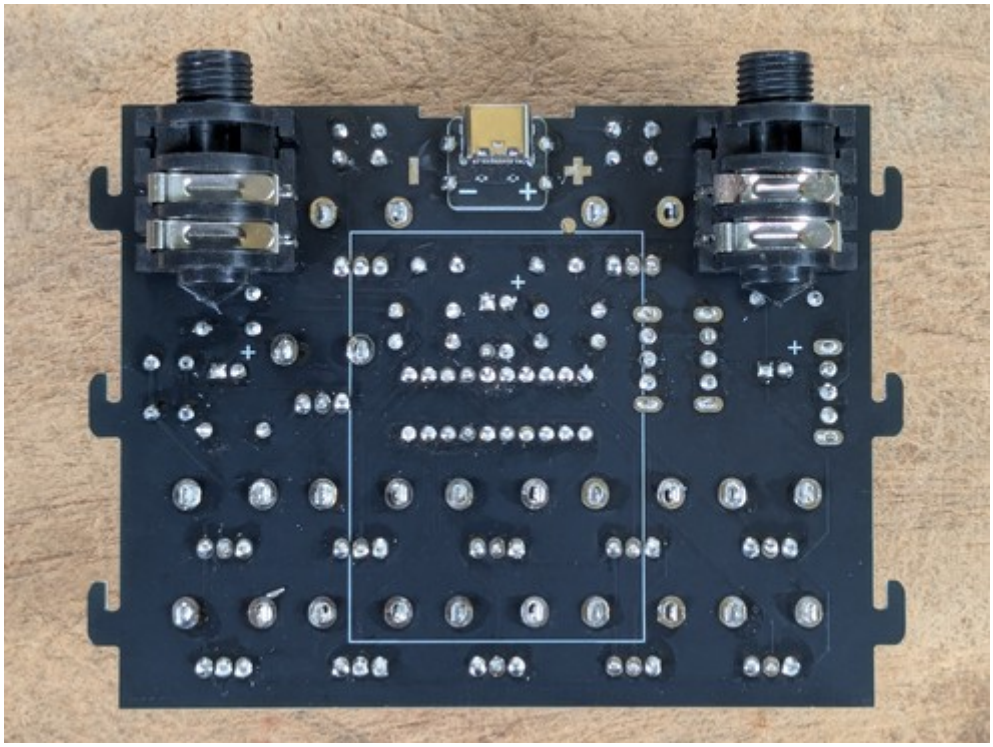


The next step is to install the **potentiometers**. Please note that in addition to the 12x 10kOhm potentiometers, there is a **single 1kOhm** potentiometer. This is labeled **B102** and must be **inserted at the top left** of the circuit board. The component is color-marked to make it easier to find.

To get the **potentiometers well aligned**, you should first solder only the middle one of the three legs and correct it if necessary.

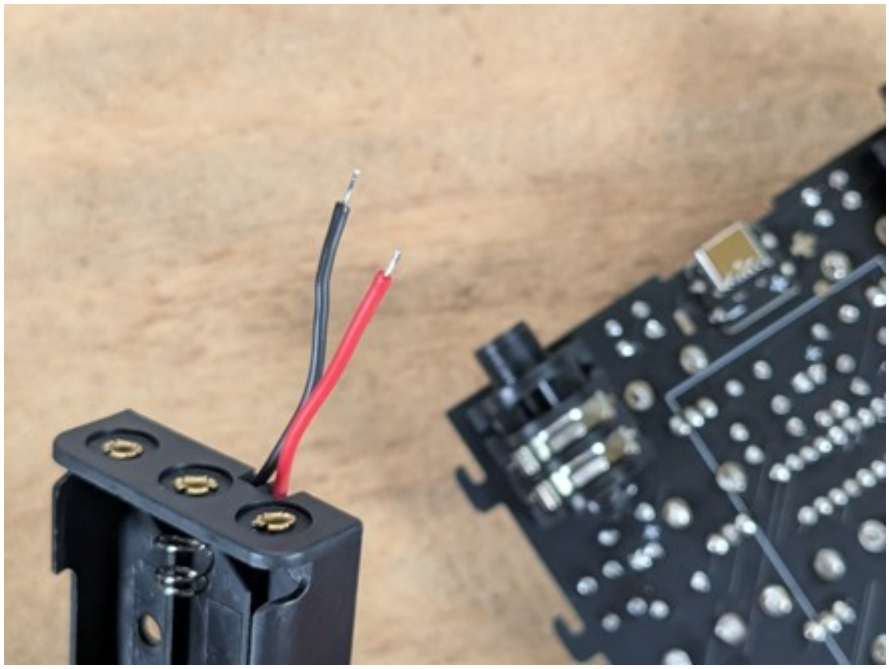


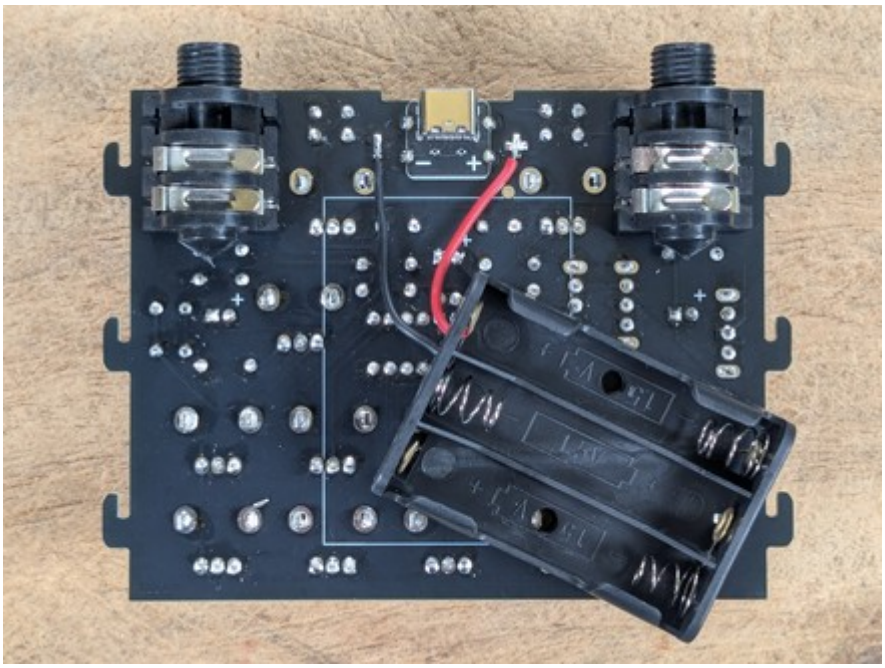
The **6.35mm sockets can then be installed from below** and soldered on the upper side. Make sure that the legs are well inserted and that the ends are sticking out by just about 2 mm.



The cables of the **battery holder** should be shortened to a **length of 2-3 cm**. The ends must then be stripped again. They are soldered directly to the plus pad **(+) = red wire and (-) = black wire**.

After stripping the insulation, the **open copper stranded wire should be coated with solder** and **shortened to approx. 3mm**. This ensures that the cable ends fit well on the two solder pads.

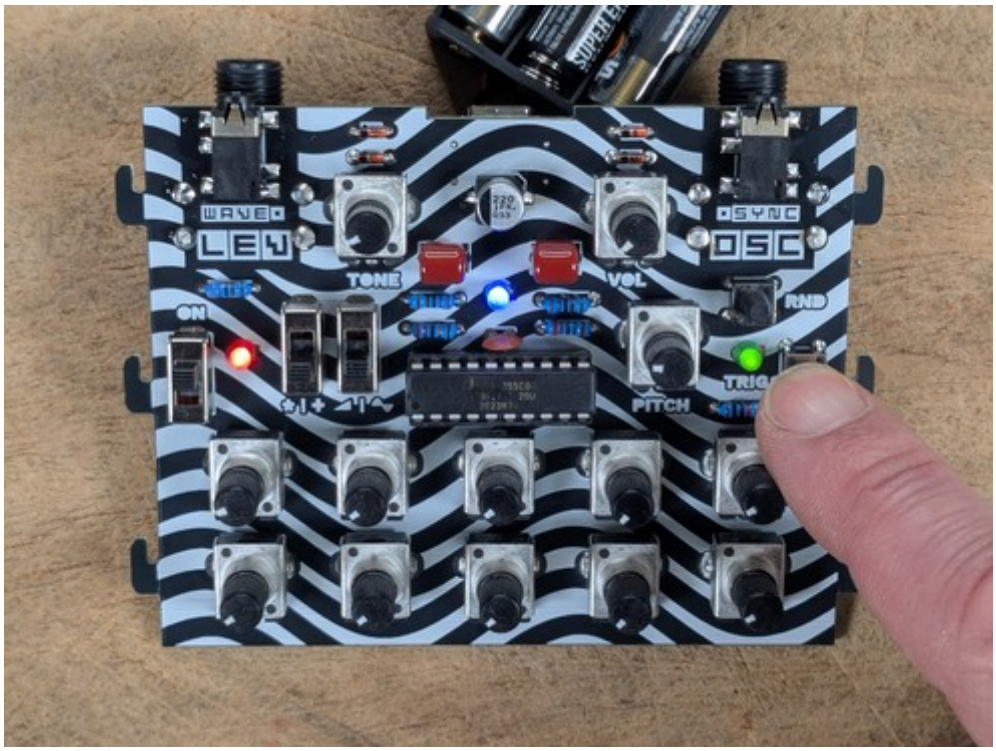




All electronic components are now installed.

The device should be **tested before installing the housing**. The first step is to insert the **microcontroller with the semi-circular marking on the left**. After inserting three AAA batteries or connecting to a USB-C power supply unit, the device can be switched on. The **red LED (left) and the blue LED** should now light up. When the **trigger button (right)** is pressed, the corresponding **green LED** lights up.

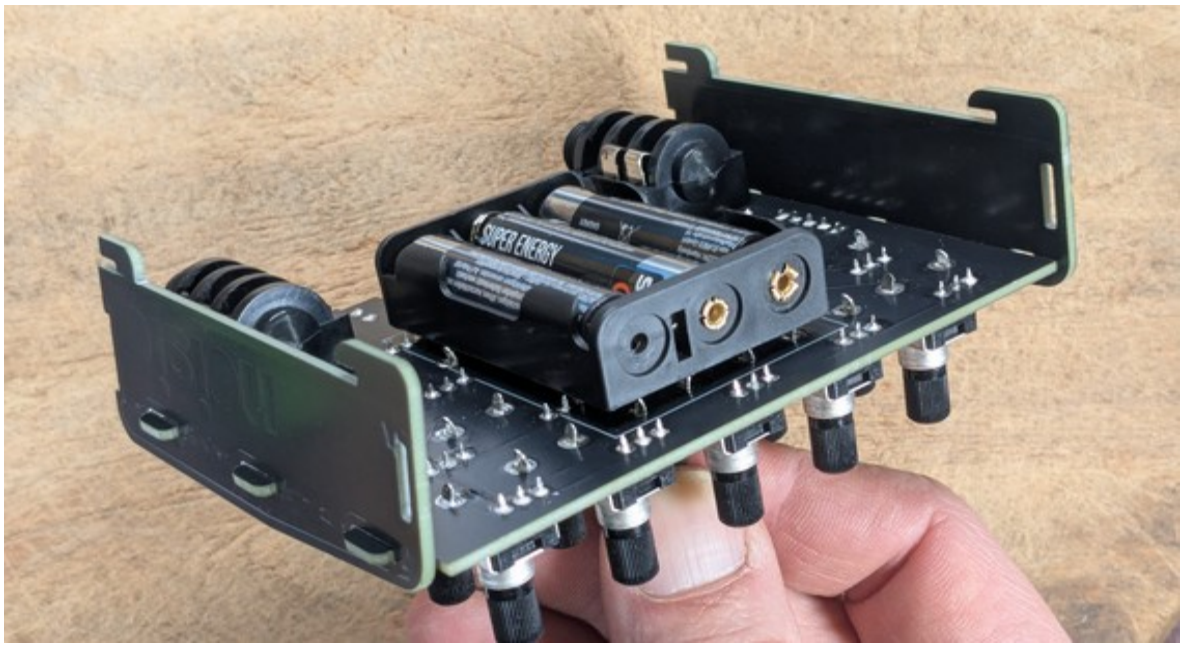
The **audio output** can then be tested. To do this, turn up the VOL potentiometer slightly and connect one of the sockets on the left-hand side to an amplifier or headphones. Sounds should now be audible. Note that with a stereo setup, the signal may only be output on one side.



If something does not work, check all solder joints again to make sure they are fully seated and not unintentionally connected to each other. Further tips and an **overview of common errors** can be found at this **link**.

If everything works well, the **housing can now be assembled**.

The first step is to attach the two **side panels** and push them forward until they are aligned with the rear of the circuit board.



The next step is to insert the **front panel**. The two side panels must be **bent slightly outwards** and the panel pushed in.

The **base plate** is now installed and pushed forward until it is in line with the front panel.

Finally, the plate with the LEVITATION OSC lettering can be attached to the **back** and the housing can be completed by fastening the **2 nuts**.

Screwing the plastic parts tight by hand is perfectly fine. No other tools are required.

It is an advantage if the **nuts end horizontally at the top**. This means that plugs with slightly larger housings also fit into the 3.5mm sockets above them.

Congratulations ..You Made It!

The **operating instructions** with an overview of all functions and connection options can be found under this link:

https://noisio.de/boards/levitation-oscillator