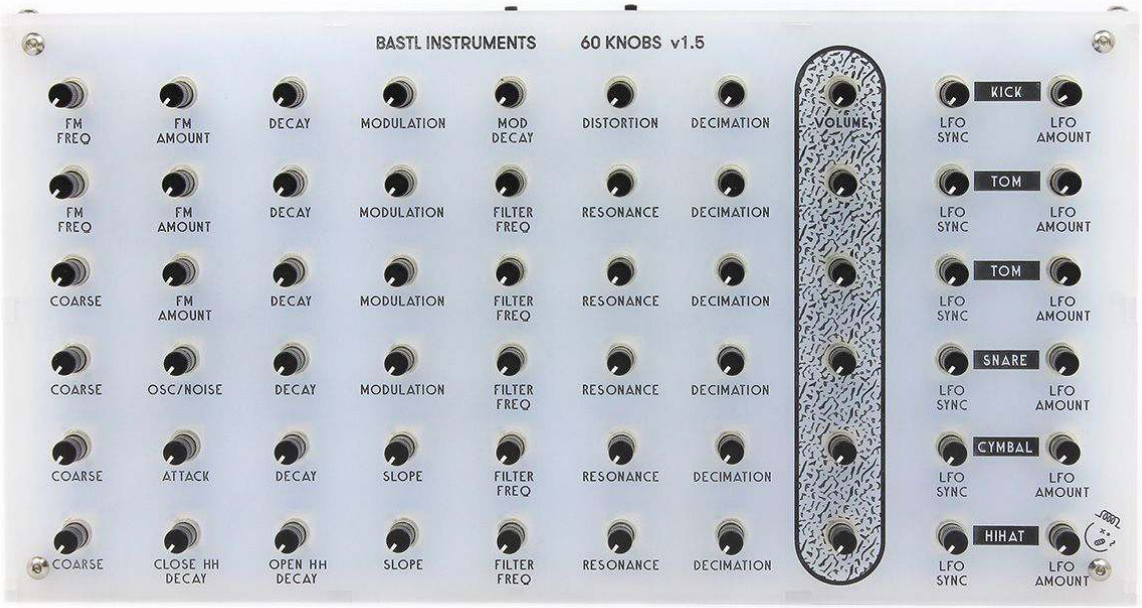
last update: 20. 7. 2017

BASTL INSTRUMENTS

60 KNOBS - Assembly Guide

bastl-instruments.com



INTRODUCTION

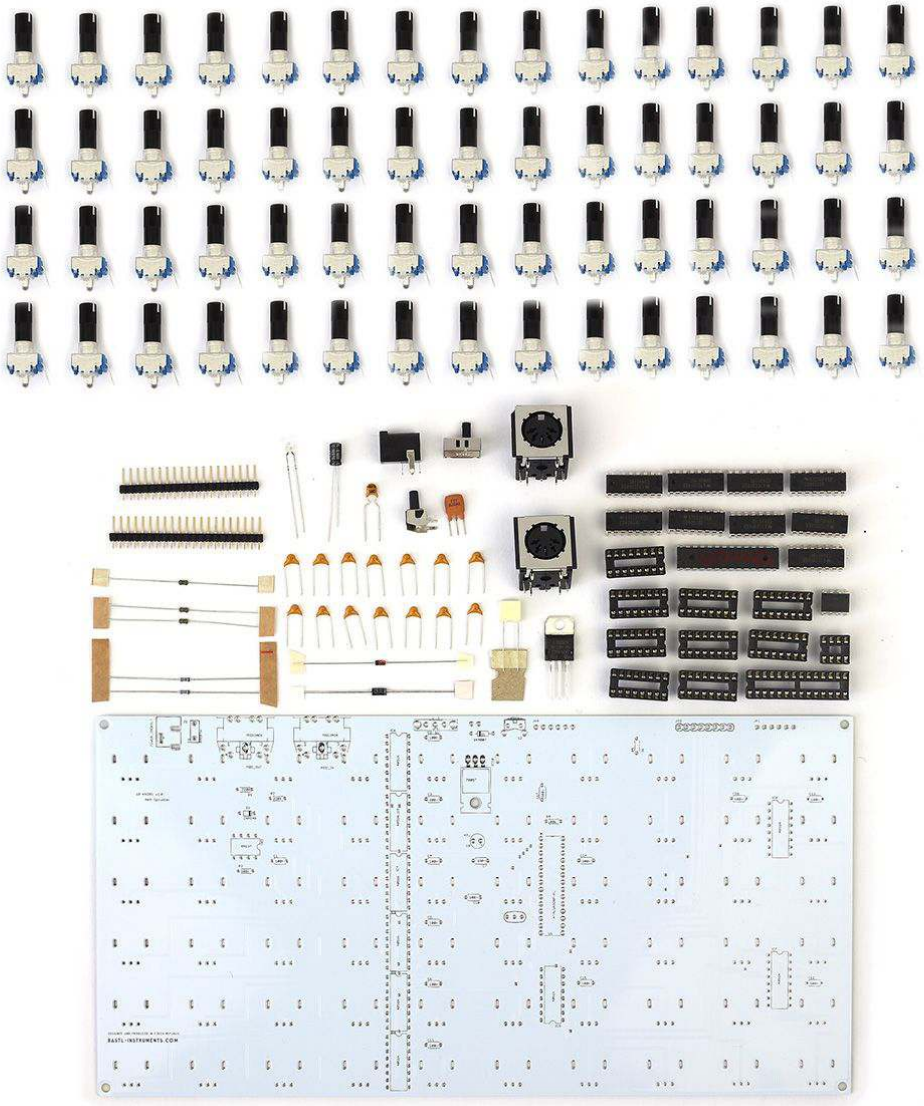
Welcome to the assembly guide for the **60 KNOBS** kit. 60 Knobs is a midi-controller, designed specifically for the Sonic Potions' LXR drum machine. For all the features see the manual here.

This kit doesn't require too much experience. However, it is good to have basic soldering skills and to be able to identify electronic components before starting it. We have also included some of the best quality solder to help you solder everything faster and better.

60 KNOBS kit consists of just one big printed circuit board (PCB), soldering components and mounting components for both enclosure versions. The plastic enclosure is sold separately. Please check all of your parts BEFORE you begin work to make sure you are not missing anything. See the bill of materials (BOM) for detailed list.

BILL OF MATERIALS

60KNOBS_V.1.0 SOLDERING BOM		
qty	**value**	**part**
2	220R	resistor
2	100k	resistor
1	1k	resistor
1	1N4148	DIODE-D-5
1	1N4007	DIODE-D-7.5
14	100nF	ceramic capacitor
1	330nF	polyester capacitor
1	10uF	electrolytic capacitor
1	7805	voltage regulator
1	100mA	fuse
1	8 pin DIL	DIL socket - in foam
9	16 pin DIL	DIL socket - in foam
1	28pin DIL	DIL socket - in foam
9	CD4051BE	IC in foam
1	6N137	optoisolator
1		ATMEGA328-PU-ND / w software
1	16mHz	resonator
2	5 pin	DIN MIDI Connector
1	PC-GK 2.1mm	power barrel connector
1	12mm	small button ANGLED
60	POT LIN w B100k 25mm	linear potentiometer
1	Switch 2 P B	2p 45angled switch
1	20 pin	male pinheader
1		LED white
1		PCB
60KNOBS_V.1.0 MOUNTING BOM		
qty	**value**	**part**
5	20 mm	spacer nut x nut
1	18 mm	spacer nut x nut
5	M3 x 11,5 mm	spacer nut x screw
4	8 mm	spacer screw x nut
5	M3 x 6 mm	mushroom head screw
5	M3 x 6 mm	countersunk head screw
4	M3 x 12 mm	mushroom head screw
4	M3	small nut
1		allen key
4		rubber standoffs



BEFORE STARTING THE KIT...

Prepare the following tools:

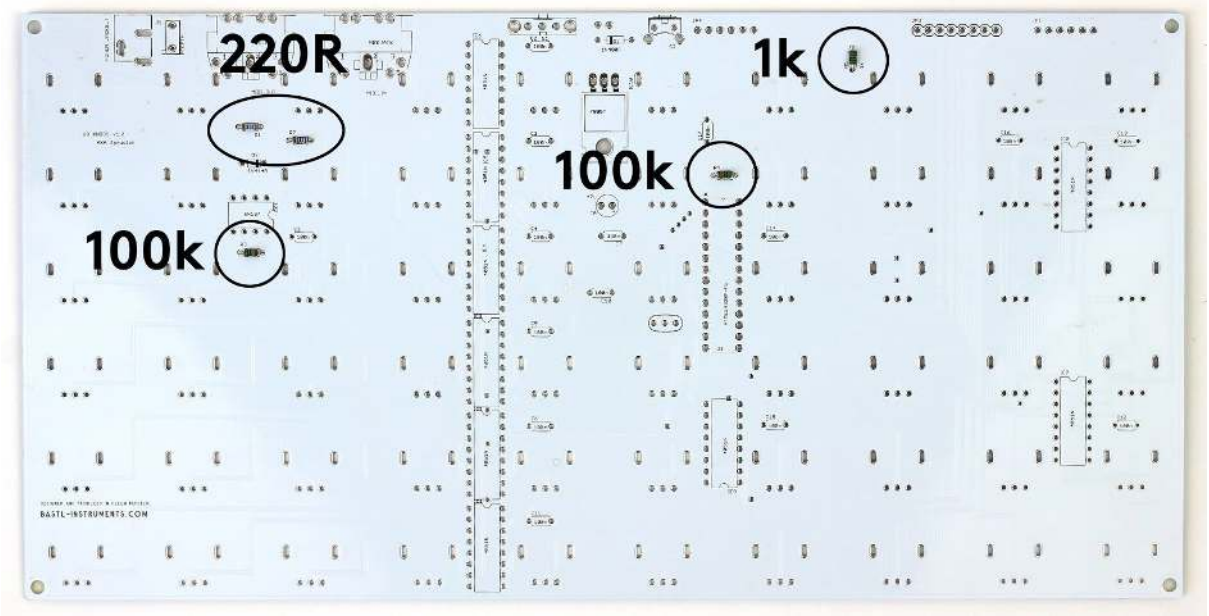
- Soldering iron
- Multi-meter
- Flush cutters
- n2. hex screwdriver or allen key (enclosed with kit)
- Phillips screwdriver
- Isopropyl alcohol + smaller and clean brush (optional)
- Protective eyewear
- … and also a sufficient amount of time and patience.

We suggest that you work in a clean and a well lit and ventilated environment to avoid accidents or losing any of the small components.

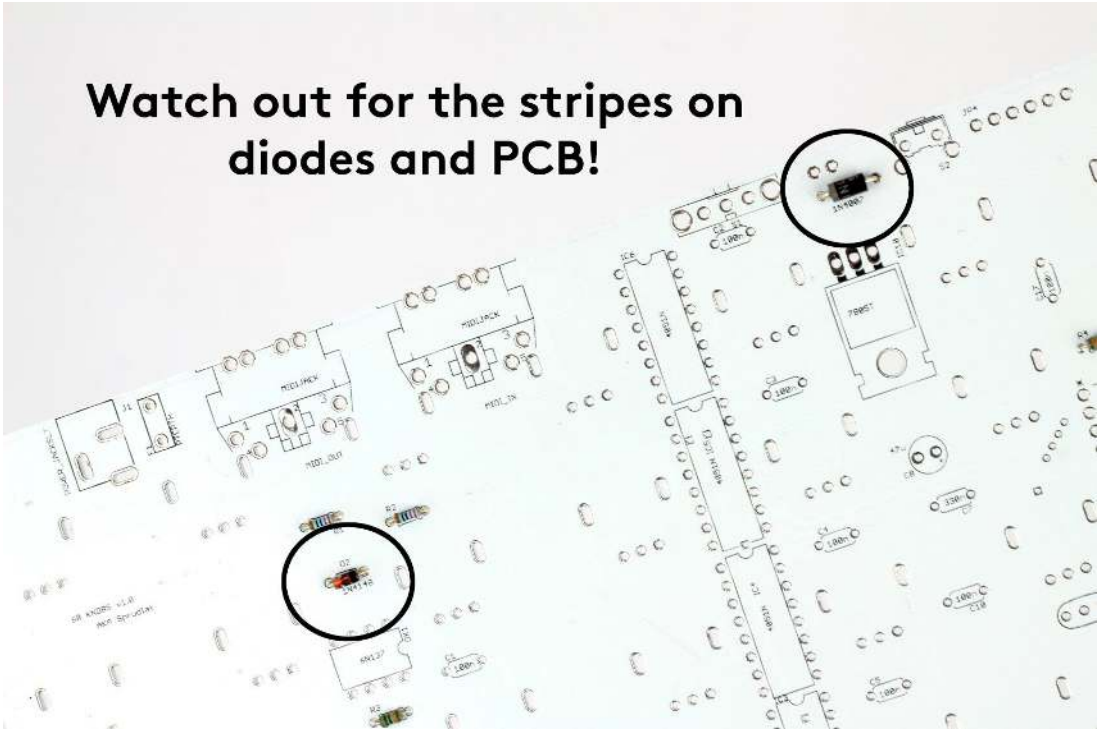
Also briefly go through this guide and make sure that you understand all the steps.

SOLDERING

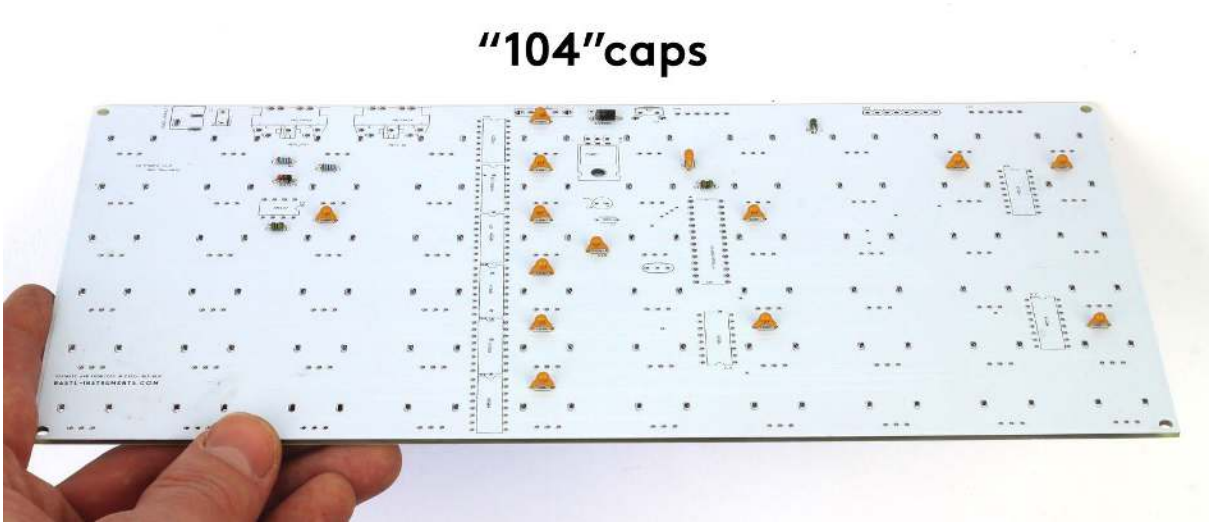
Start with the smallest parts - **resistors** and **diodes**. There are three values of resistors: **220R** (2x) and **100k** (2x) and **1k** (1x) - take your time and check those values using a multimeter (or you can check the color codes if you are seasoned enough). After soldering snip the leads close to the PCB (be sure to make this step on all remaining leads in the course of this guide).



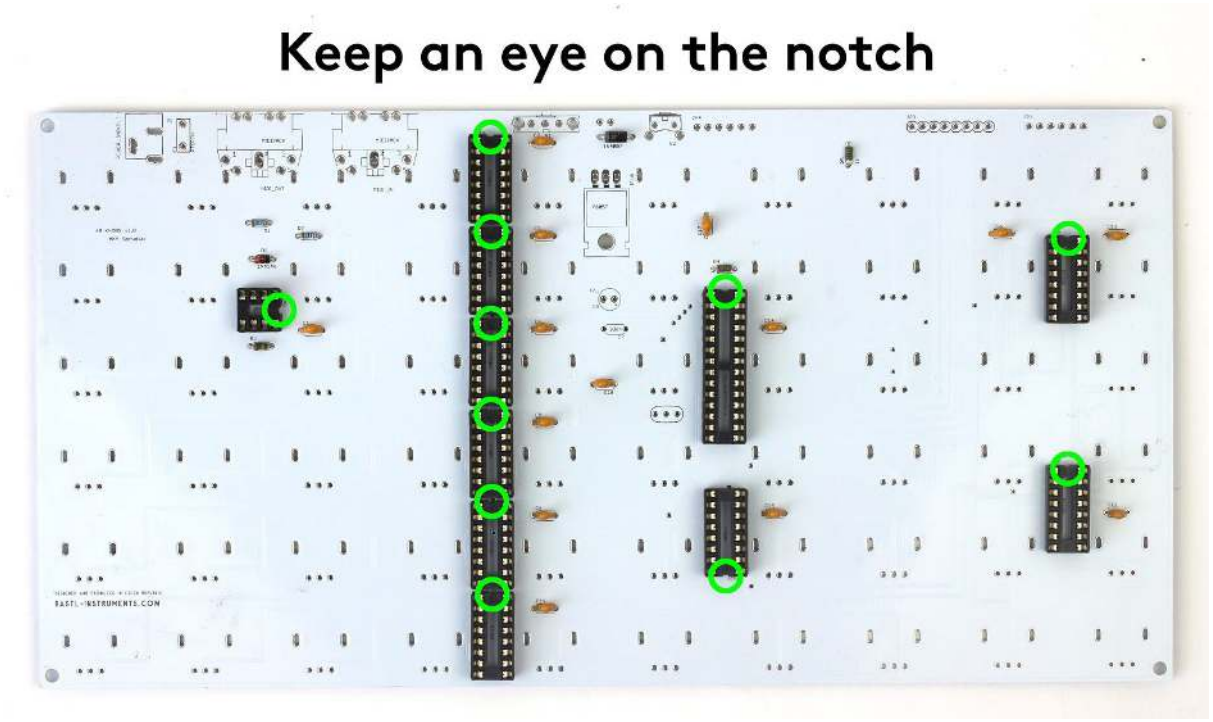
Solder also the **diodes**. There are just two values of them: **1N4007** - the bigger one (1x) and **1N4148** (1x). Be careful, **diodes are polarized**! make sure that the marking ring on the diode body matches the marking on the circuit board.



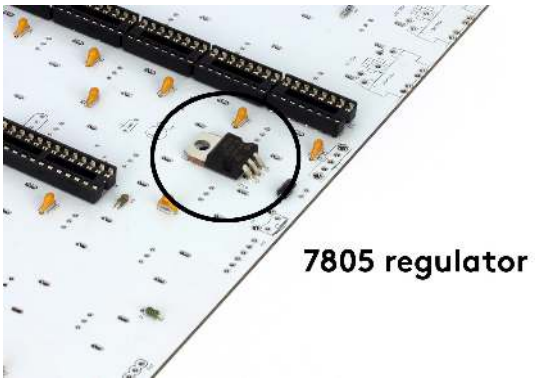
Add the **ceramic capacitors** now. There are fourteen of them of the same value - **100nF** (they are marked "104" on itself).



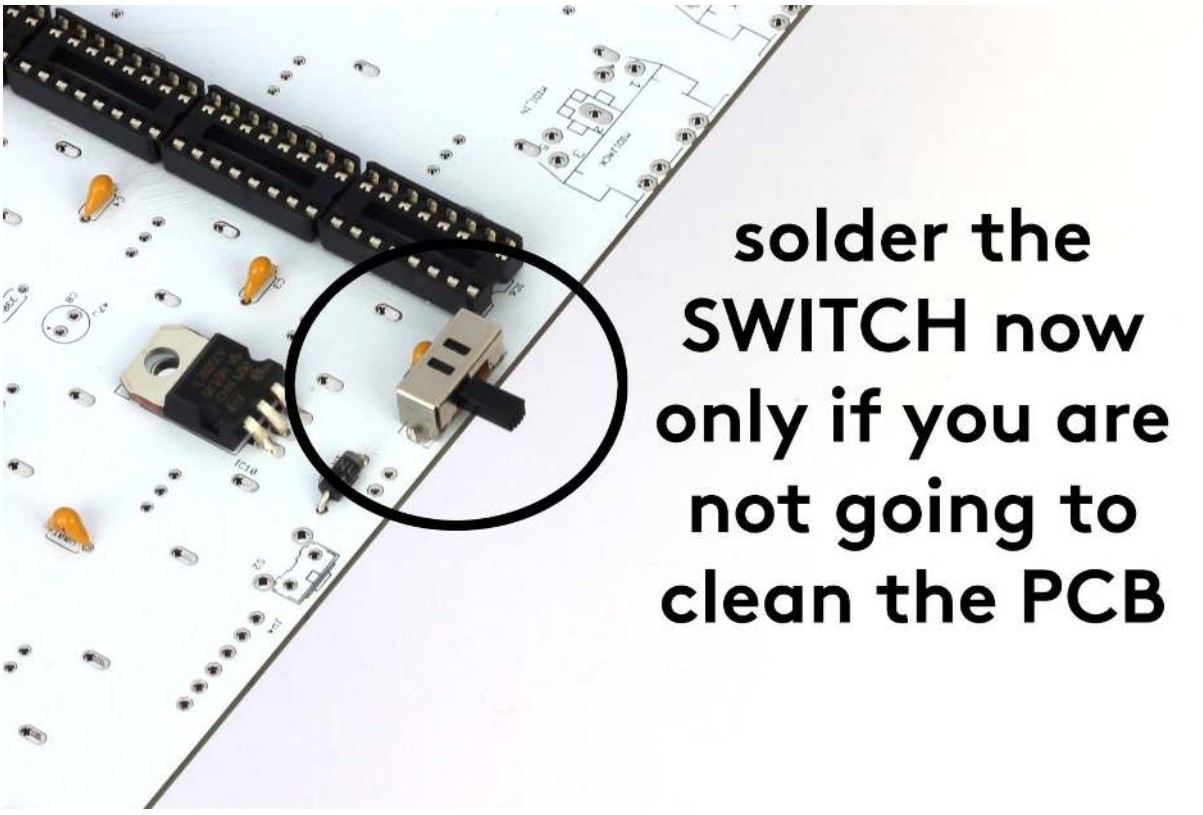
Insert the **IC sockets: 8 pin DIL** (1x), **16 pin DIL** (9x), **28 pin DIL** (1x). Just be aware of the **right direction of sockets** - there is a notch on each socket that has to match with the marked notch on the PCB.



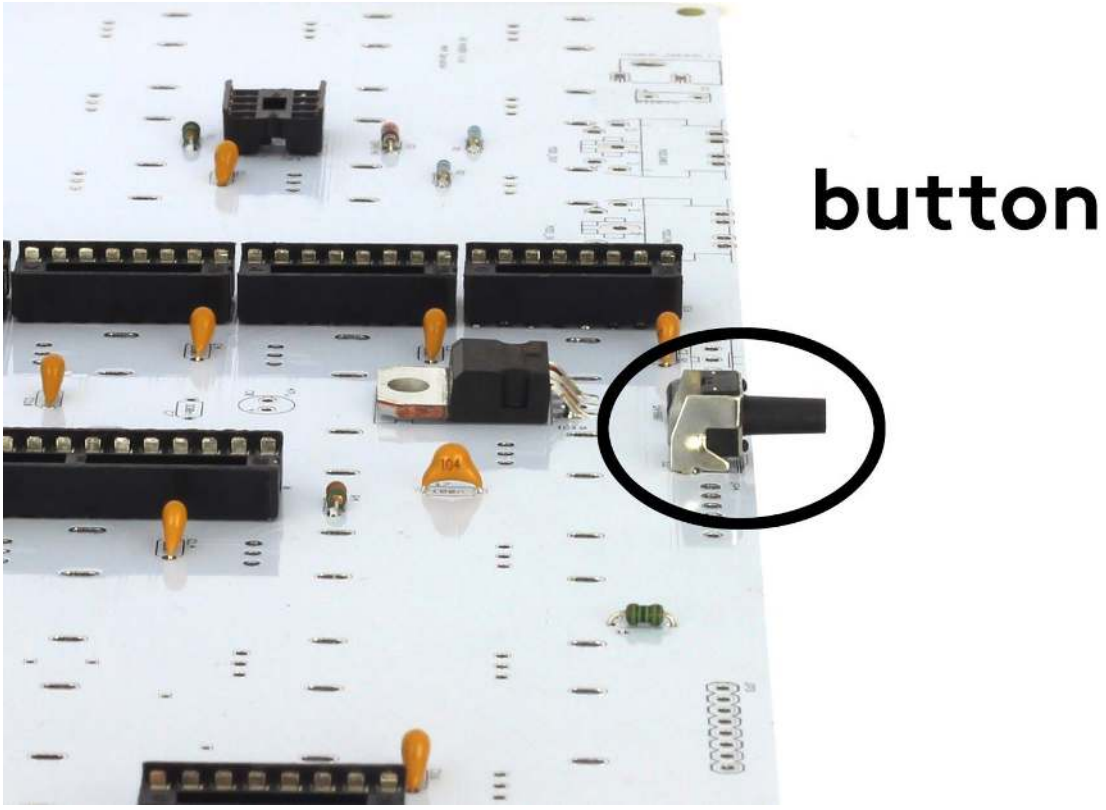
Bend the legs of the **7805 regulator** to make them right angled and solder the regulator.



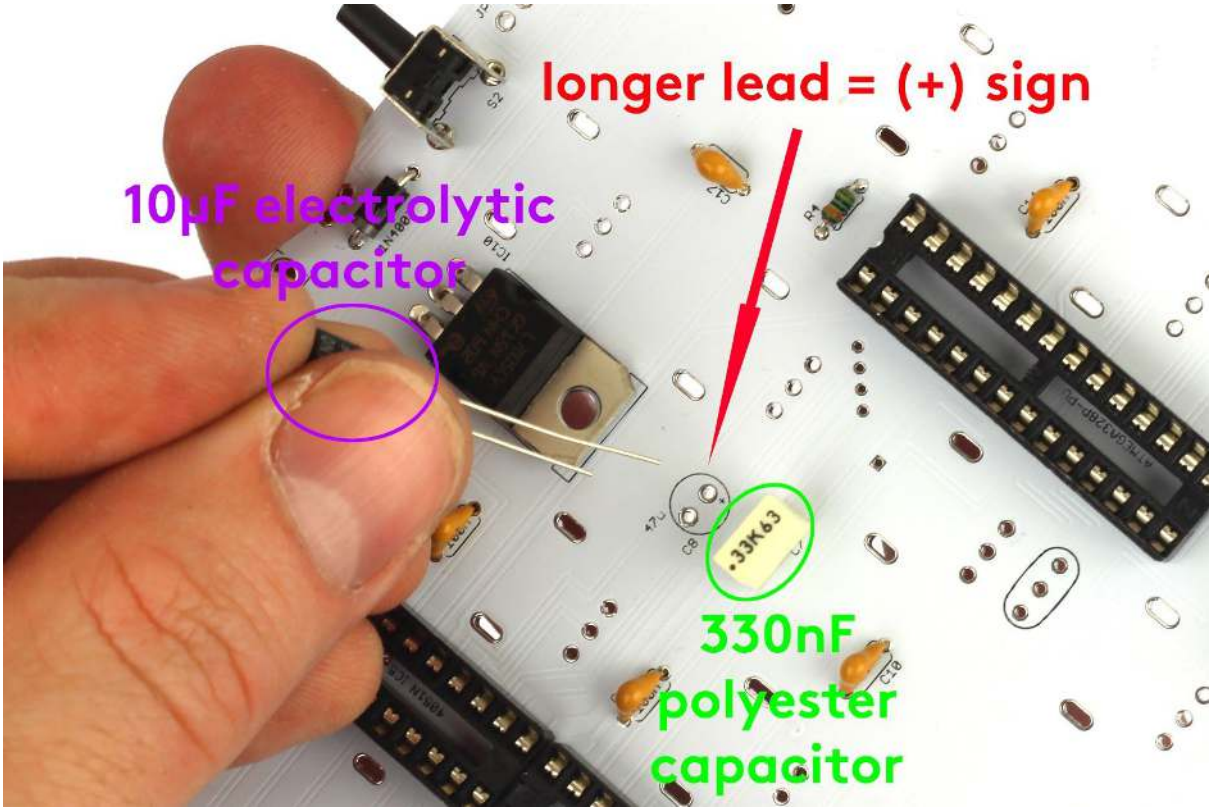
Move to soldering the **switch** now. You can solder just one leg first, adjust it by reheating and do the rest then. Just be sure to solder it at the right angle and flat with the PCB. (**IMPORTANT NOTE**: If you are going to clear the PCB with the isopropyl alcohol, do soldering of this part **AFTER** the cleaning. The alcohol could damage the switch.)

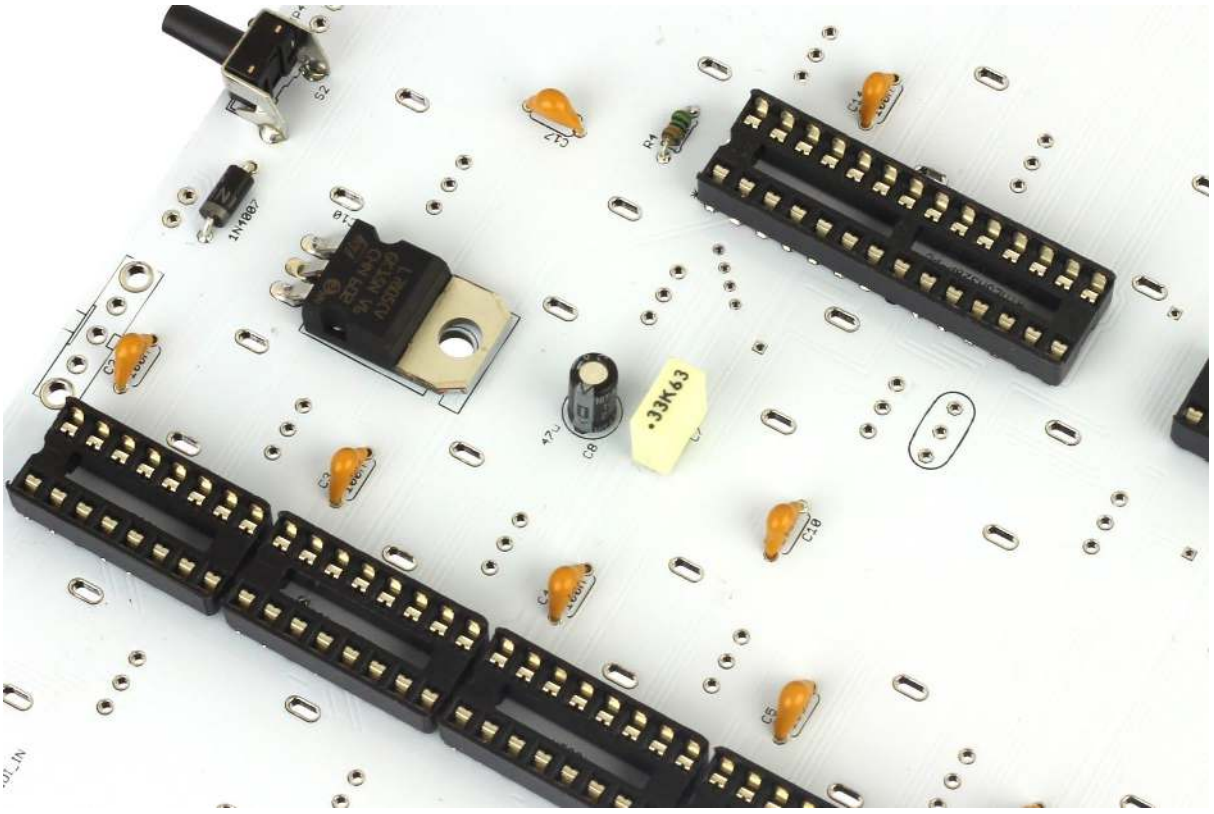


Do also the right angled **button**. Keep the same quality of position as with the switch.

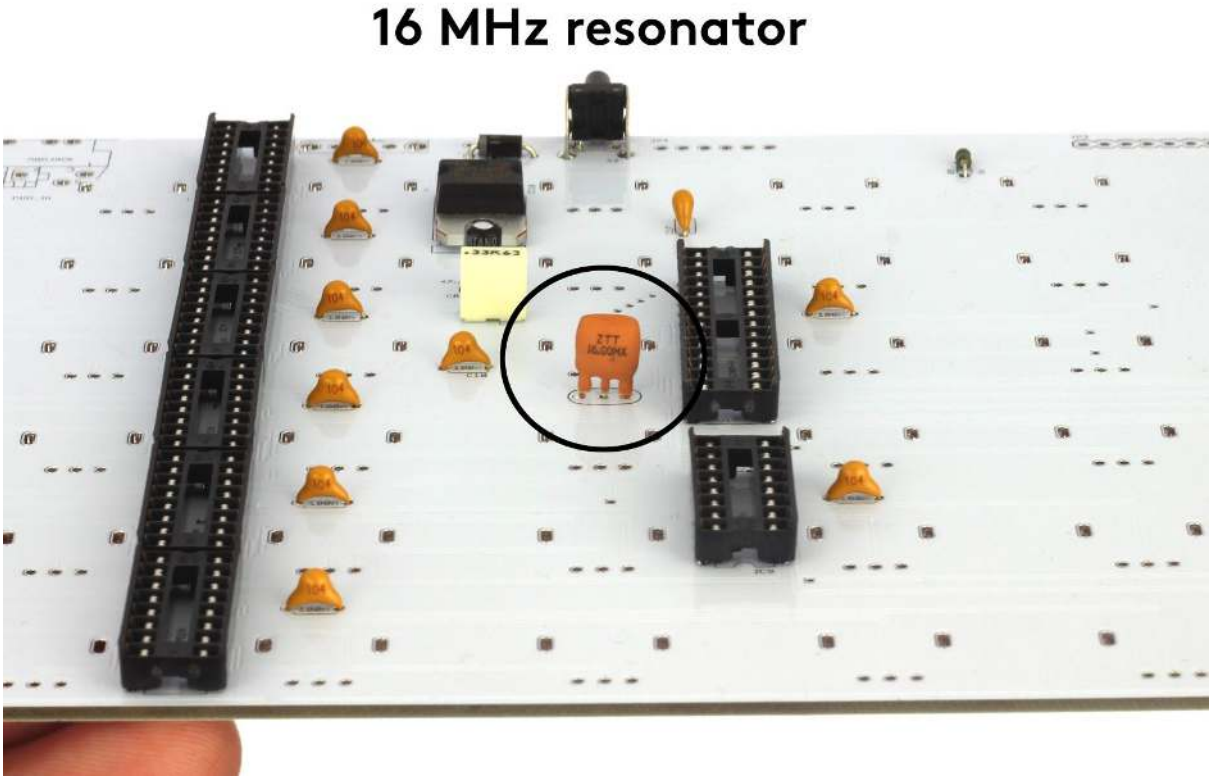


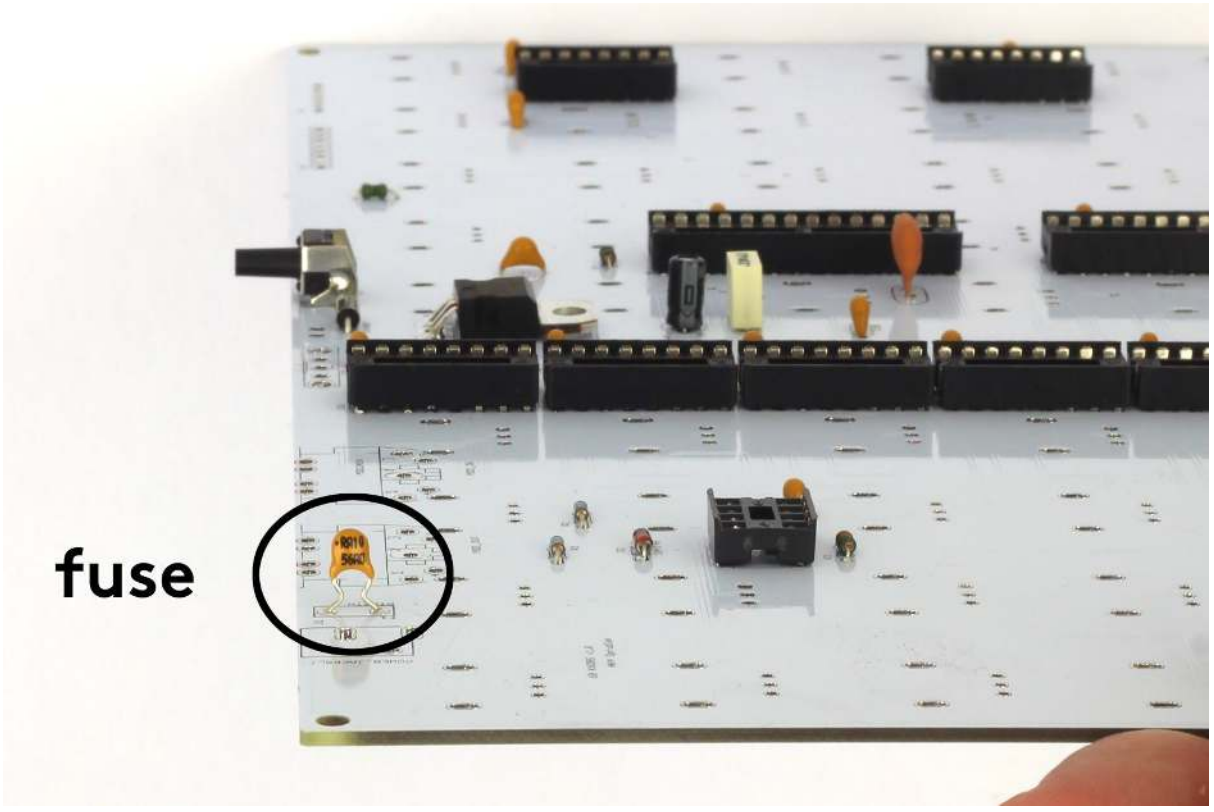
Add the rest of **capacitors**. There is **10µF electrolytic** one which is **polarized**! The **longer lead goes to the plus (+) hole on the PCB**. Solder also the **polyester capacitor** (330nF) which is not oriented.





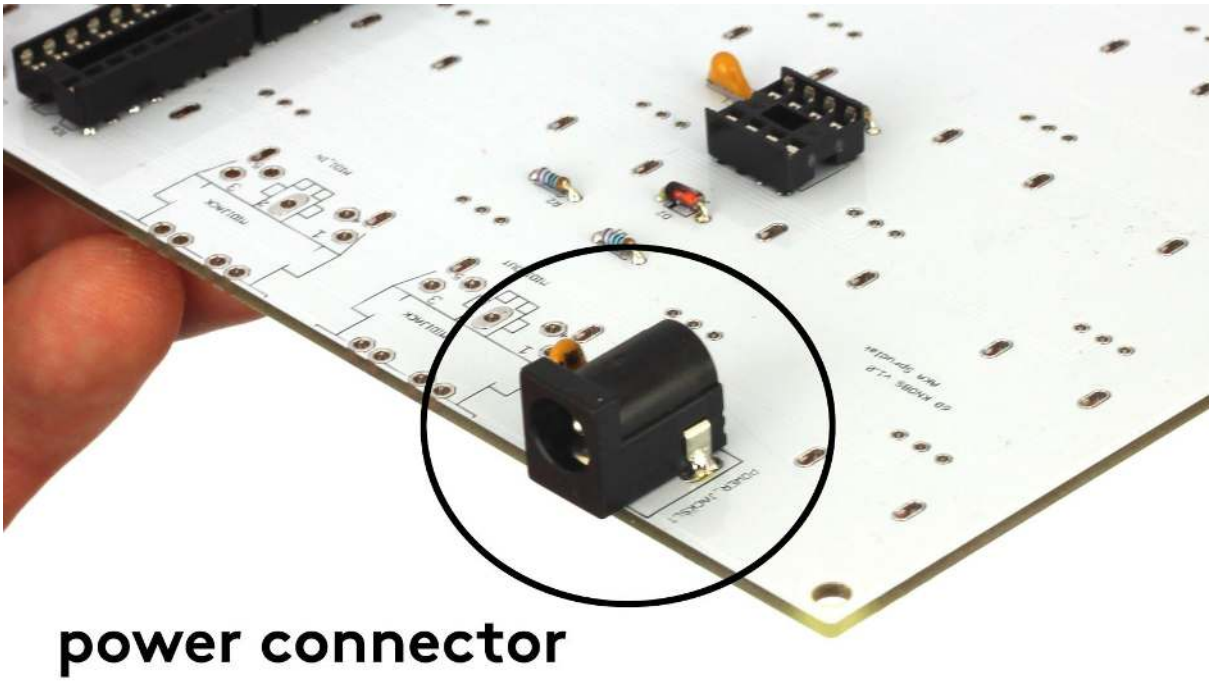
Let's solder the **resonator** and the **fuse** as well. These parts are not oriented.



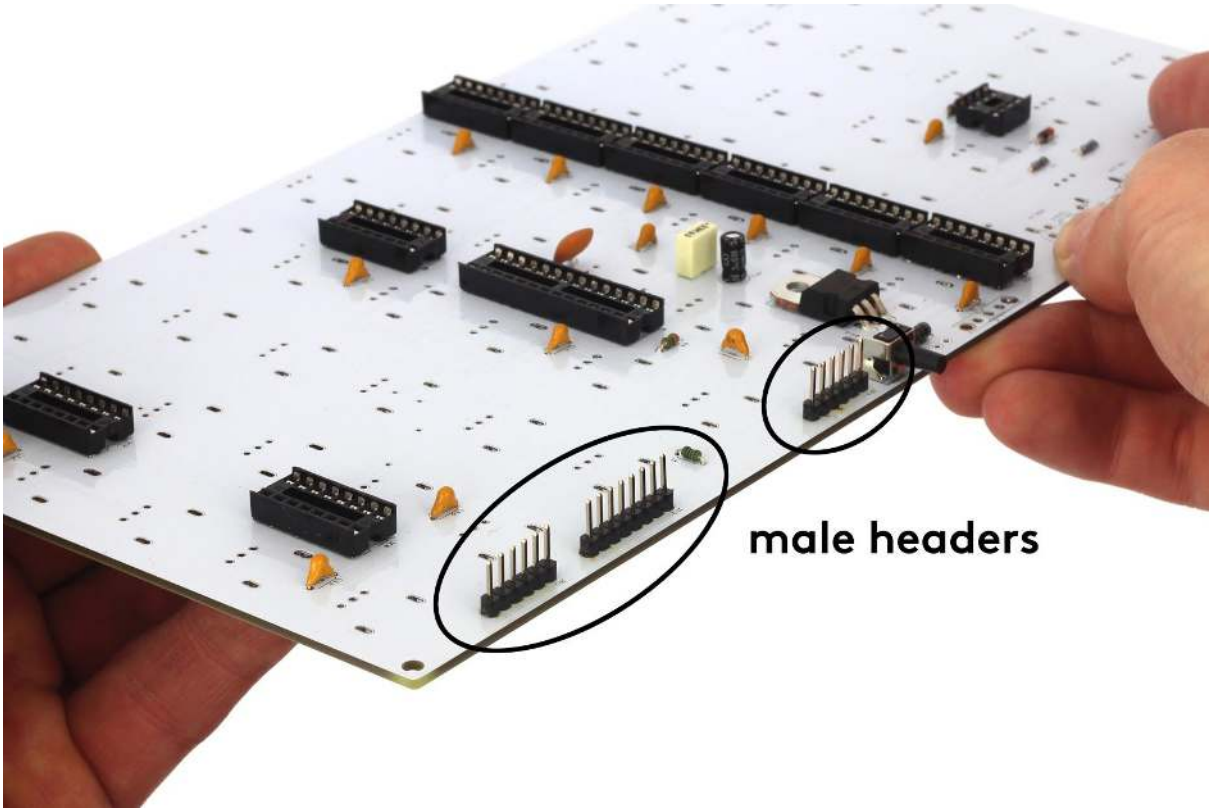

fuse


Your PCB should like this now...

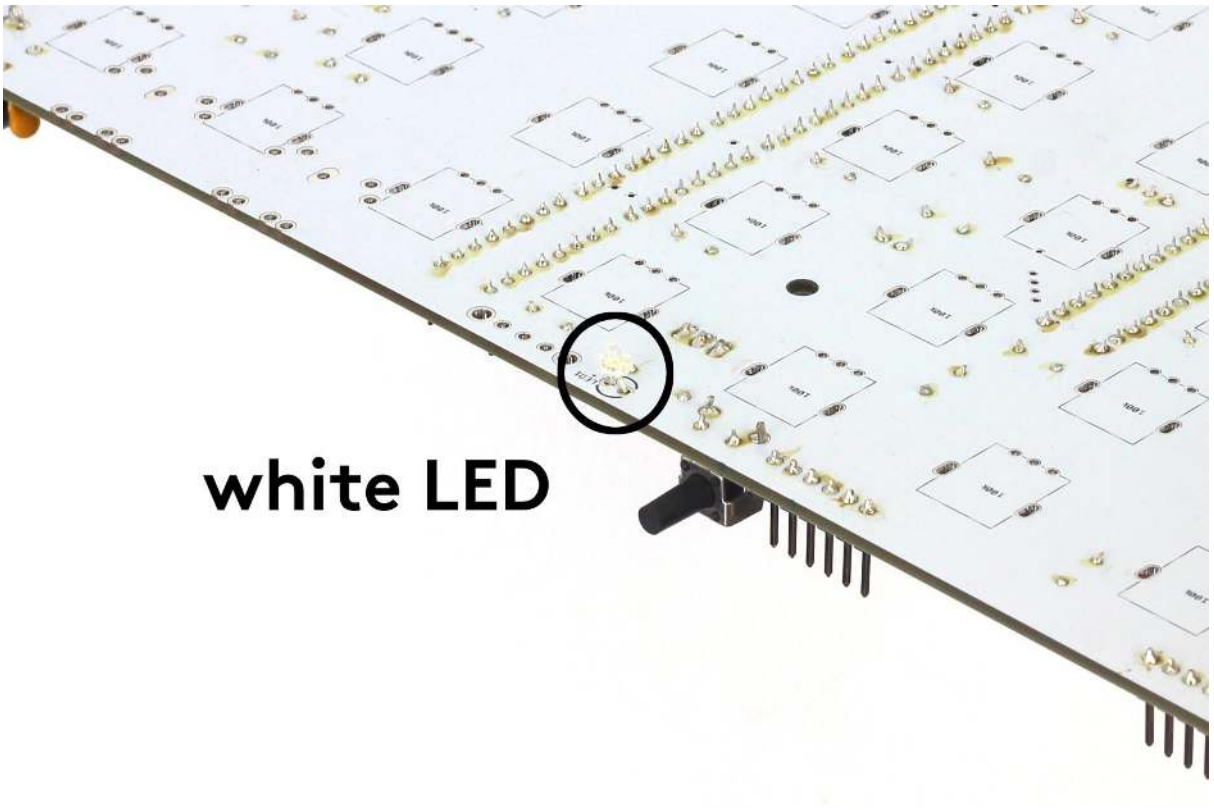
Now you can add the **power connector**. Just push it down to the PCB and solder it straight.



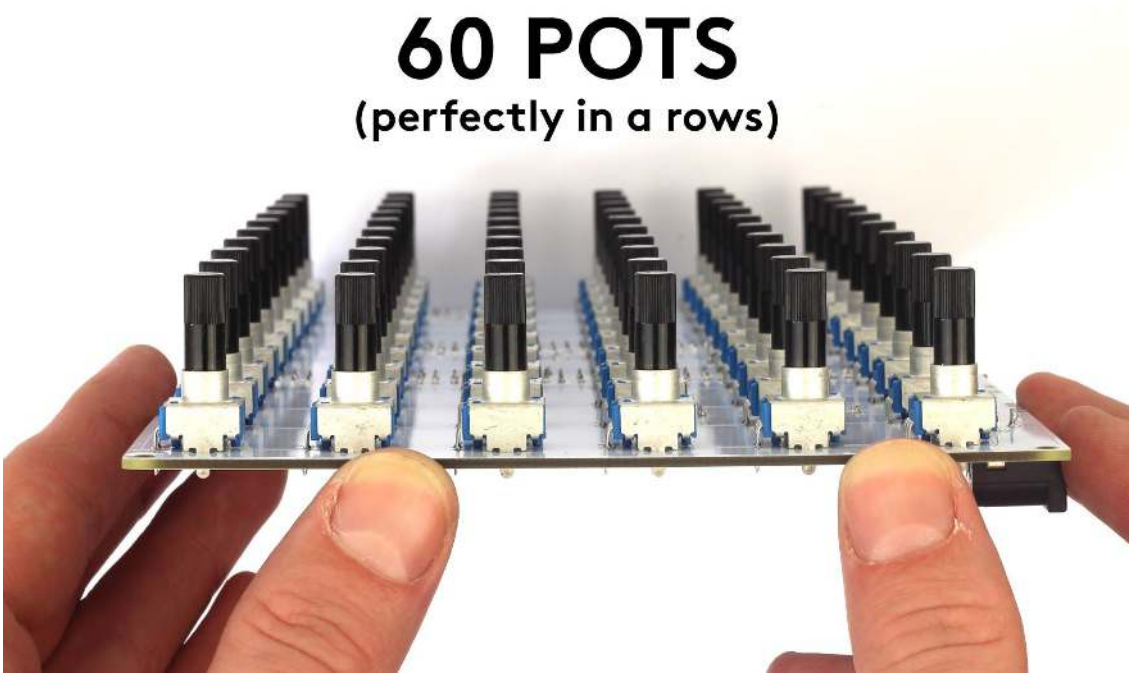
Insert the **male headers** now. Be sure to solder them straight and flat with the board. Again, you can solder just one leg, do the adjustment and solder the rest.

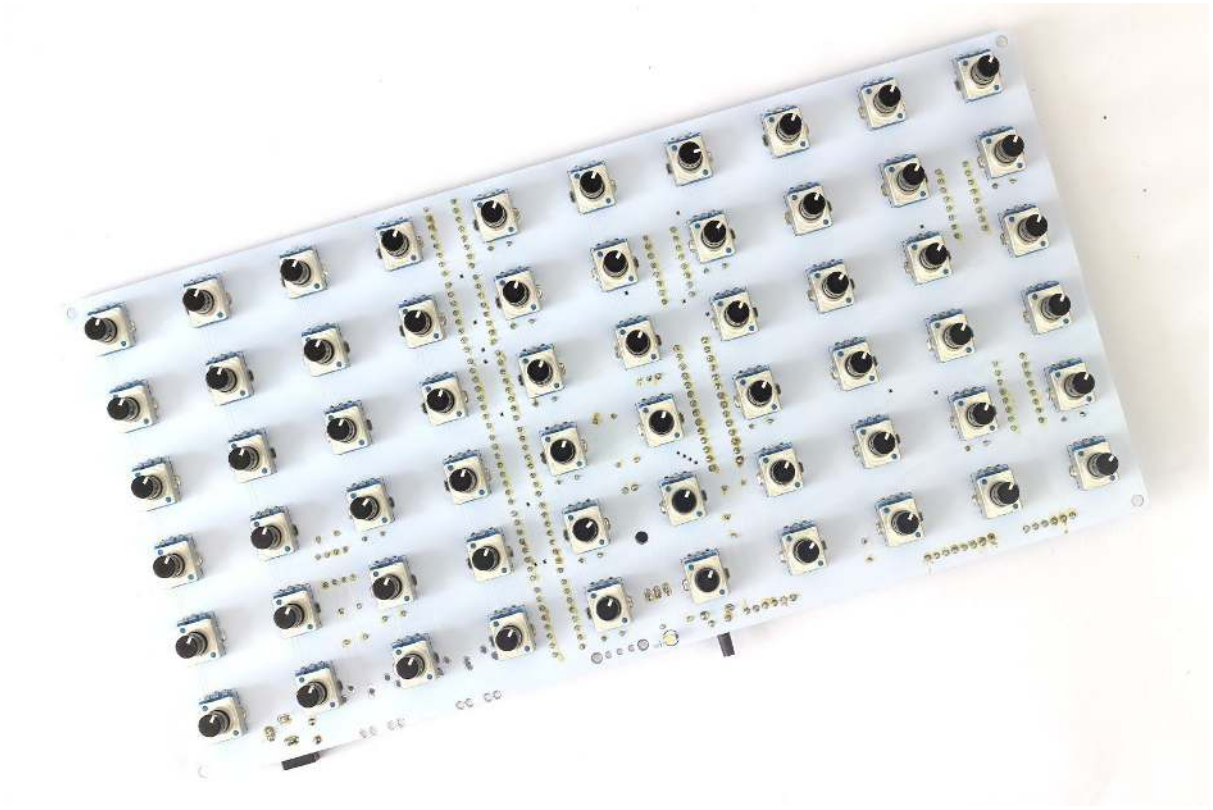


Turn the PCB around now. Insert the white **LED** according to its **orientation** - the **longer lead goes to the plus (+) hole**. Solder it almost down to the PCB.

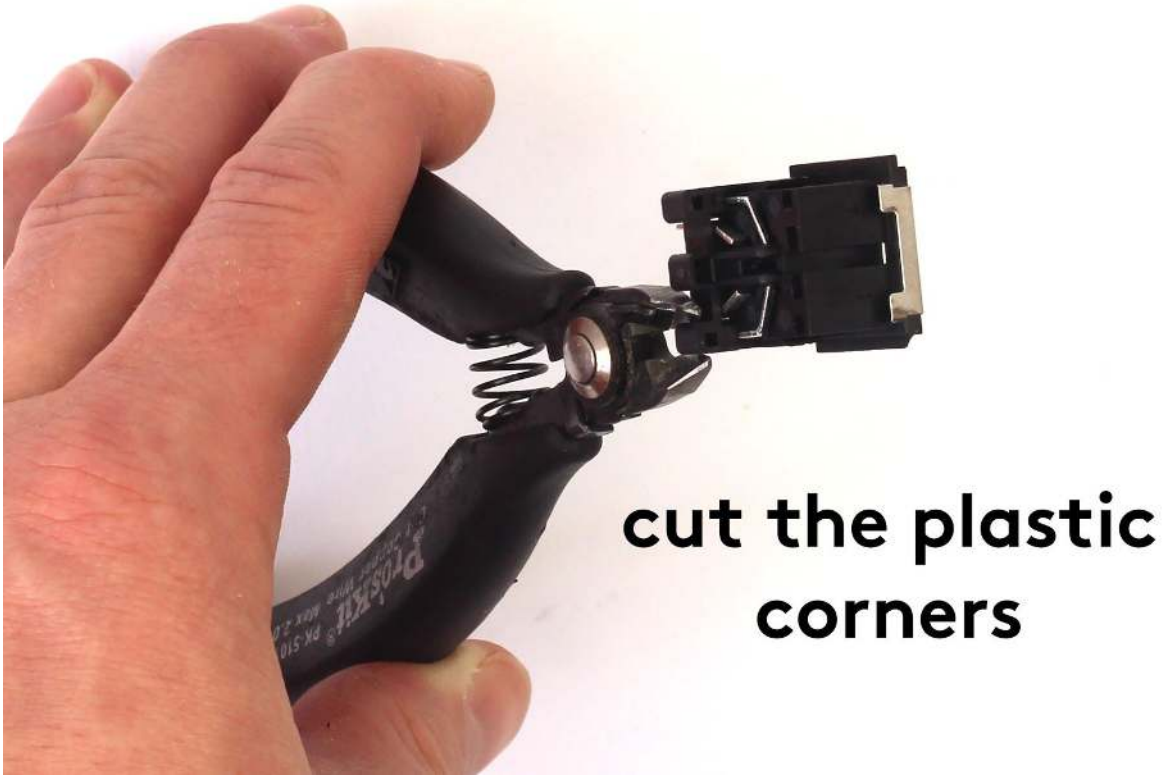


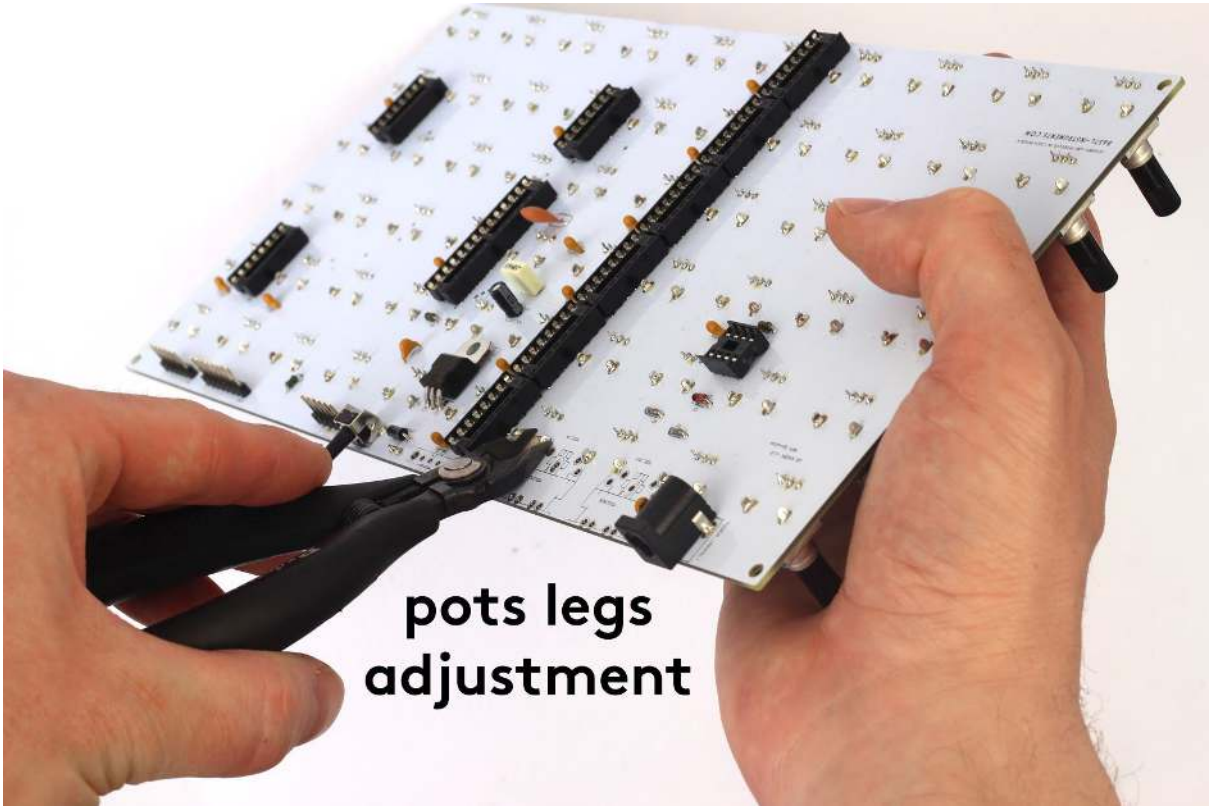
Finally, move on to the funniest part - **potentiometers**. There are (surprisingly!) SIXTY of them. Pots take a little care and patience to install correctly. Push the pots on the place and look closely to see if they are in straight. Solder just ONE leg on each pot. Do the check. Solder another leg. Do the double check. Once they look perfectly in a row you can finish the soldering.

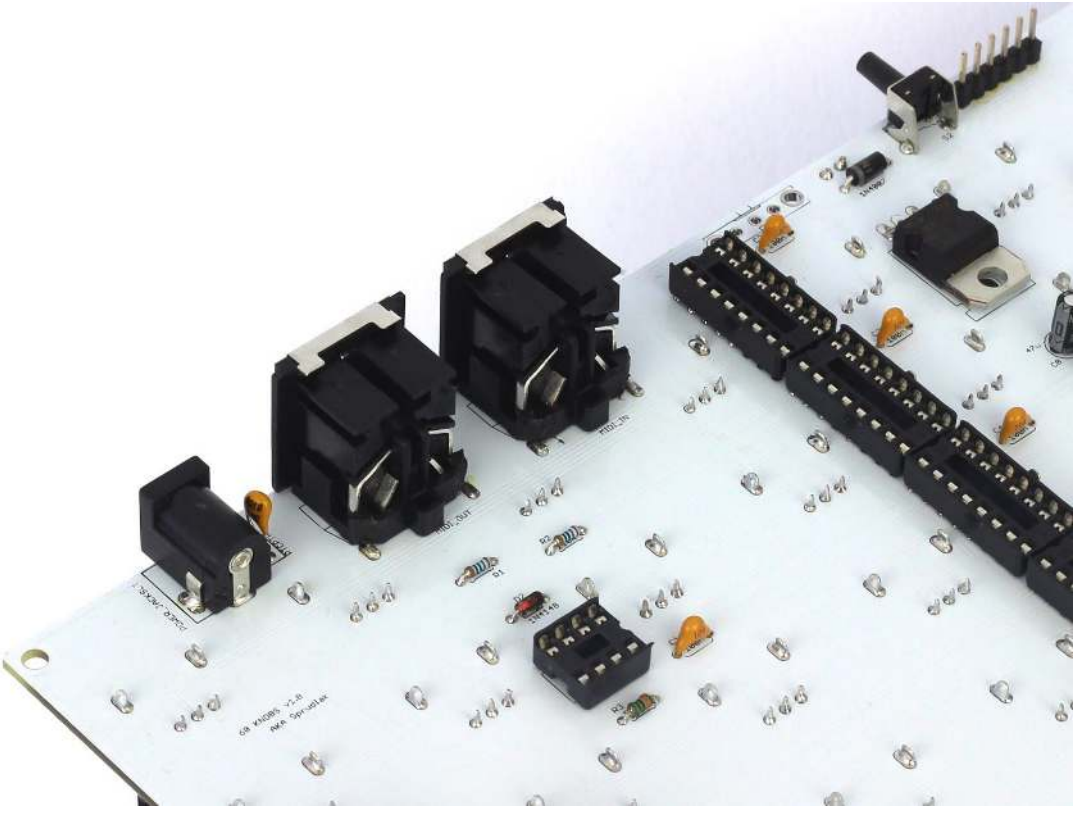




And now the last parts for soldering - **MIDI connectors**. You have to do a little adjustment before soldering. You should adjust the plastic corners (see the photo) of the connector by cutting. You can also cut the legs of pots. Then just be sure to solder them straight and flat with the PCB.

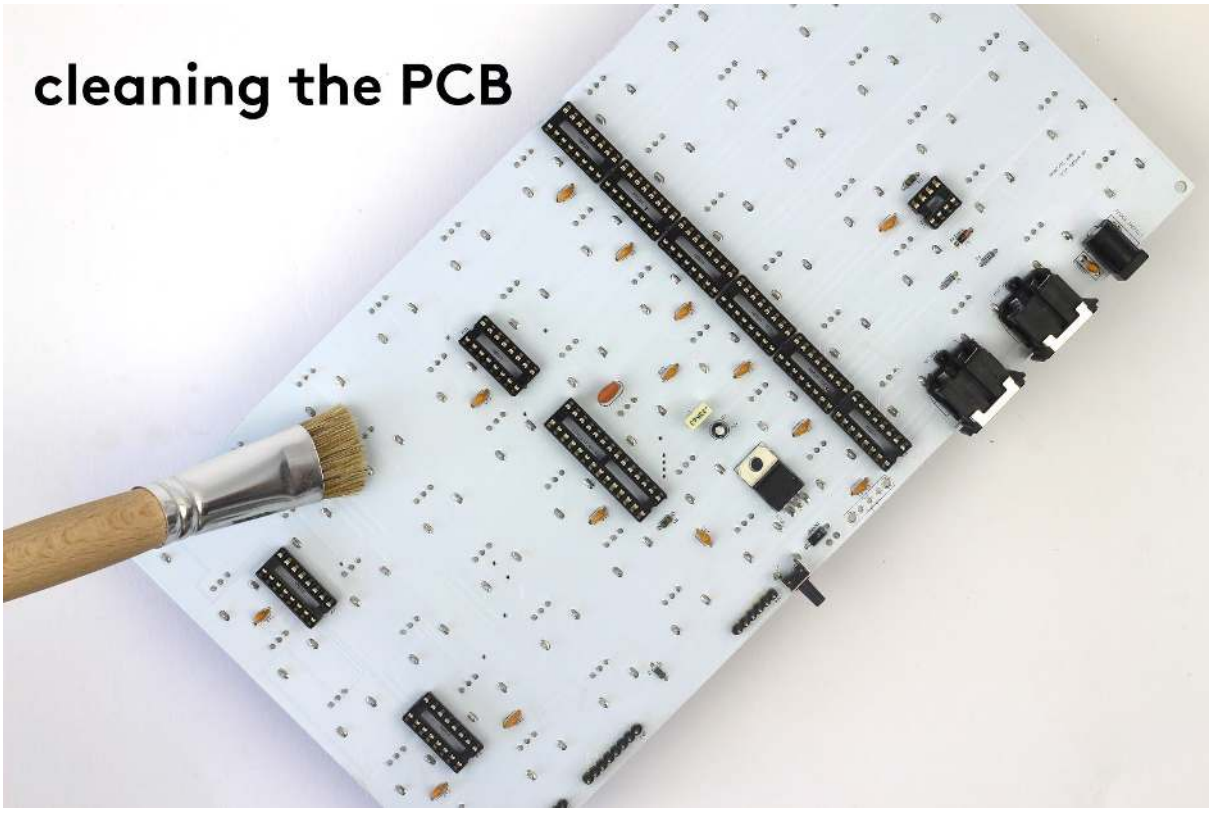



pots legs
adjustment

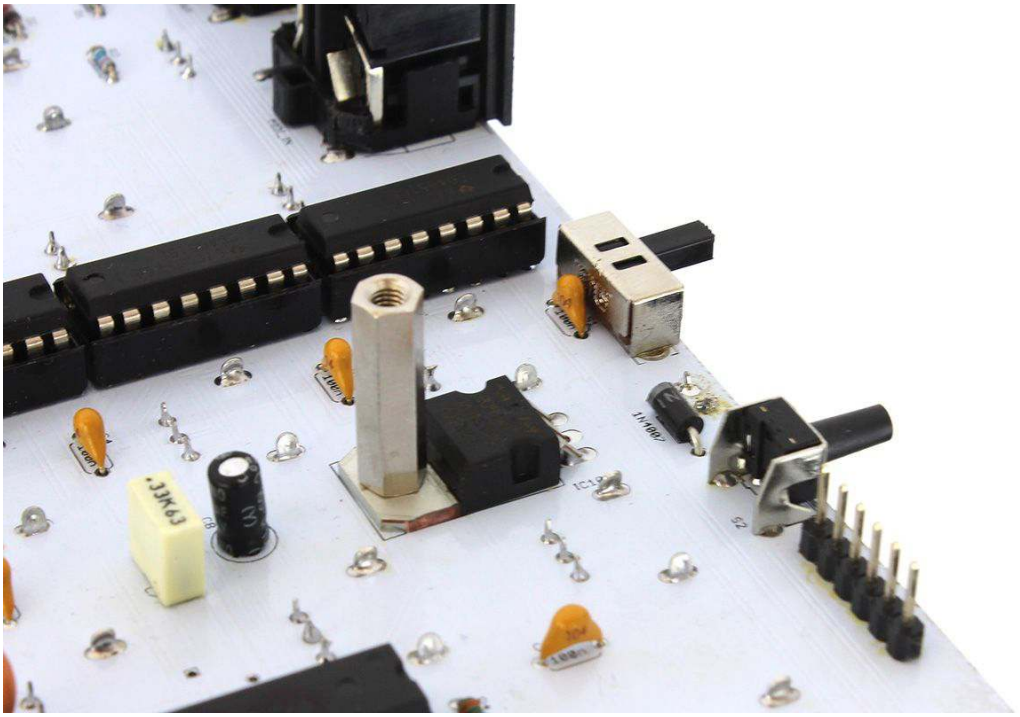


ASSEMBLY

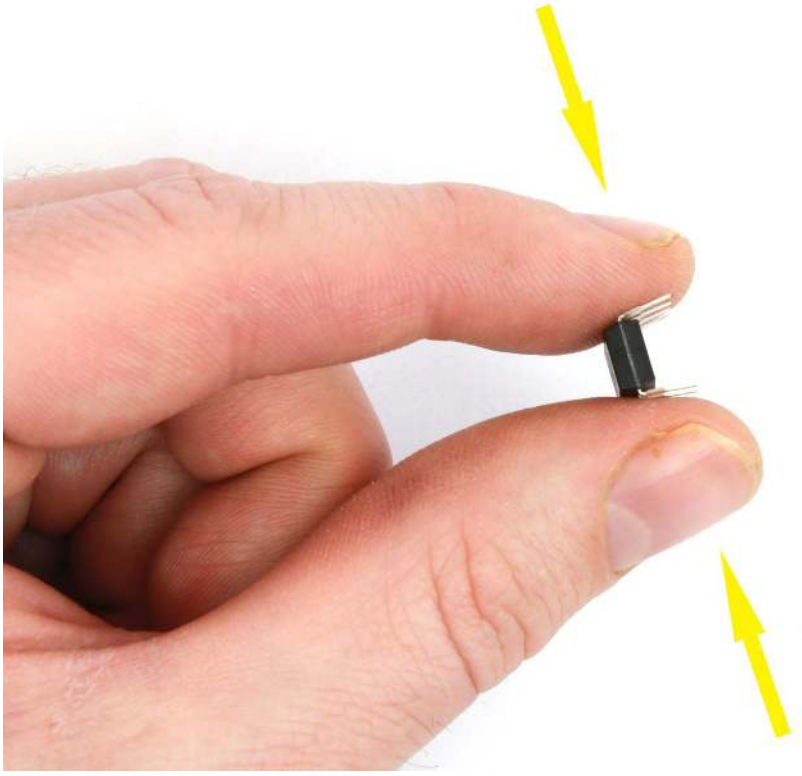
Before you begin to place the enclosure on, you might want to **clean** your PCB. You can use e.g. isopropyl alcohol. Put some of the liquid all over the PCB using the brush, let it act for a while and sweep it off. Then just let it dry. You can repeat these steps until you are satisfied with the result.

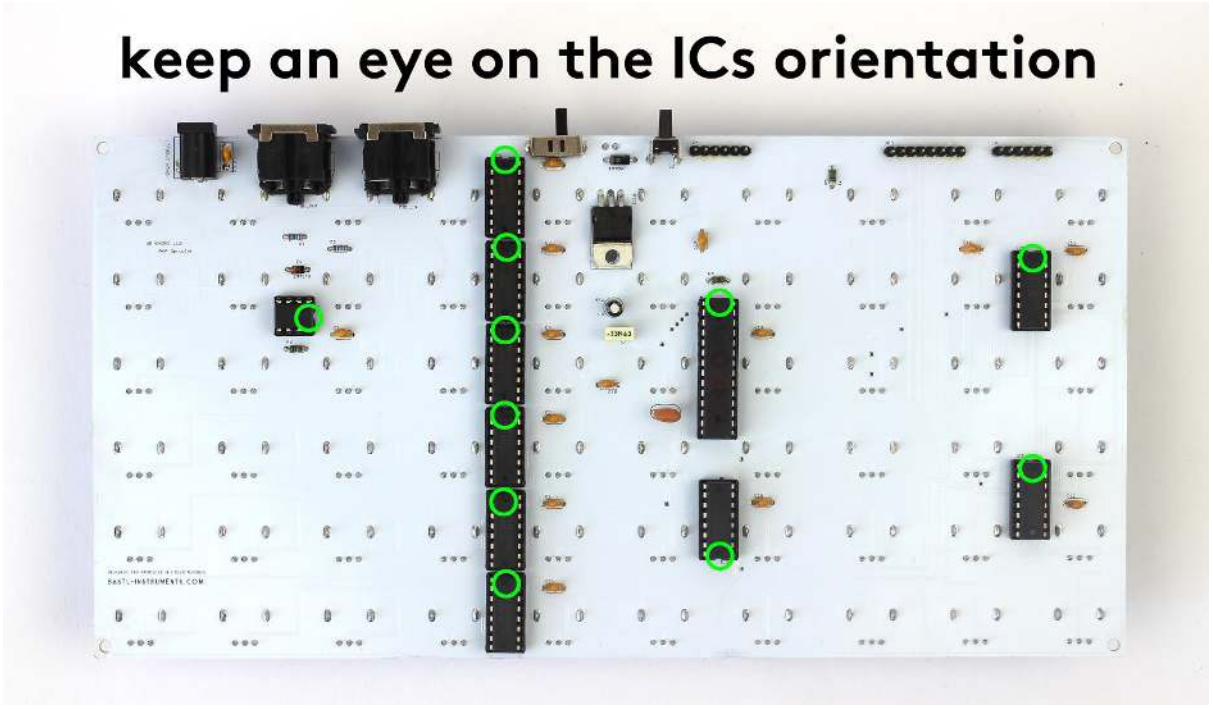


After this step you can finally add the **switch** and mount the 6 mm mushroom head **screw** with the 18 mm **spacer** on the regulator.



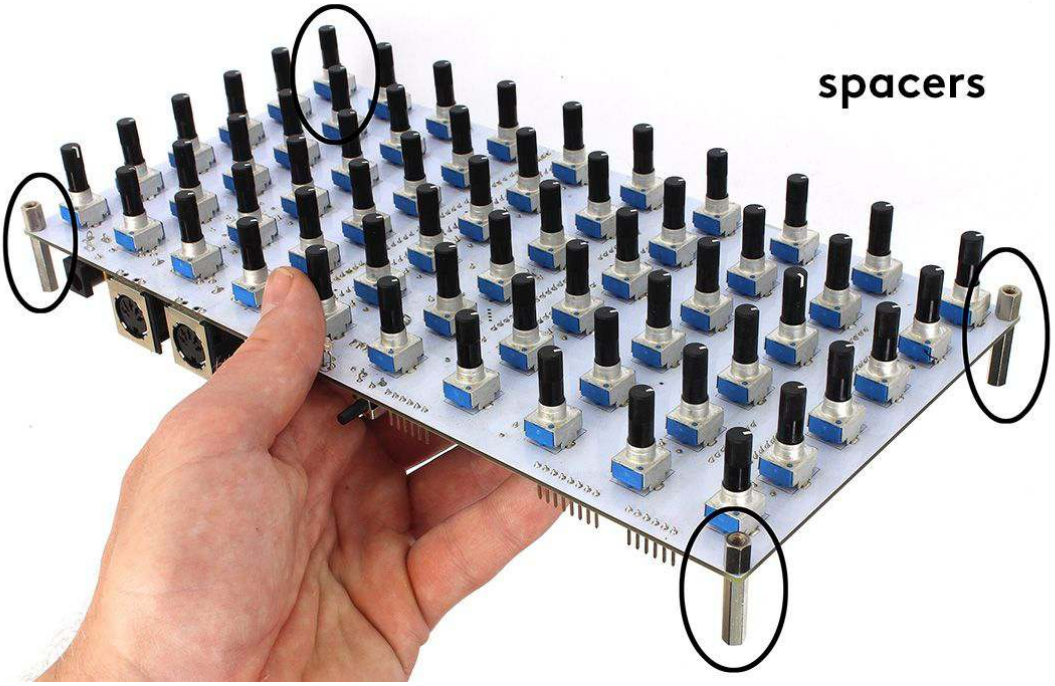
At this point, don't forget to insert all **ICs** in the sockets: **Atmega** (1x), **CD4051BE** (9x) and **6N137** (1x). Watch out for the **orientation** for particular IC. There is a little half circle notch or dot on one side of each IC that should match the notch drawn on the PCB. Installing the ICs can be a little tricky. The IC leads are flared out a bit wider than the socket will accept. Bend them in slightly with your fingers, and then try to press all the leads into the sockets in one shot.





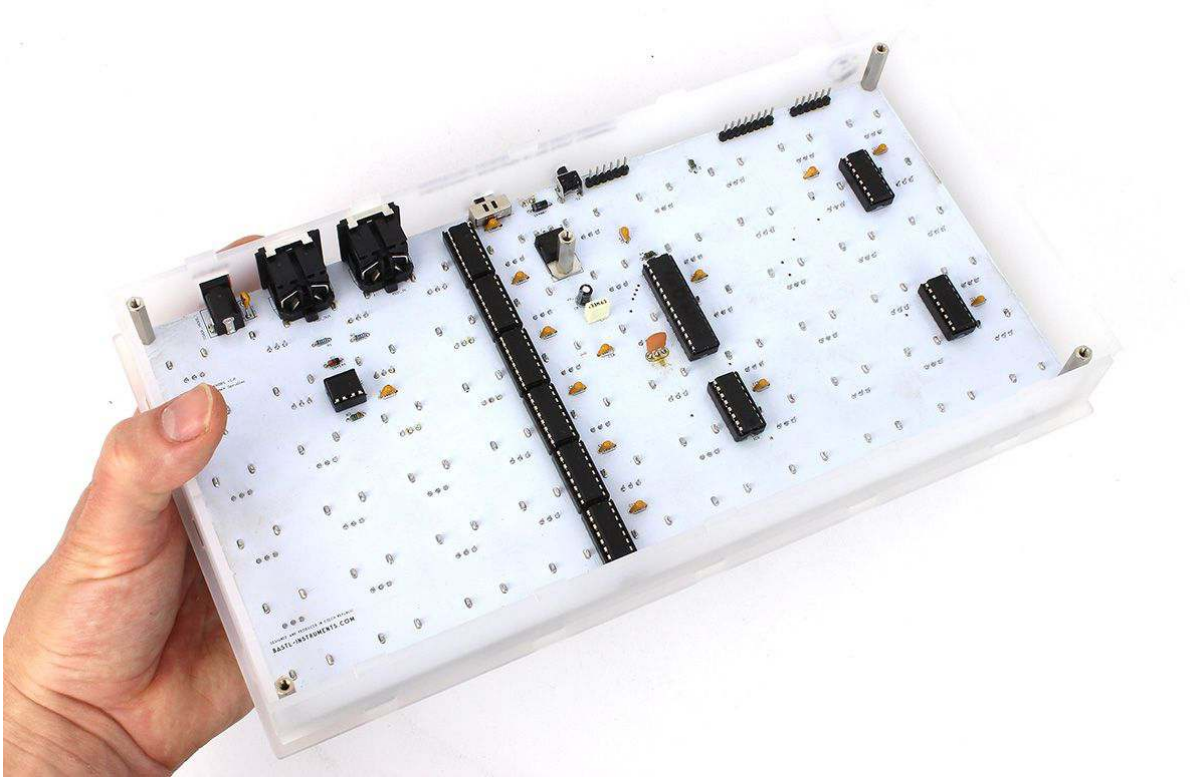
ENCLOSURE (FLAT VERSION)

First install the spacers into the corners. The longer ones goes to the bottom side.

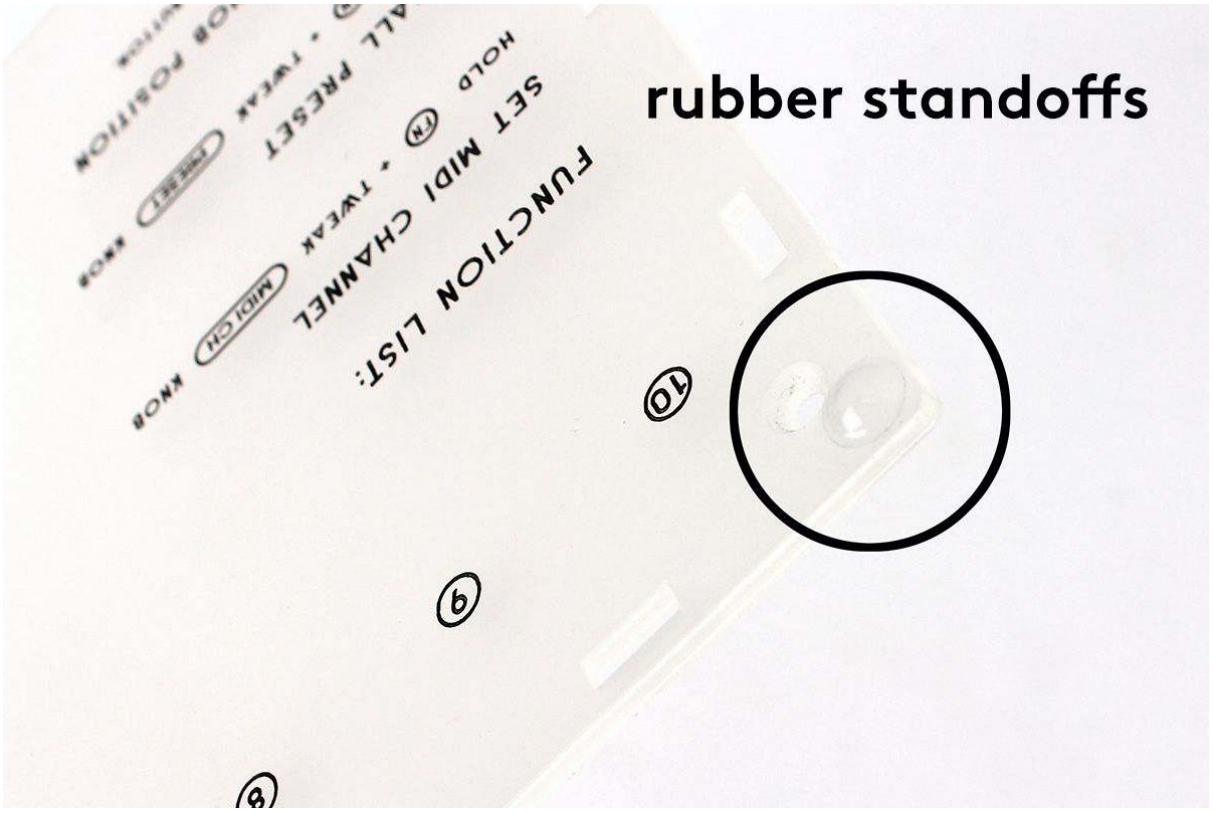


Put the top enclosure on and secure it with the four 6 mm mushroom head screws.

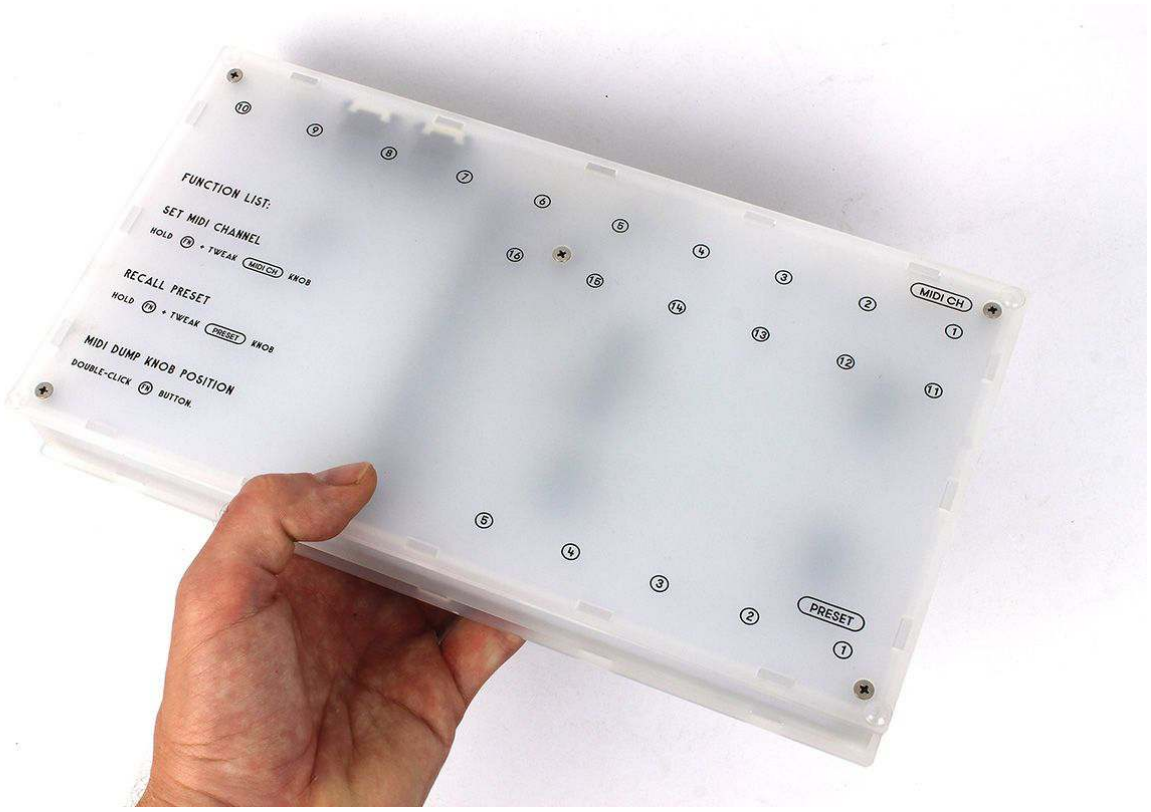
Turn the unit around and place the side enclosures on.



Now you can also add the rubber standoffs.



Finally, place the bottom enclosure on and secure it with the five countersunk screws.



Your 60 Knobs is completely done now, congratulations!

TROUBLESHOOTING

Check the F.A.Q. on our website first. If you are still in trouble the best thing is to take a nap! Especially late at night! Then you can send the detailed description of the problem with enclosed high-resolution photos on diy@bastl-instruments.com. Consider our “Come to Daddy” service if you think that you are unable to make the instrument work on your own.