

# BASTL INSTRUMENTS

## MICROGRANNY v2.1 - Assembly Guide

bastl-instruments.com



### INTRODUCTION

Welcome to the assembly guide for the MicroGranny kit. MicroGranny is a monophonic granular sampler by Bastl Instruments. For all the features go [here](#) or just check out the manual.

This kit is suitable for more advanced users. It is almost necessary 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.

This kit consists of two printed circuit boards (PCBs). All the parts come in three main bags separated for Top board, Bottom board and Assembly parts. Please check all of your parts BEFORE you begin work to make sure you are not missing anything. See the bill of materials for detailed list.

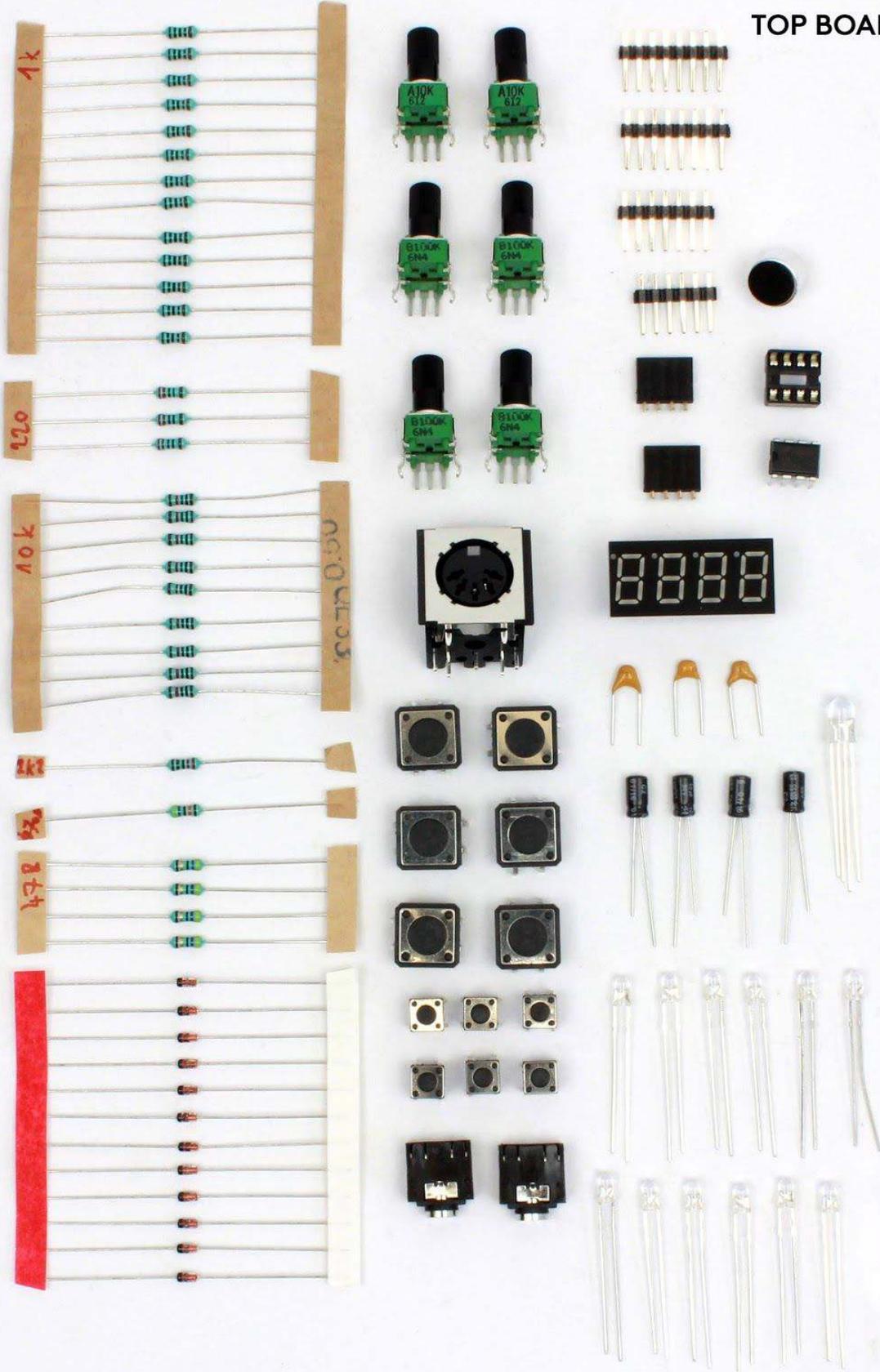
## BILL OF MATERIALS

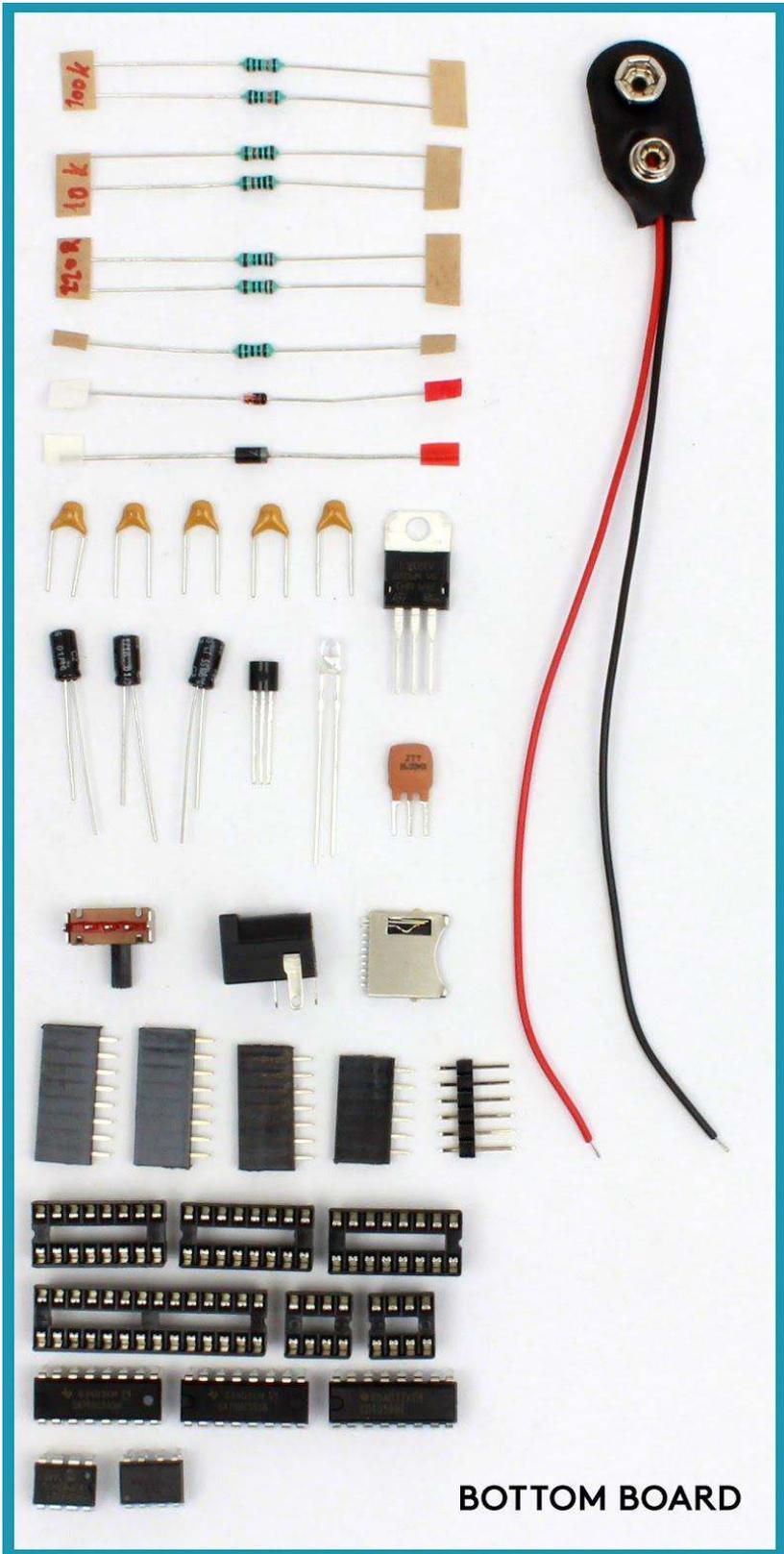
MICROGRANNY TOP		
qty	value	part
3	220R	resistor 0207
9	10k	resistor 0207
13	1k	resistor 0207
4	47R	resistor 0207
1	2k2	resistor 0207
1	470k	resistor 0207
12	1N4148	diode
1	8 pin DIL	DIL socket - in foam
1	op-amp LM358	IC in foam
4	10uF	electrolytic capacitor
1	22nF	ceramic capacitor
1	1nF	ceramic capacitor
1	100pF	ceramic capacitor
12	red 3mm RWC	LED 3mm Red Water Clear
1	5mm common anode CA	rgb led
1	LED DISPLAY R 4	7 segment display
1		electret microphone
2	jack TRS 3.5mm	audio connector
4	B100k	potentiometer
2	A10k	potentiometer
6	TACT 24	big button
6	TACT 64	small button
1		DIN MIDI Connector
1	1x6 pin	male pin header
1	1x7 pin	male pin header
2	1x8 pin	male pin header
2	4 pin	right angle female pin header

<b>MICROGRANNY BTM</b>		
<b>qty</b>	<b>value</b>	<b>part</b>
2	100k	resistor 0207
2	220R	resistor 0207
2	10k	resistor 0207
1	1k	resistor 0207
1	1N4007	diode
1	1N4148	diode
3	16 pin DIL	DIL socket - in foam
2	8 pin DIL	DIL socket - in foam
1	28pin DIL	DIL socket - in foam
2	74HC595	IC in foam
1	MCP4921	IC in foam
1	CD4050BE	IC in foam
1	6N137	optoisolator in foam
5	100nF	ceramic capacitor
3	10uF	electrolytic capacitor
1	7805	voltage regulator
1	78L33	voltage regulator
1	red 3mm RWC	LED 3mm Red Water Clear
1	2 P B	switch 2 P B
1	16MHz	resonator
1		micro SD slot
1	PC-GK 2.1mm	power barrel connector
1	9V BC	straight battery clip
1	6 pin	male pin header
1	1x6 pin	female pin header
1	1x7 pin	female pin header
2	1x8 pin	female pin header

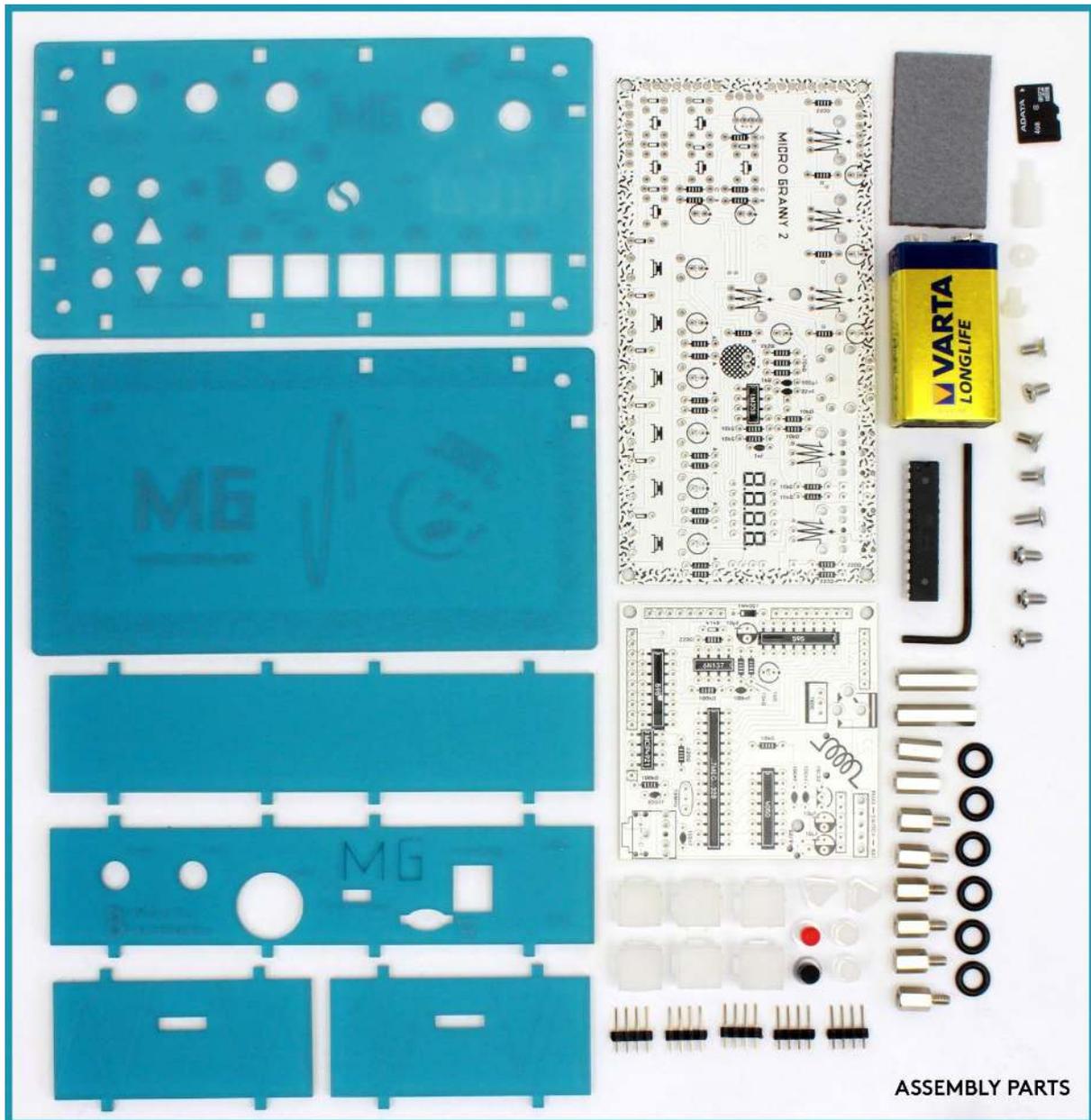
<b>MICROGRANNY ASSEMBLY</b>		
<b>qty</b>	<b>value</b>	<b>part</b>
1	Top	PCB
1	Bottom	PCB
1	9V	battery
1		ATMEGA328-PU-ND
1		micro SD card /w samples
2	M3x20	spacer - nickel nut x nut
6	M3x8	spacer - nickel srew x nut
2	M3x11	spacer - nickel nut x nut
1	M3x11	spacer - plastic screw x nut
1	M3x5	screw - plastic
1	M3	nut - plastic
4	M3x6	mushroom head screw
4	M3x6	countersunk screw
1		allen key
1		felt under the battery
6		O-Ring
5		1x4 male
6		lasered button with cross
2		lasered triangle
2		lasered circle
1		lasered circle red
1		lasered circle black
1		lasered top cover
1		lasered bottom cover
2		lasered side cover
1		lasered back cover
1		lasered front cover

TOP BOARD





BOTTOM BOARD



## 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.

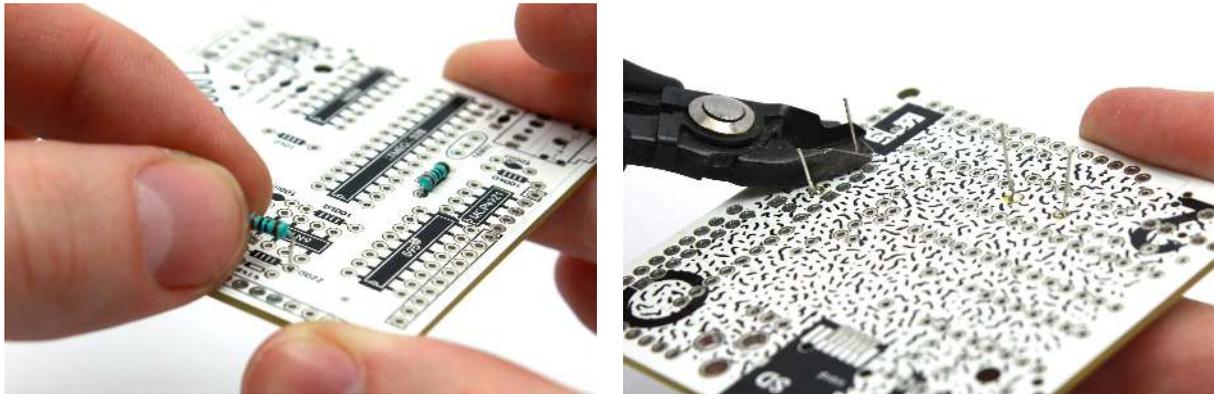
## SOLDERING - BOTTOM BOARD

Start with the bottom board parts. First of all, take your time and check the **values** of all **resistors** [using a multimeter](#) (or you can check the color codes if you are seasoned enough):

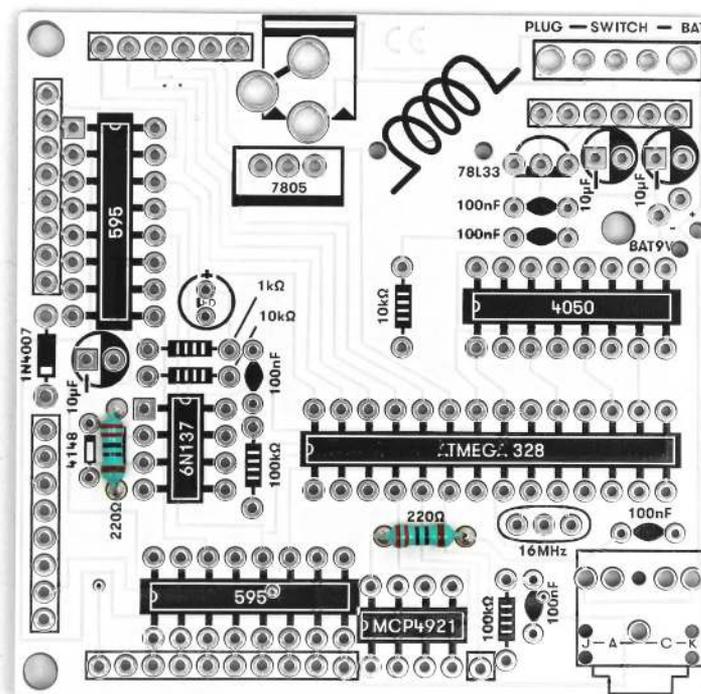
- **220R** (2x), **1k** (1x), **10k** (2x), **100k** (2x).

Then solder them on the bottom PCB (the smaller one) and 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 two **diodes** (be careful, **diodes are polarized!** make sure that the marking ring on the diode body matches the marking on the circuit board):

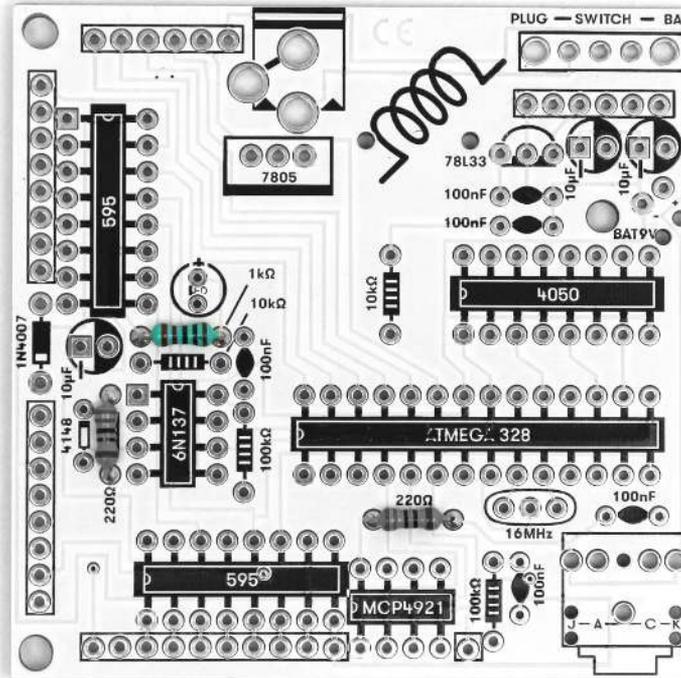
- **1N4007** (1x), **1N4148** (1x).



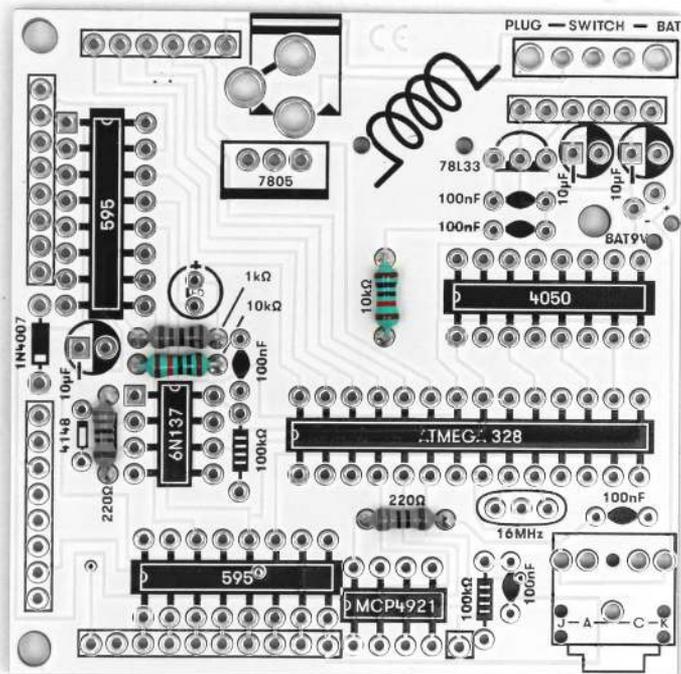
## 220R resistors



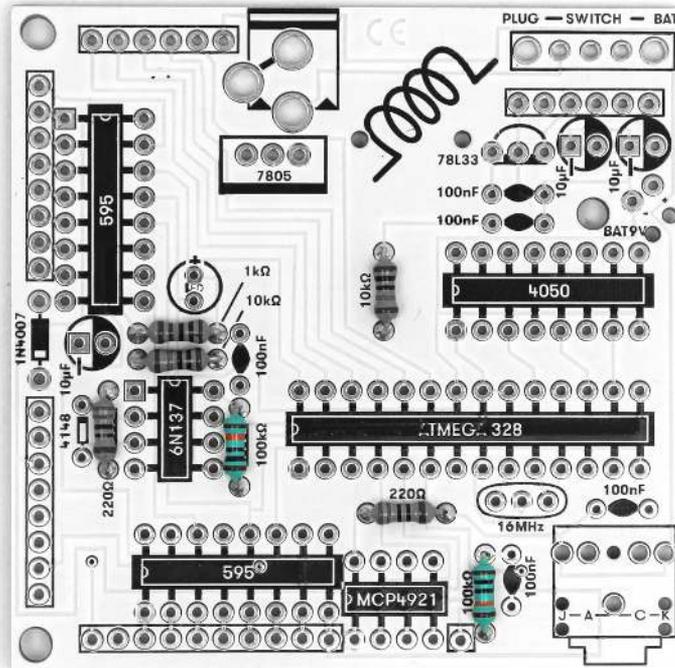
# 1k resistor



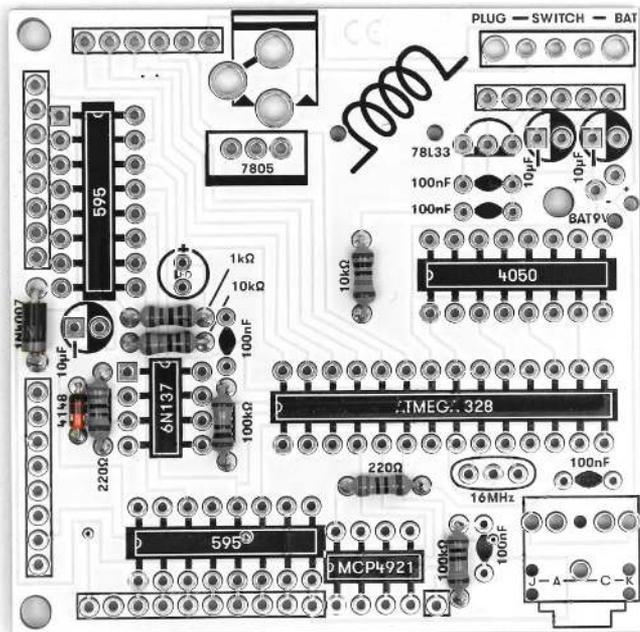
# 10k resistors



# 100k resistors

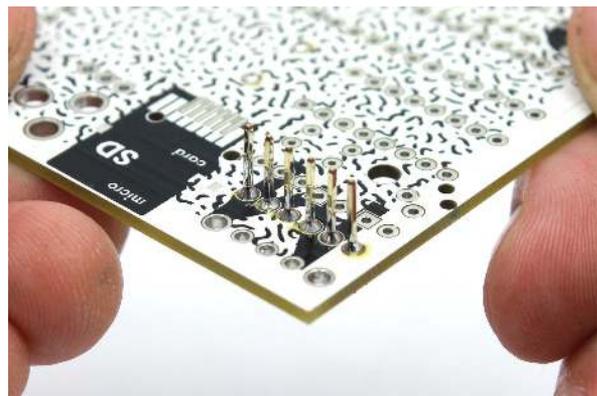
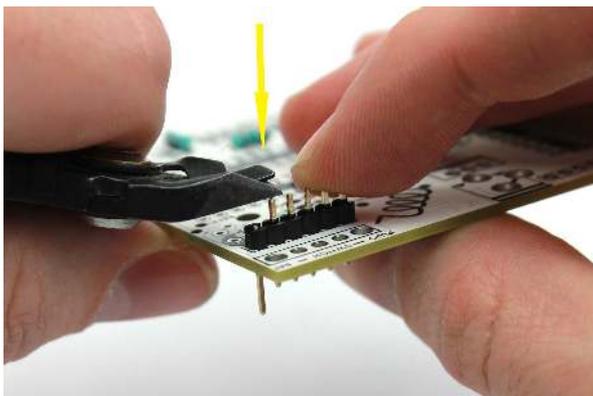
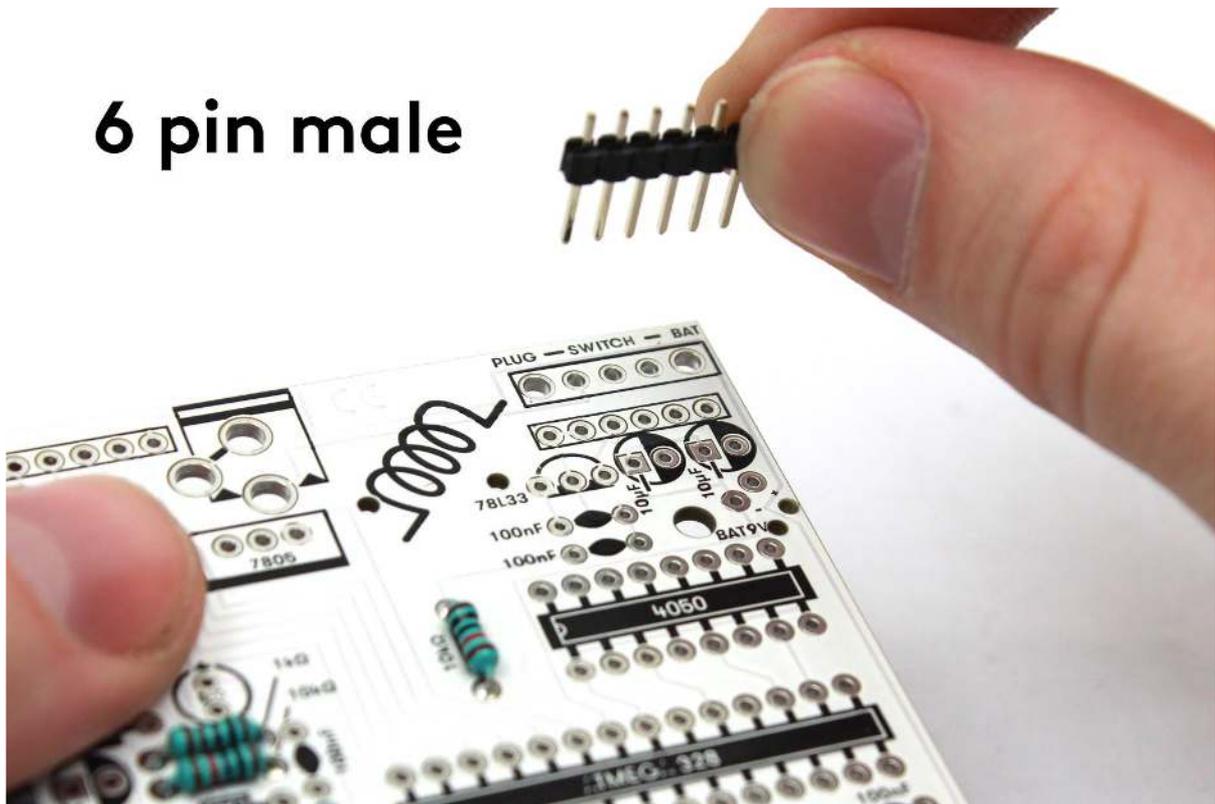


# 1N4007 + 1N4148 (watch out for the orientation!)



Take the **6 pin male** header now and push the headers to align them with the edge using your pliers or another appropriate tool. Insert and solder the header then.

## 6 pin male

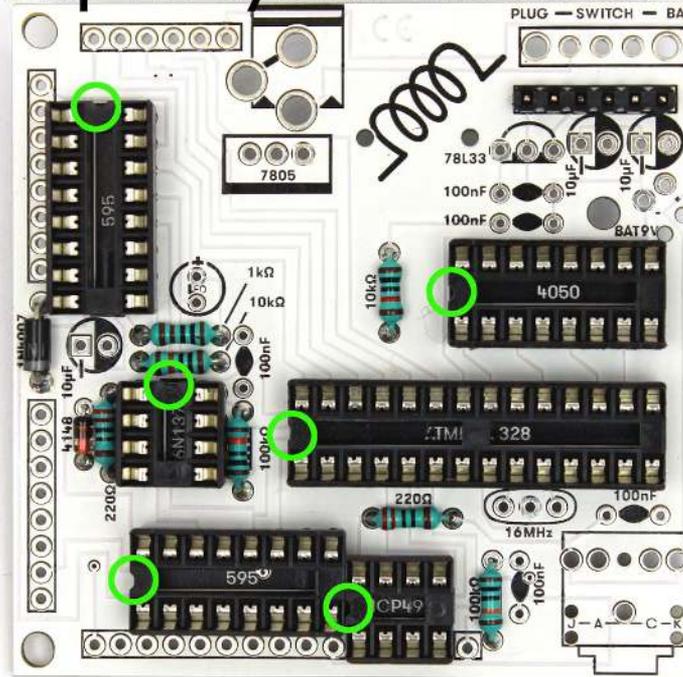


Insert the **IC sockets**:

- **8 pin DIL (2x), 16 pin DIL (3x), 28 pin DIL (1x).**

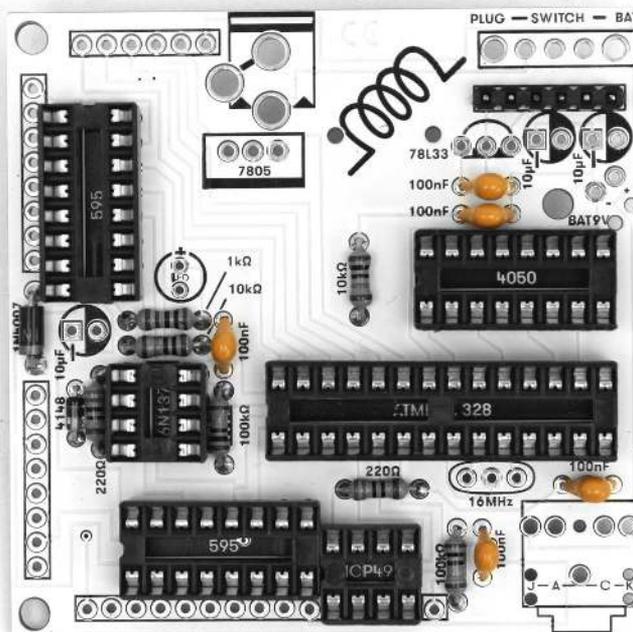
Just be aware of the **right direction of sockets** - there is a notch on each socket that has to match with the marked notch on the PCB.

## IC sockets (keep an eye on the notches)

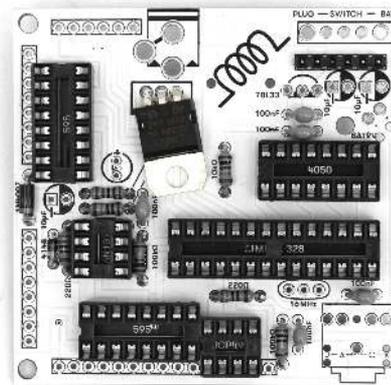


Add the **ceramic capacitors** now. There are just five of them of the same value - **100nF** (they are marked "104" on itself).

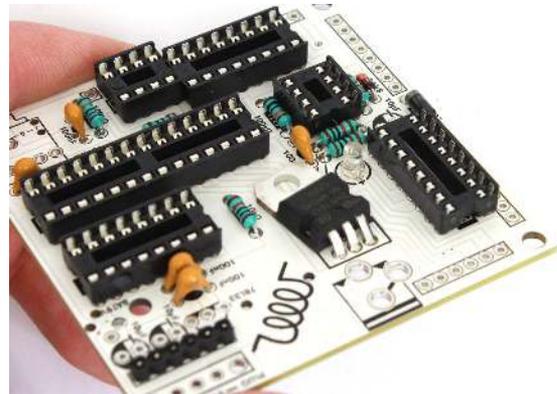
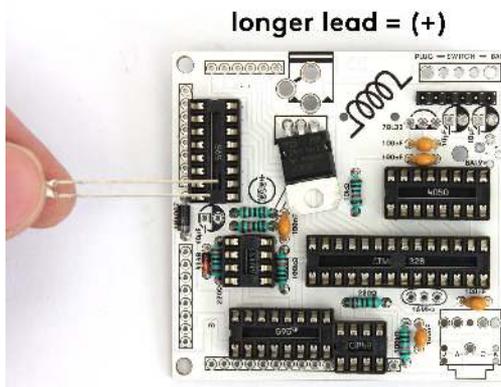
## "104" caps



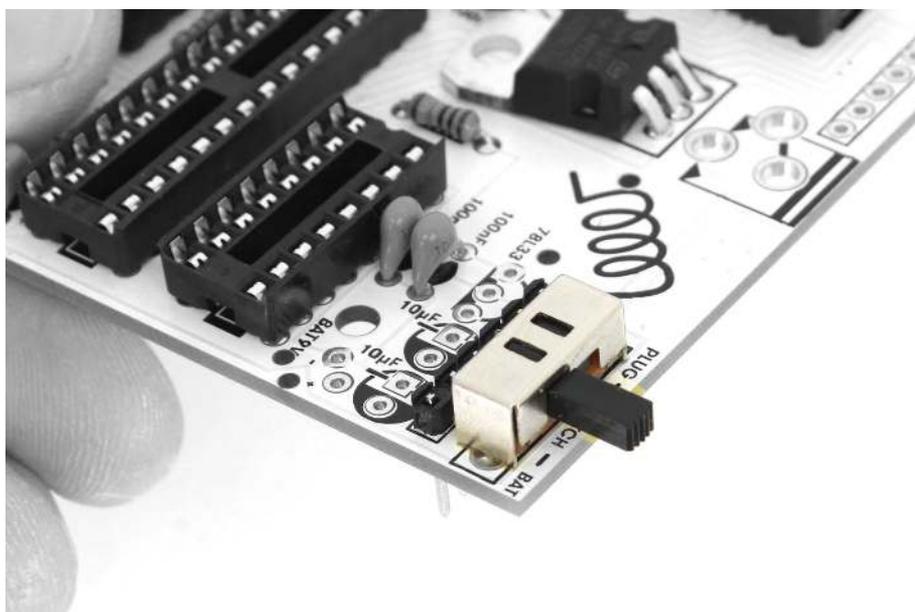
Bend the legs of the **7805 regulator** to make them right angled and solder the regulator. Be aware to not let it touch with some other component. You can adjust it a little bit after the soldering also.



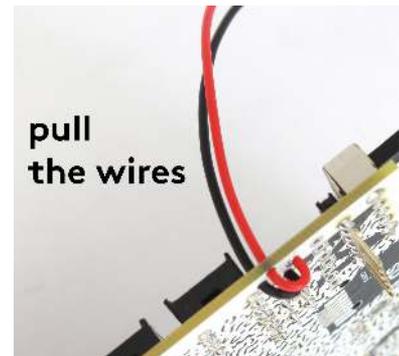
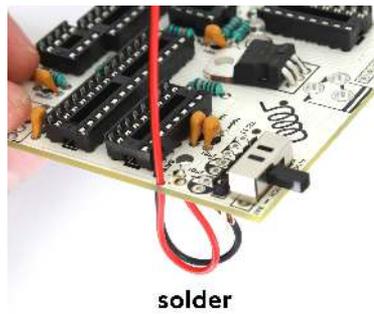
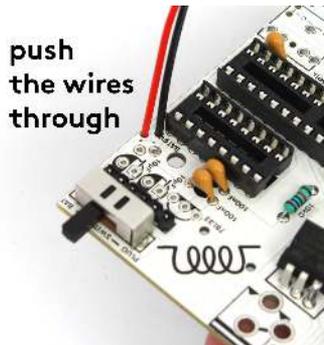
Solder the **LED** down to the PCB - be sure to insert the longer lead into the plus (+) hole.



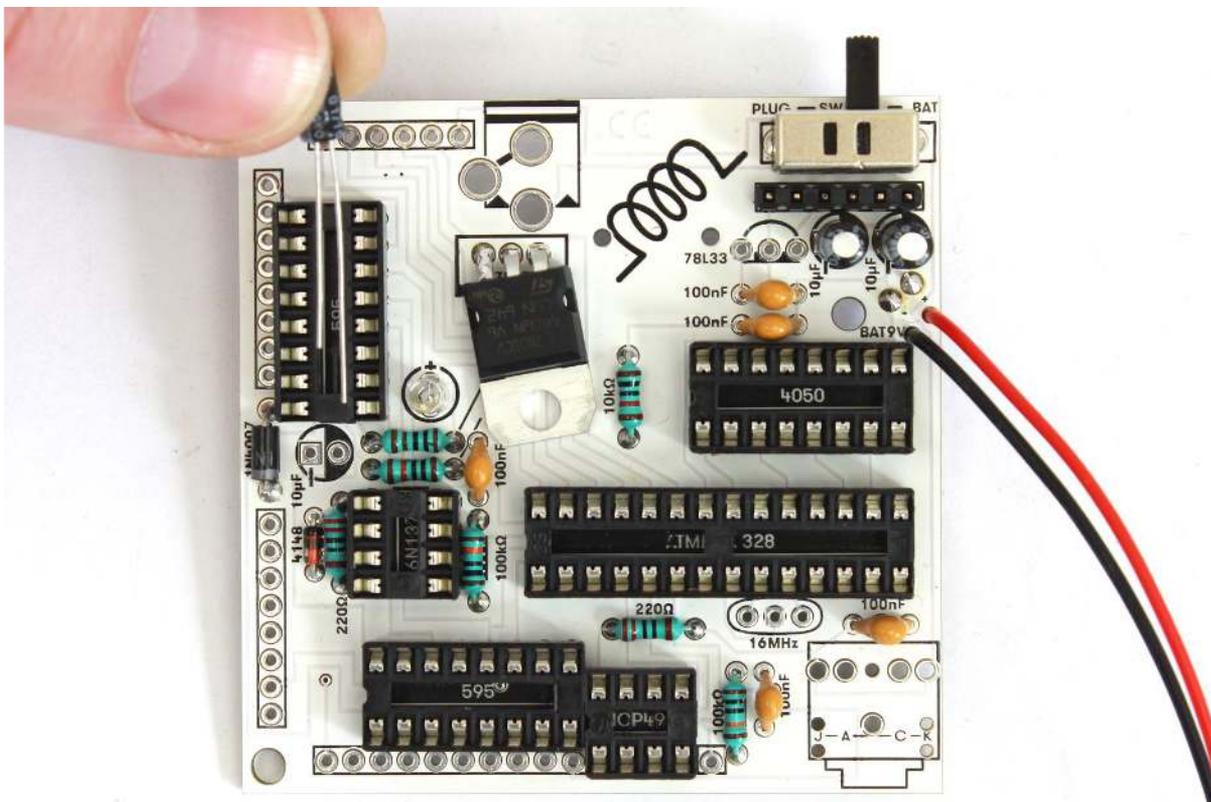
Move to soldering the **switch** now. You can solder just one leg first, adjust it and do the rest then. **(IMPORTANT NOTE:** If you are going to clear the PCB with the isopropyl alcohol, do soldering of this part **AFTER** the cleaning. The alcohol could damage the switch.)



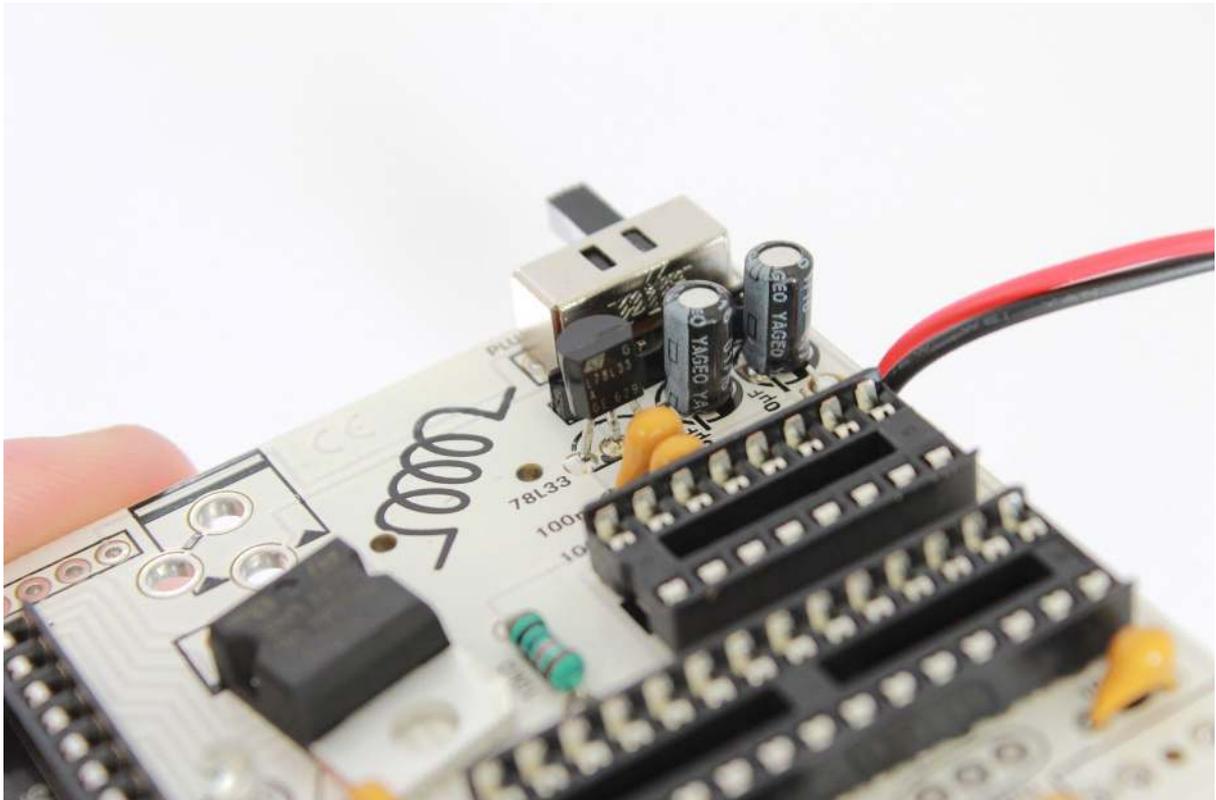
Take the **battery clip** and push the wires through the holes from the top WITHOUT soldering pads and then through holes with soldering pads facing the the **red cable** to the **plus (+)** sign. See the photo for proper soldering (This way, cable is secured against excessive pulling while changing the battery. Clever, huh?).



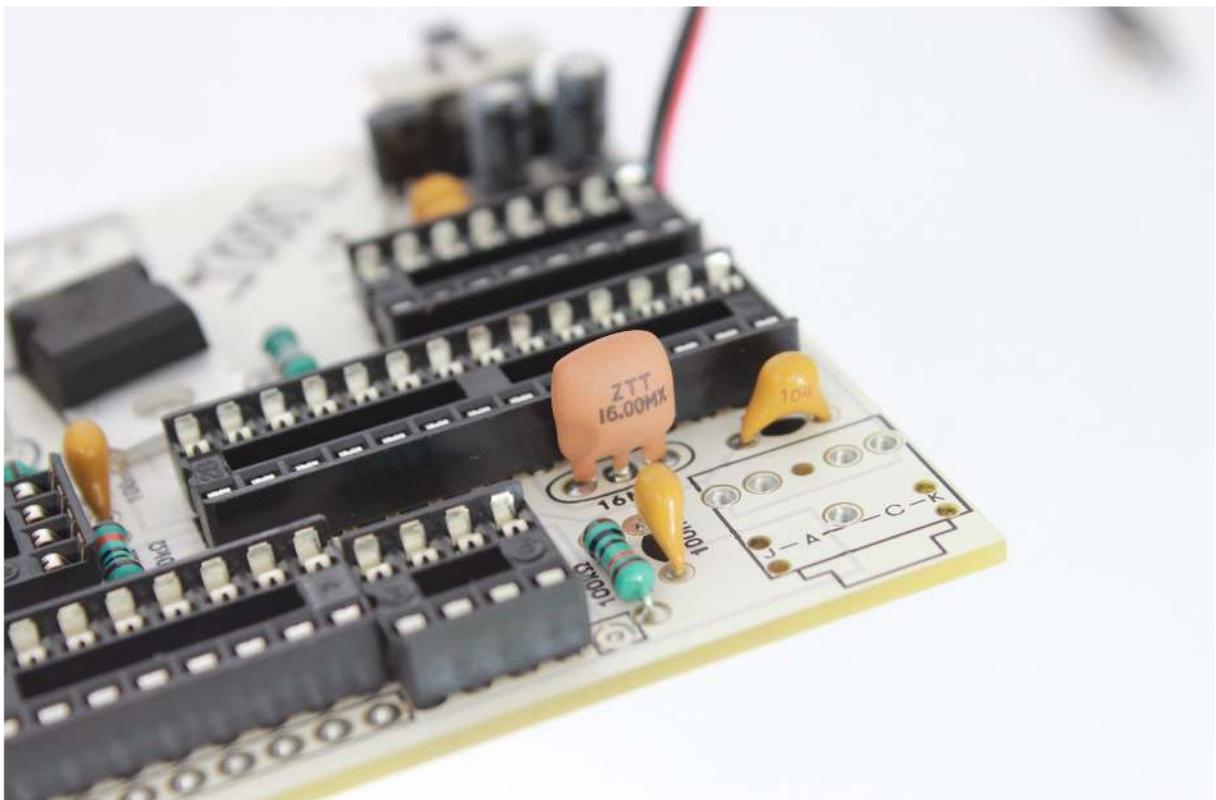
Solder the **electrolytic capacitors: 10 $\mu$ F** (3x; **watch out**, there is a circle hole in black print on the PCB that has to match the longer lead of the capacitors).



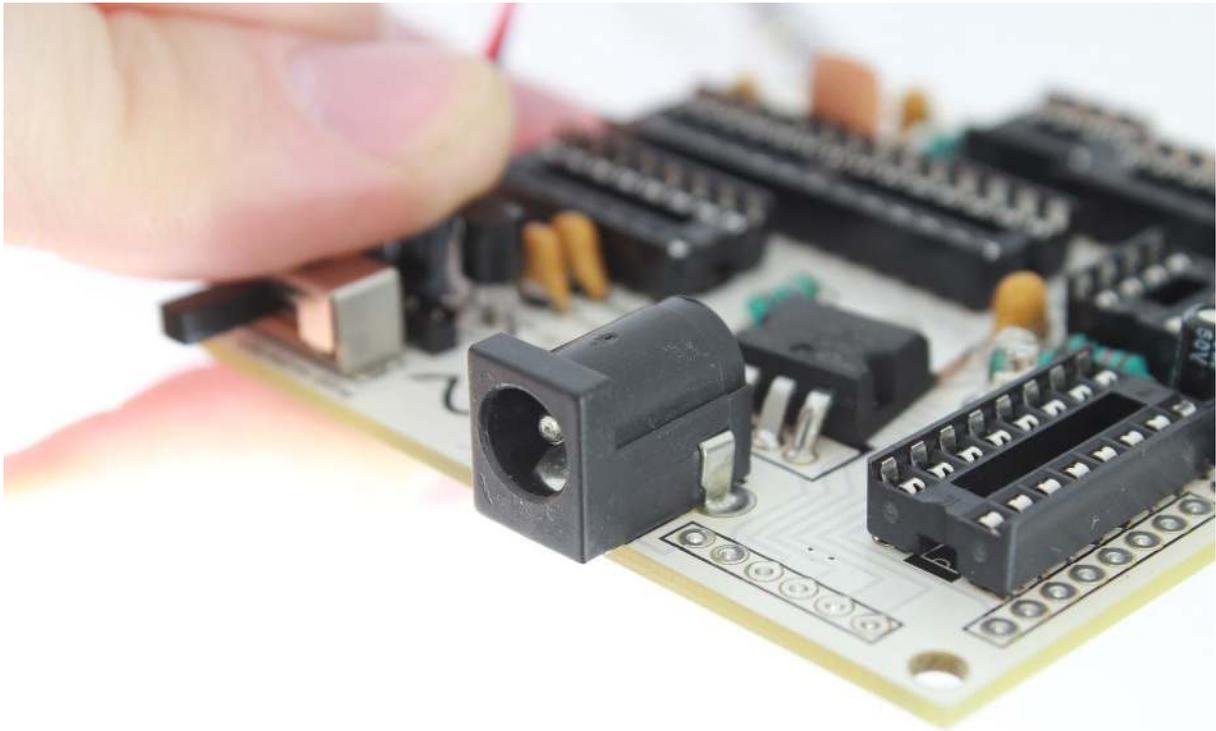
Now you can solder also the **78L33 voltage regulator**. Be aware that the flat side of the regulator has to match the flat side marked on the PCB.



Add also the **16MHz resonator**. Nothing extra here again, just solder the three leads.



Do the same with the **power barrel connector**. Just push it down to the PCB and solder it.



Now a little challenging soldering of the **micro SD slot**: turn the PCB around and put the slot in its place, be sure it is aligned properly. You have to solder the two side pads first. Check that the slot sits flat on the board. Carefully solder the rest of the leads by placing the soldering iron perpendicular to the edge of the lead and applying solder to the pad. Make sure that the pads don't bridge between them. Alternatively you can apply some solder to all the pads before placing the card holder and then reheat them.



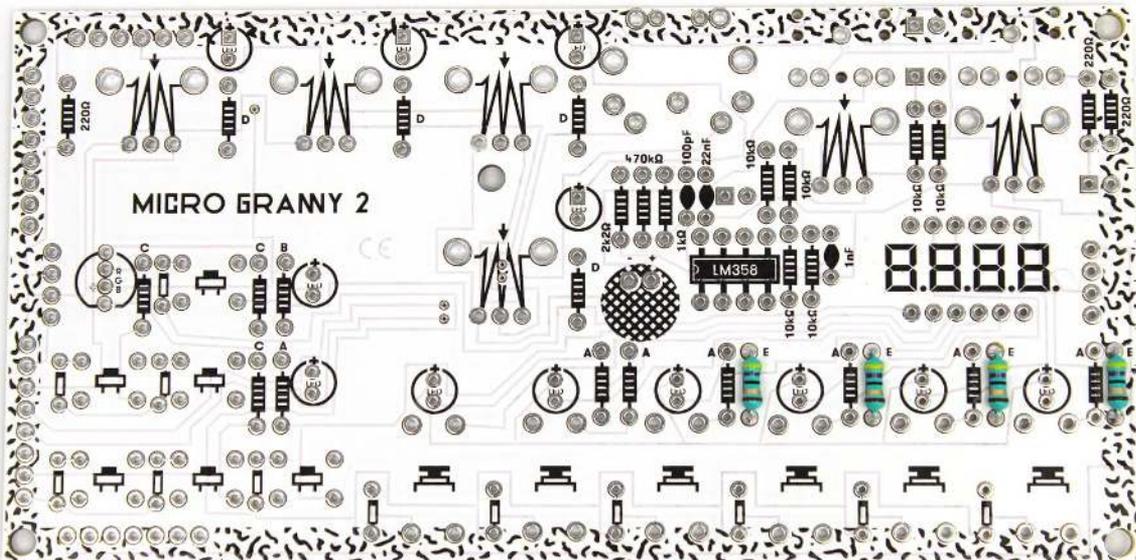
As you can see a few ICs and female headers left. Let's keep them for the next steps. You are done with the bottom board for now!

## SOLDERING - TOP BOARD

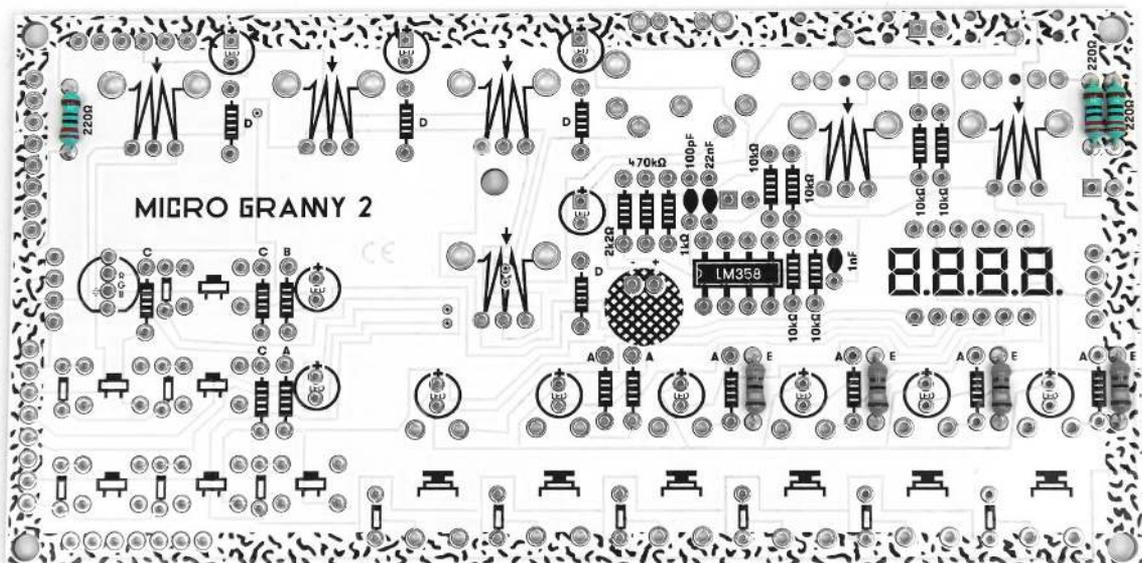
Let's move to the top PCB now. Again, start with the **resistors** and **diodes**:

- **47R** (4x; marked E on the PCB), **220R** (3x), **1k** (13x; marked A, B, D and the value), **2k2** (1x), **10k** (9x; marked C and the value), **470k** (1x),
- **1N4148** diode (12x; watch out for **orientation**).

### 47R resistors

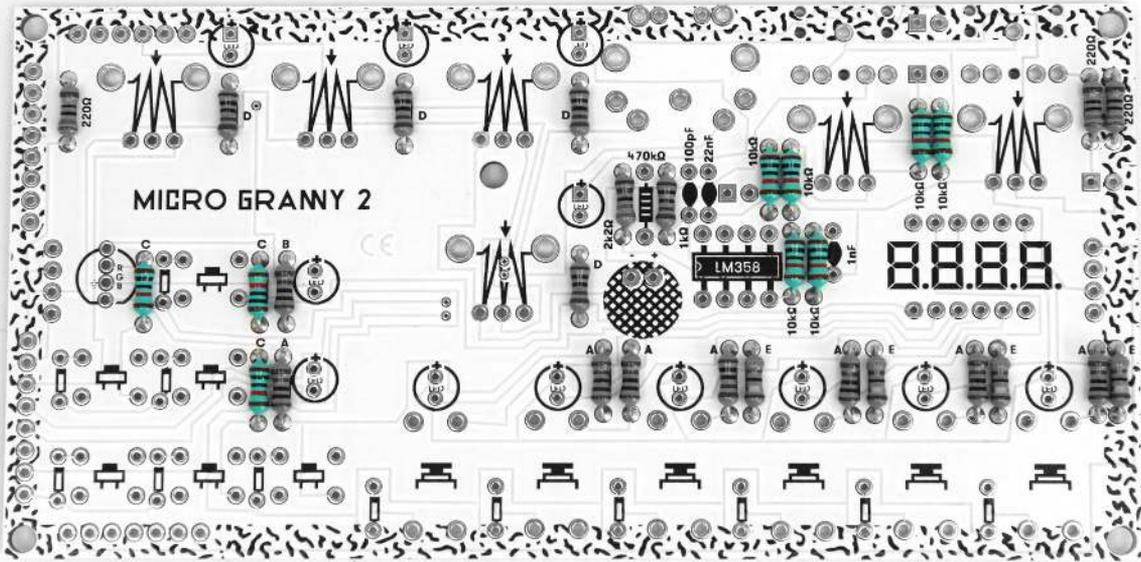


### 220R resistors

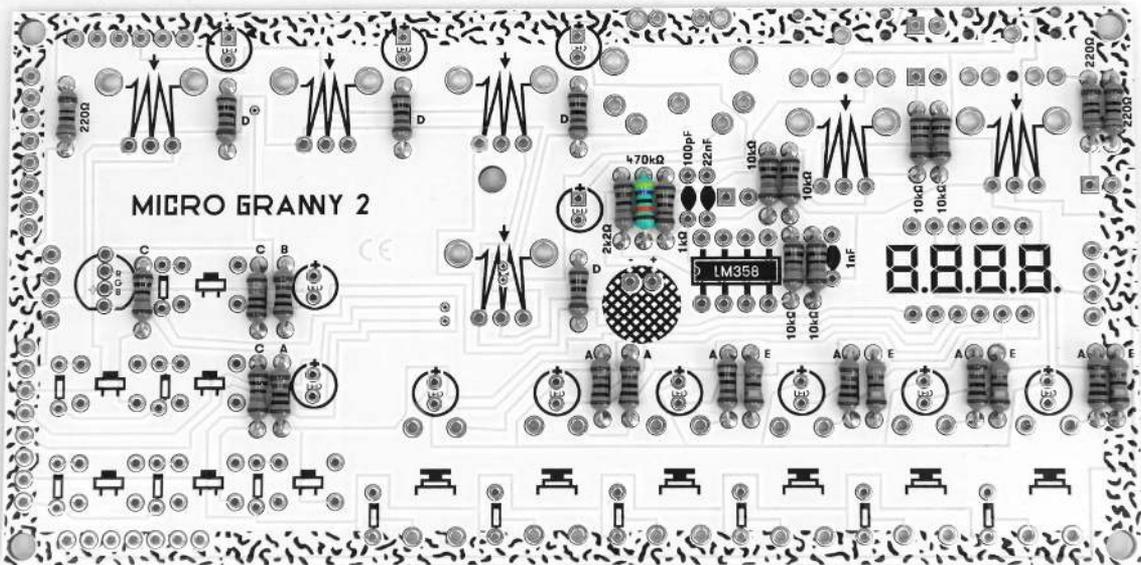




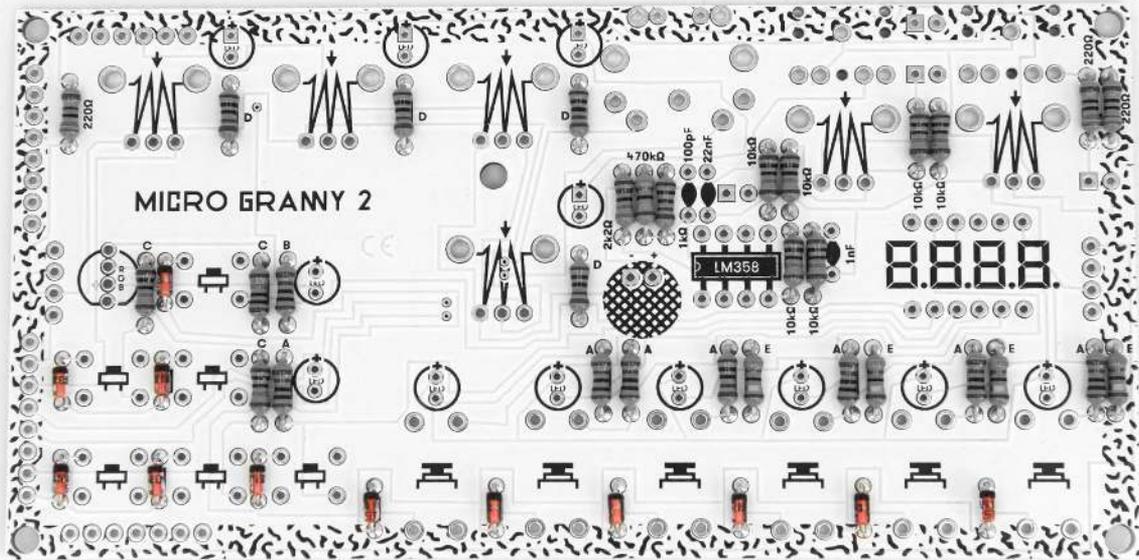
# 10k resistors



# 470k resistors



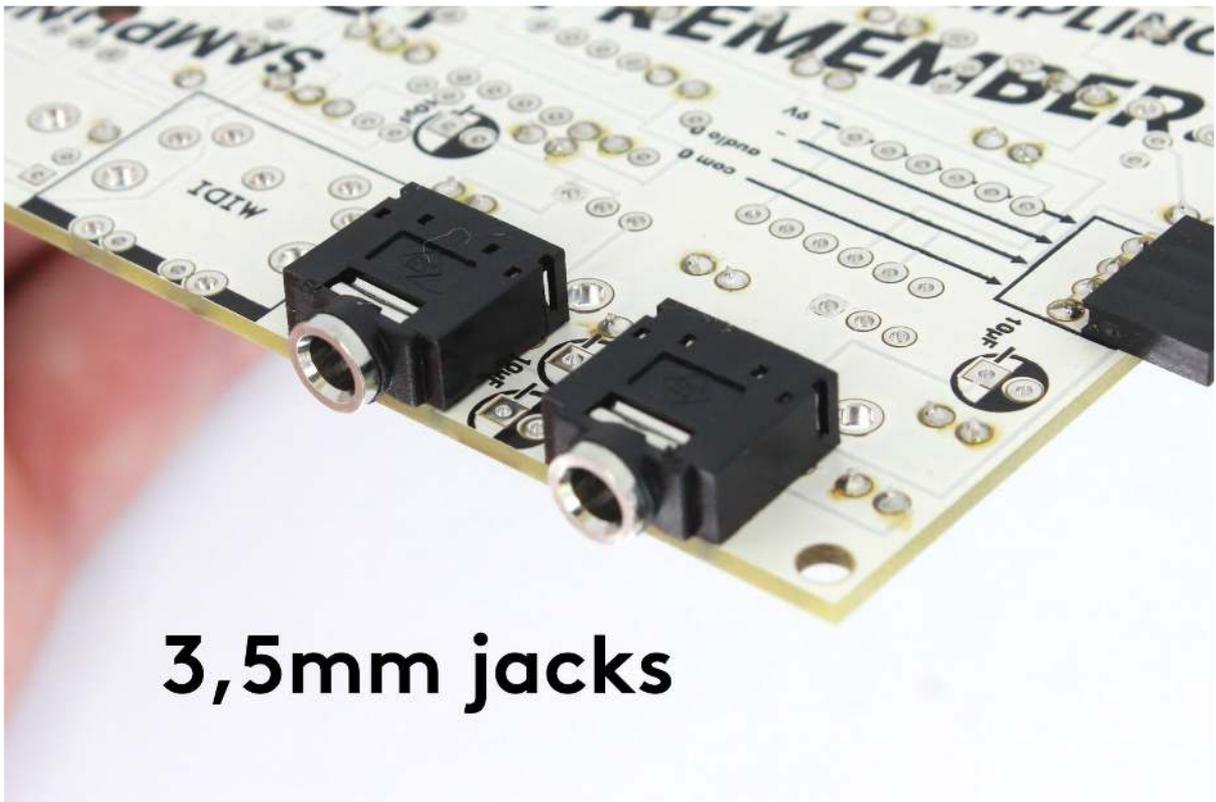
# 1N4148 diodes (orientation upwards)



Do the 4 pin right angle female headers (2x) from the bottom side now.

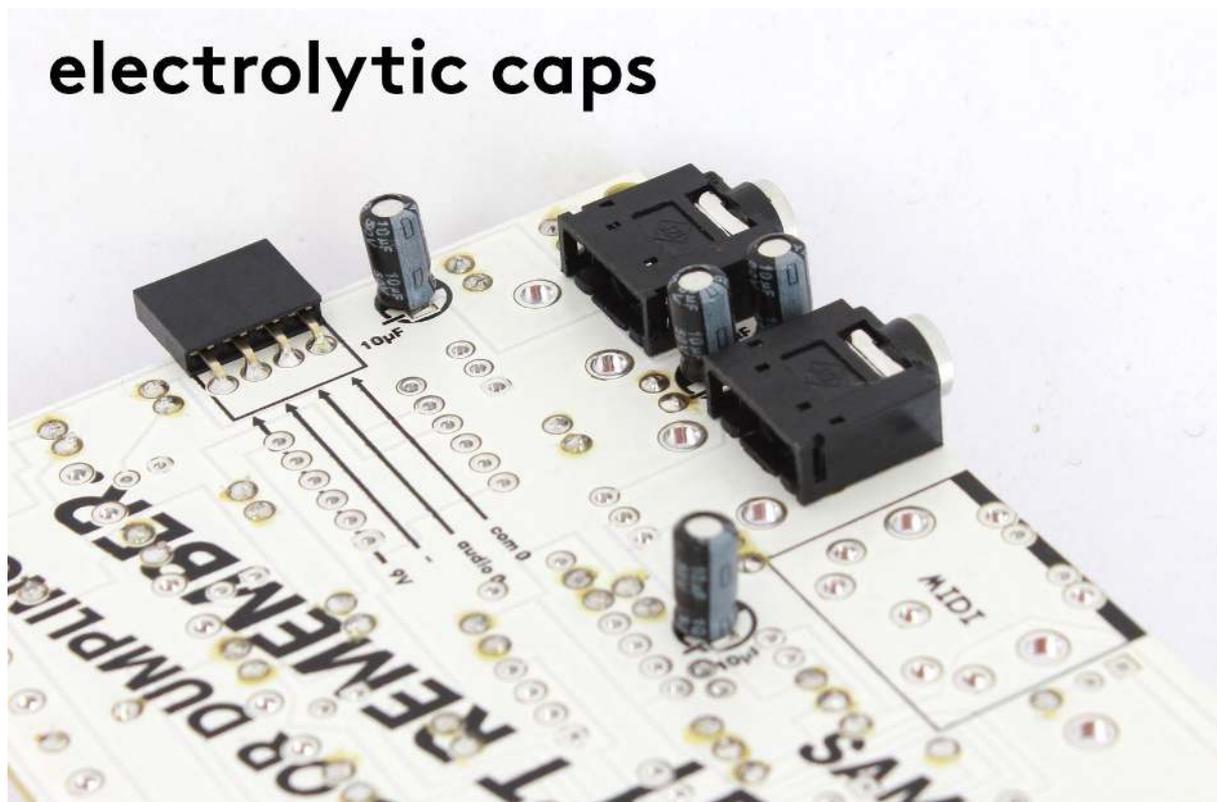


Add also the **3,5mm jack connectors** (2x).



## 3,5mm jacks

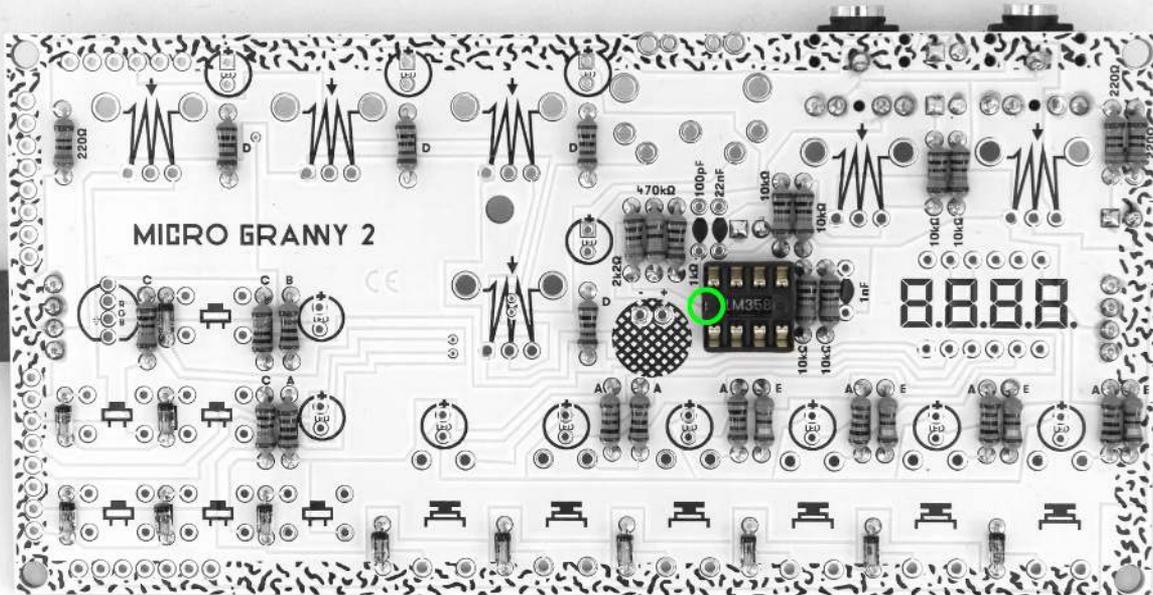
Do the **10µF electrolytic capacitors** (4x; watch out for the polarity).



## electrolytic caps

Do the **8 pin DIL** now. Keep an eye on the right **orientation**.

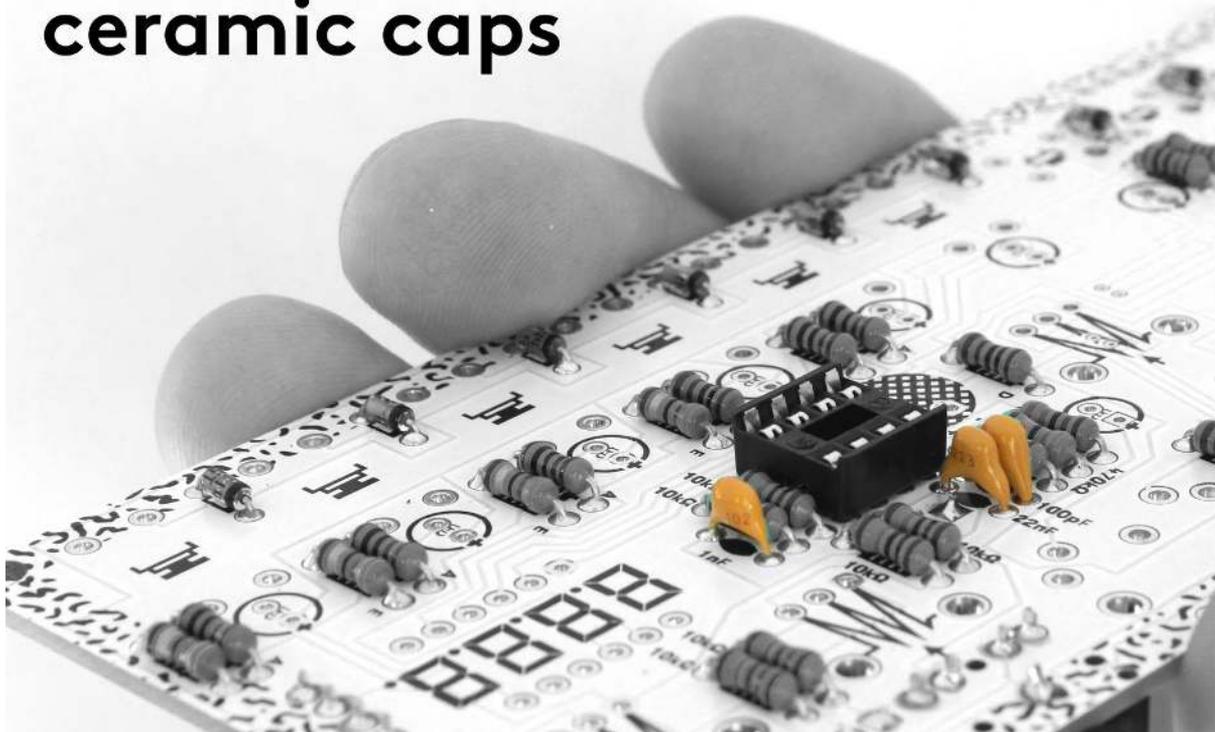
## IC socket



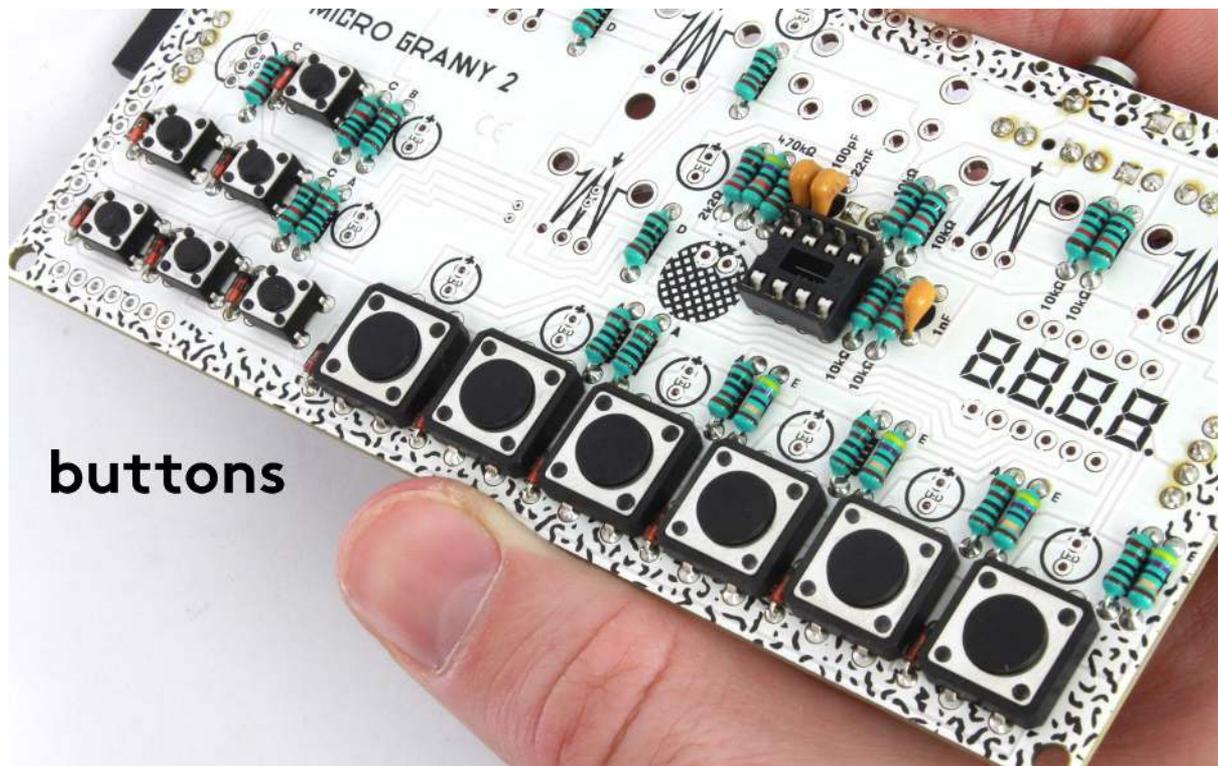
Next add the ceramic capacitors now:

- **100pF** (1x; marked "101" on itself), **1nF** (1x; marked "102") and **22nF** (1x; marked "223").

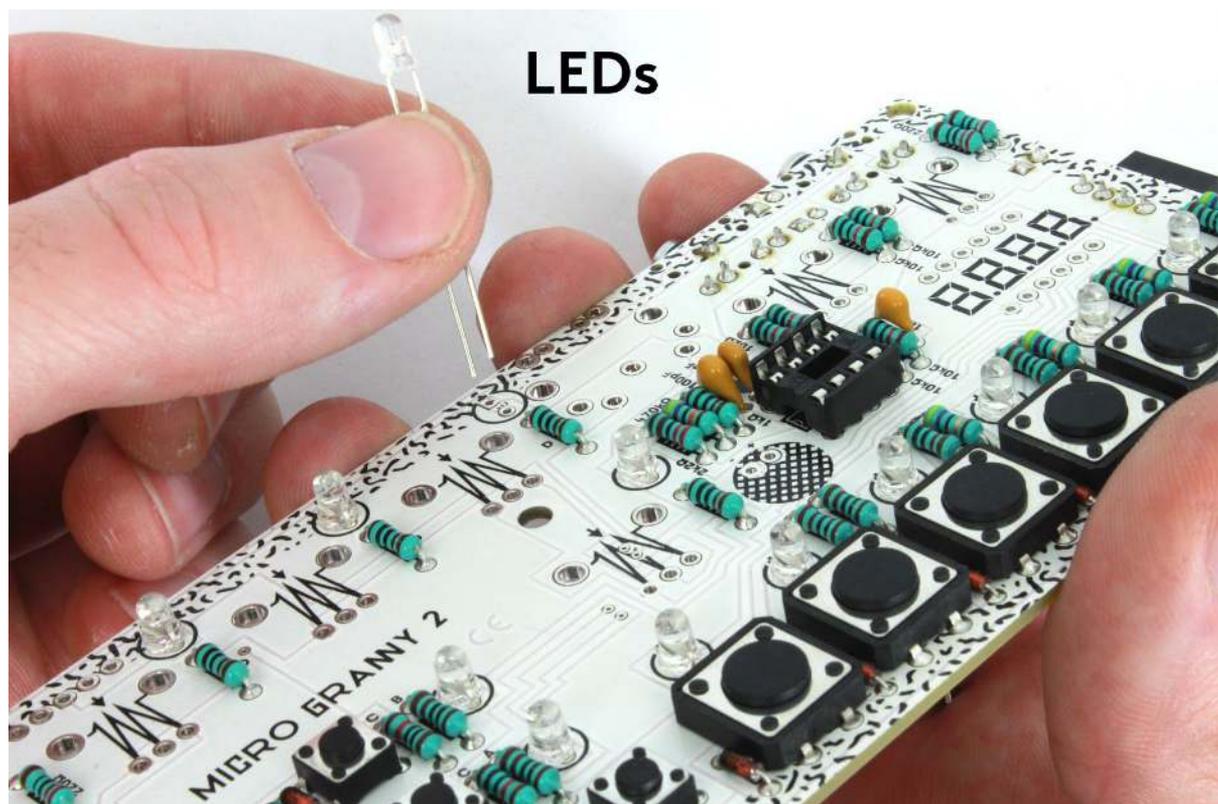
## ceramic caps



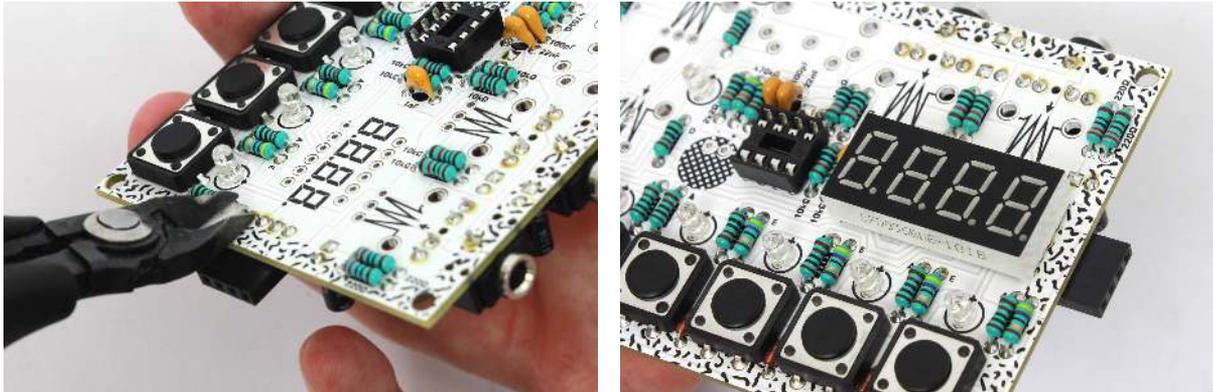
Push the **small (6x)** and **big (6x) buttons** down to the PCB and solder them. Be sure that they are flat with the PCB.



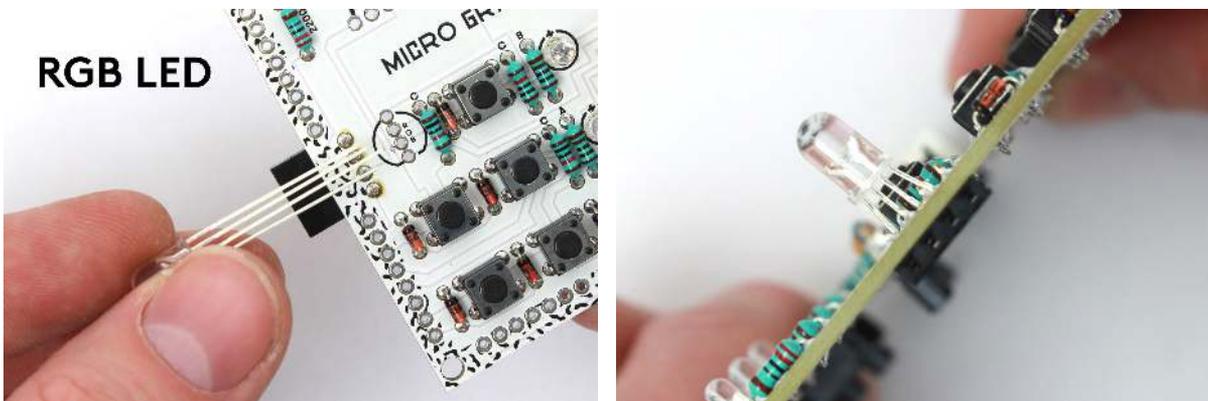
Insert the small transparent **LEDs** (12x) according to their **orientation** - the longer lead goes to the plus (+) hole. Push them down to the PCB and solder.



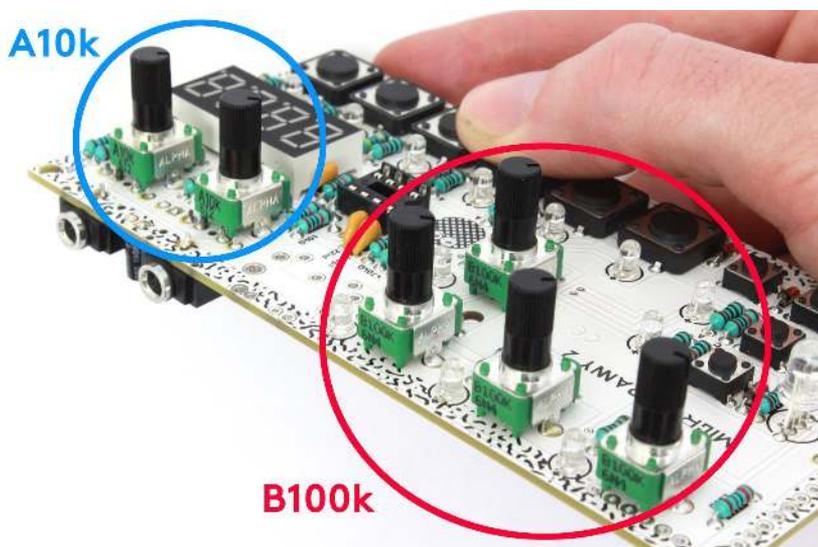
Move to the **display** now. First, shorten by cutting the legs of female header. Then be aware of the right **orientation** - make sure the dots on display are heading down, just like on the PCB.



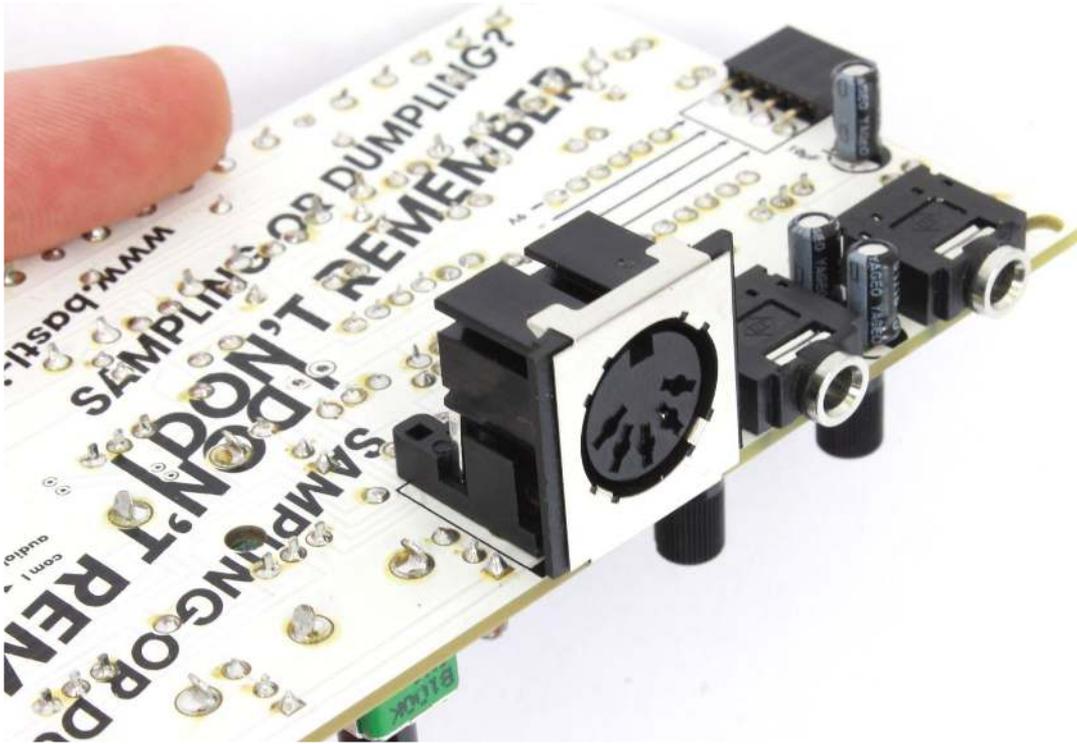
There is also one **RGB LED**. Be aware of the **orientation** - the longest lead of the RGB goes to the plus (+) hole. It should stuck in the place where the leads are little bit expanded. This is the right position for soldering.



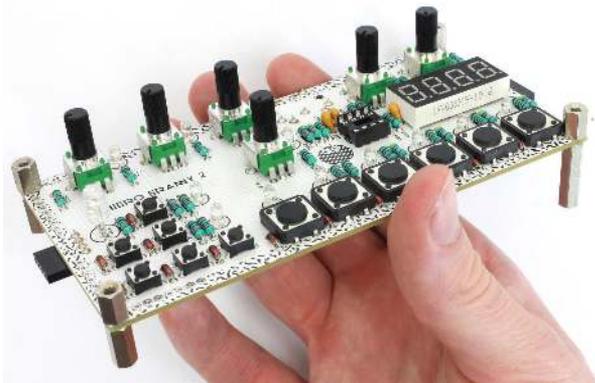
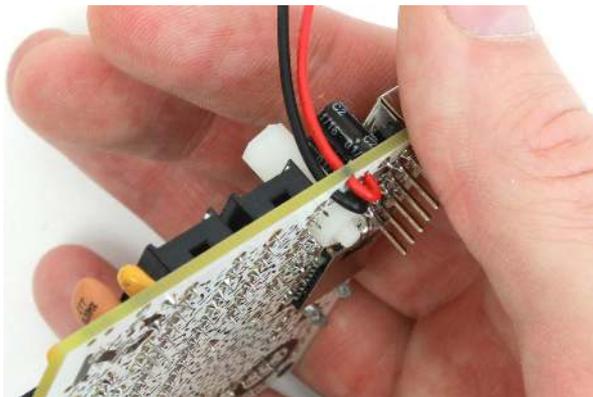
Move to soldering the **potentiometers** now. There are two values of them: two **10k logarithmic** (marked "A10k" on itself) and four **100k linear** (marked "B100k"). The logarithmic ones goes above the display. Pots take a little care and patience to install correctly. Push the pots on the place and look closely to see if they are in straight. Solder just ONE leg on each pot. Do the check - make sure that the pots are touching board with all four plastic legs. Then once they look good finish soldering.

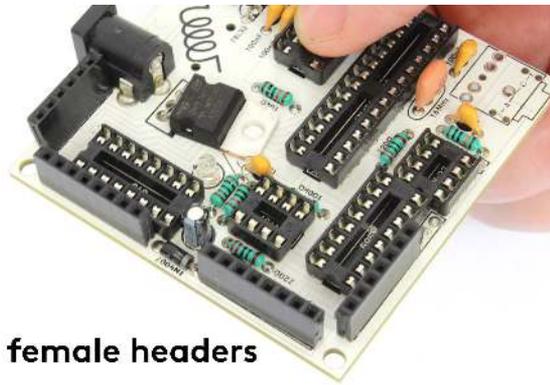


You can do the **MIDI connector** from the bottom side now. Just be sure to solder it straight and flat with the PCB.

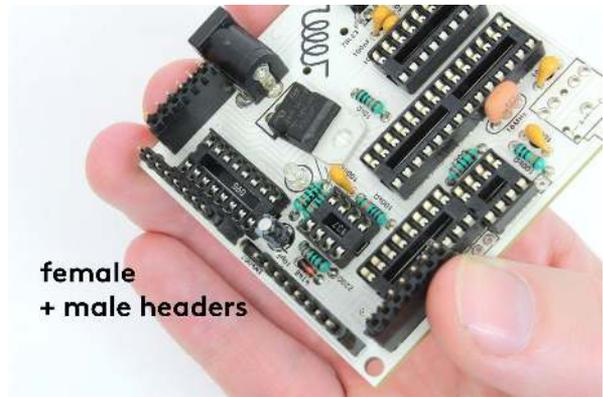


Let's move on to finishing both PCBs. Use the **plastic spacer** on the bottom board and mount it with the **plastic nut** from the bottom. Mount also the **11 mm** and **8 mm metal spacers** into the two corners of the top board and **20 mm** and **8 mm** spacers on the other side. Place also the **female headers** on the bottom board and then insert the **male headers**. Now you can connect the PCBs together and secure it with the last **8 mm spacers** from the top. Check the position of the headers and you can solder them to both PCBs finally.

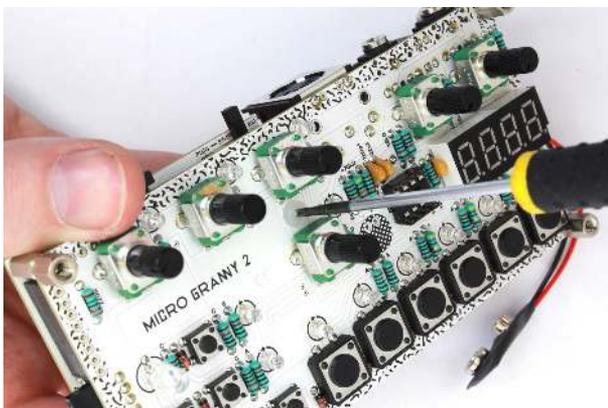
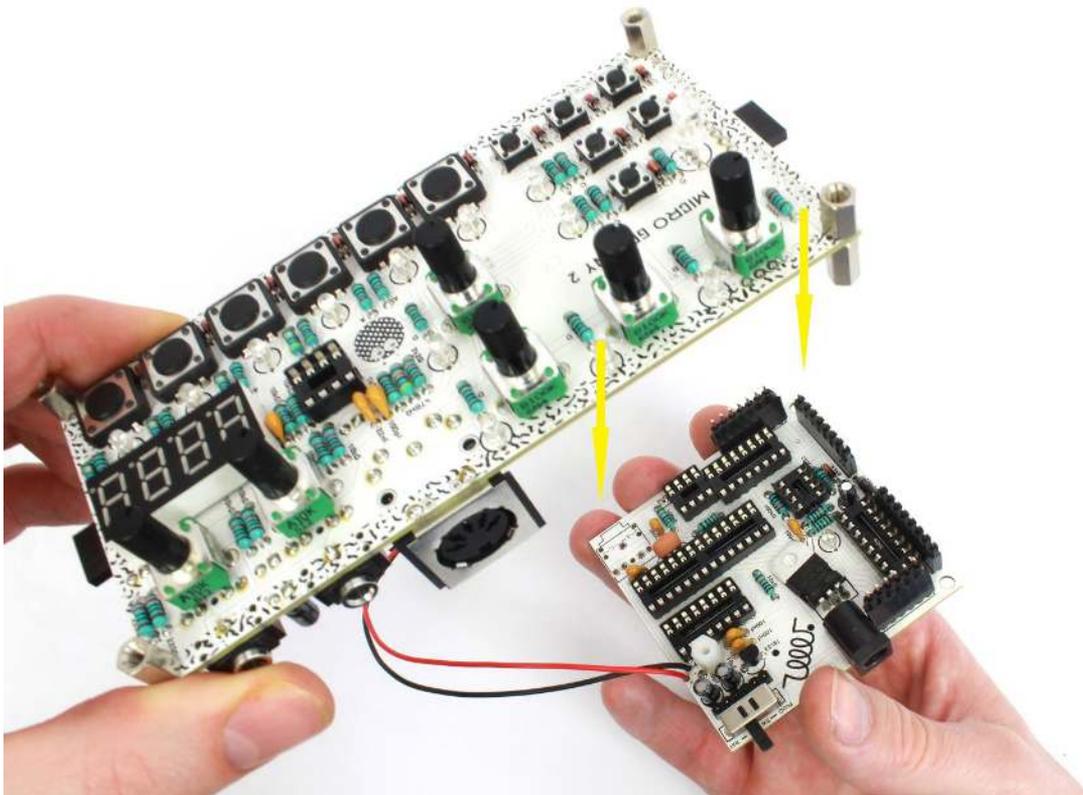




female headers



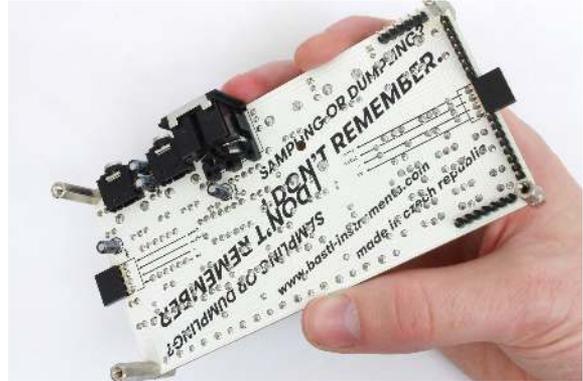
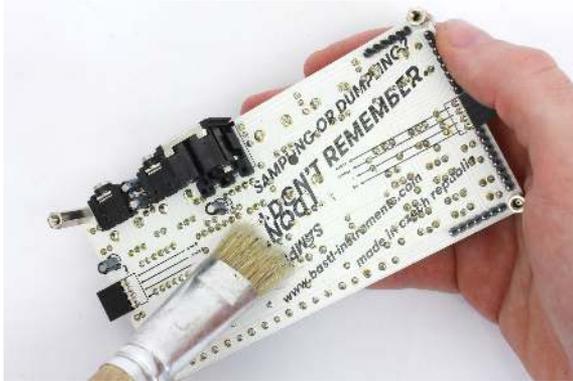
female  
+ male headers



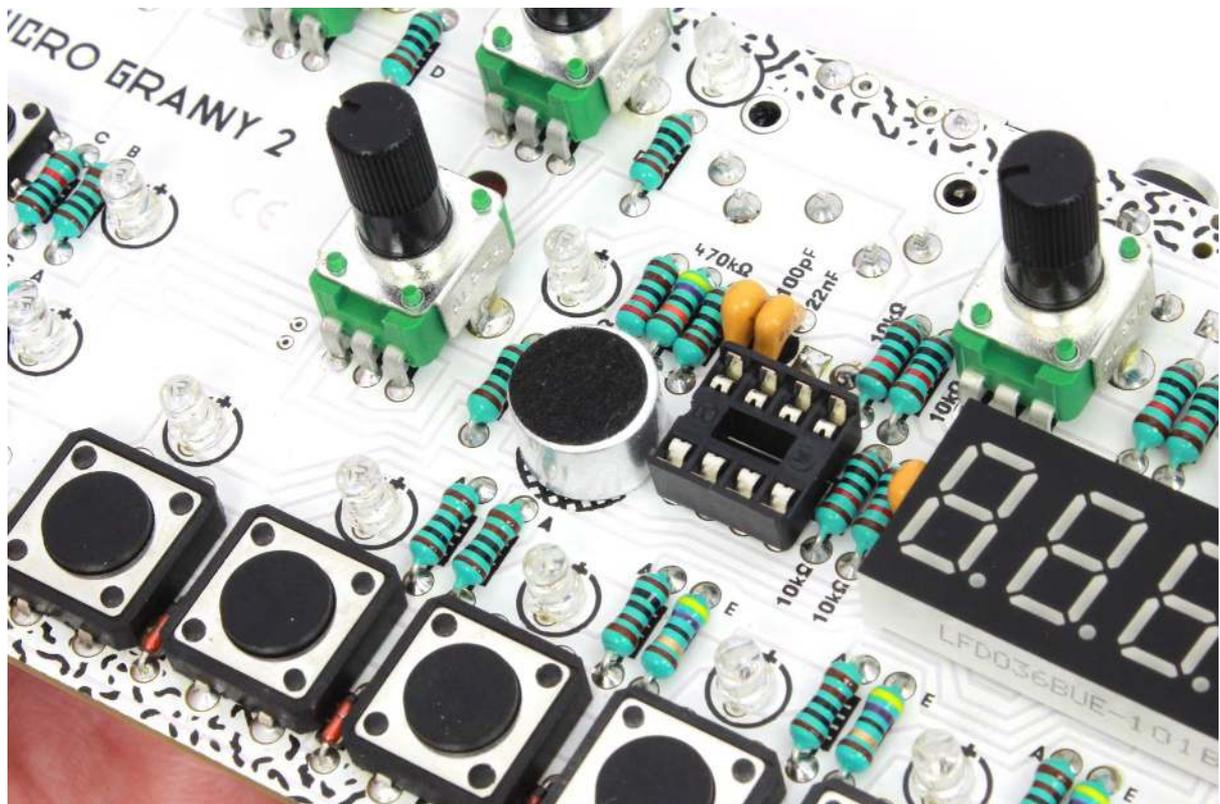
Let's move on to completing the MicroGranny after the soldering.

## ASSEMBLY

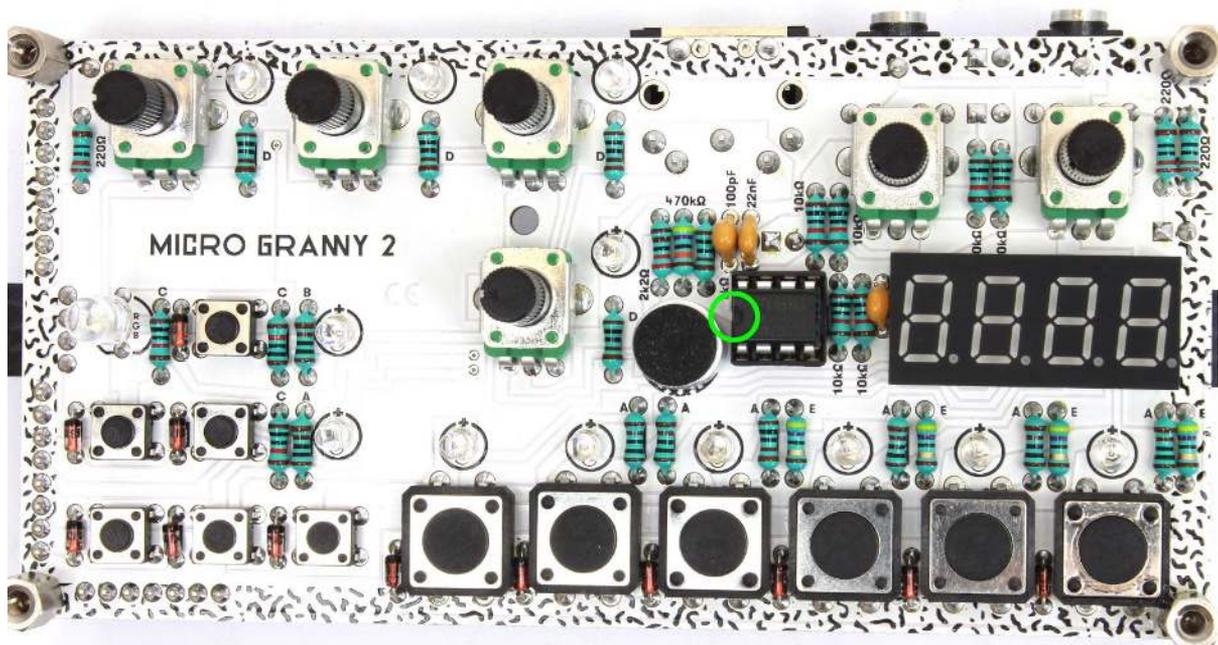
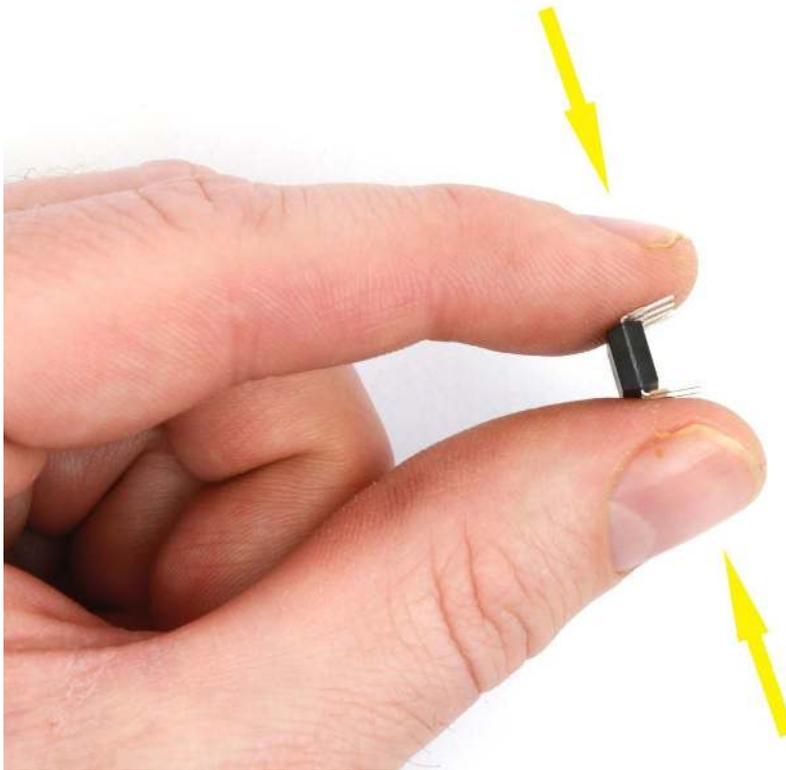
Before you begin to place the transparent enclosure on, you might want to **clean** your PCBs in order to prevent the PCBs to become rust and to just look cool. You can use e.g. isopropyl alcohol. Put some of the liquid all over the PCB using the brush, let it act for a while and sweep it off. Then just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

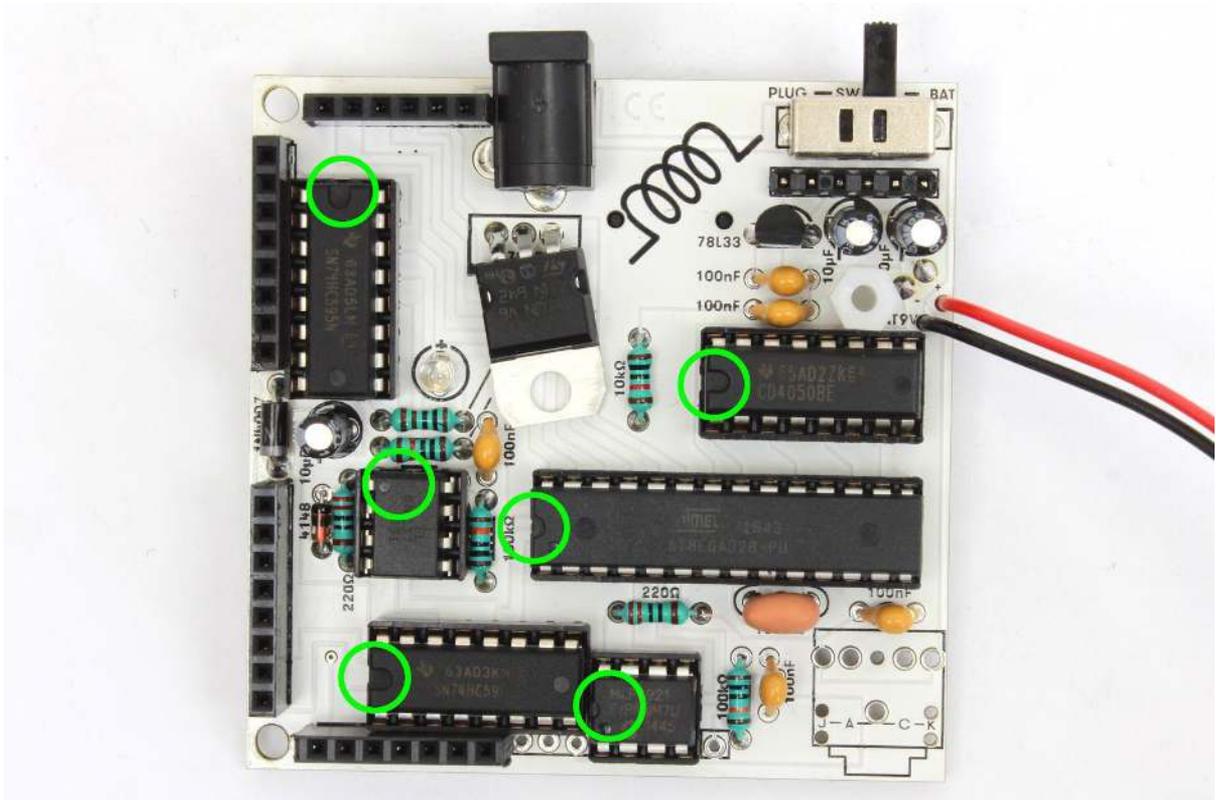


After this step you can add the **switch** and **microphone**. The mic is polarized but it's really super-easy to find which way you should align it on board - it should match hint, marked with hatching in circle.

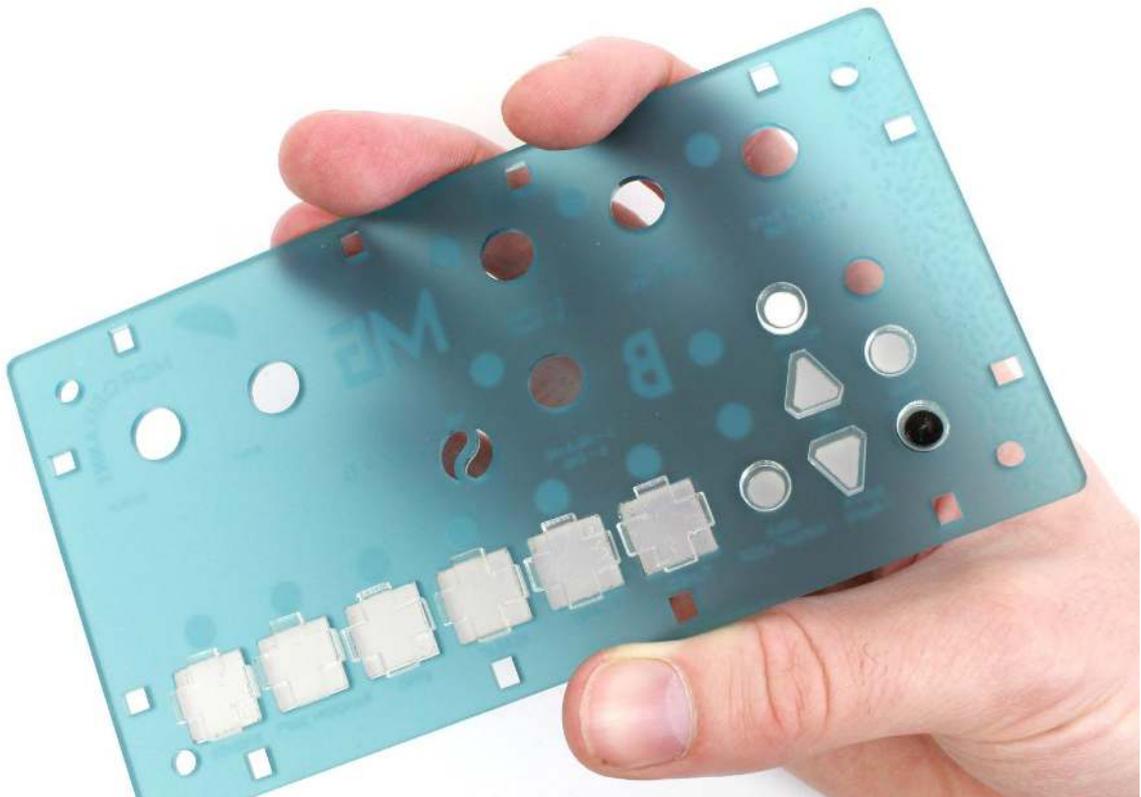


At this point, don't forget to insert all **ICs** in the sockets: LM358 (1x), 74HC595 (2x), MCP4921 (1x), CD4050BE (1x), 6N137 (1x), programmed Atmega328-PU-ND (1x). Watch out for the **orientation and assigned spot** for particular IC. There is a little half circle notch or dot on one side of each IC 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.

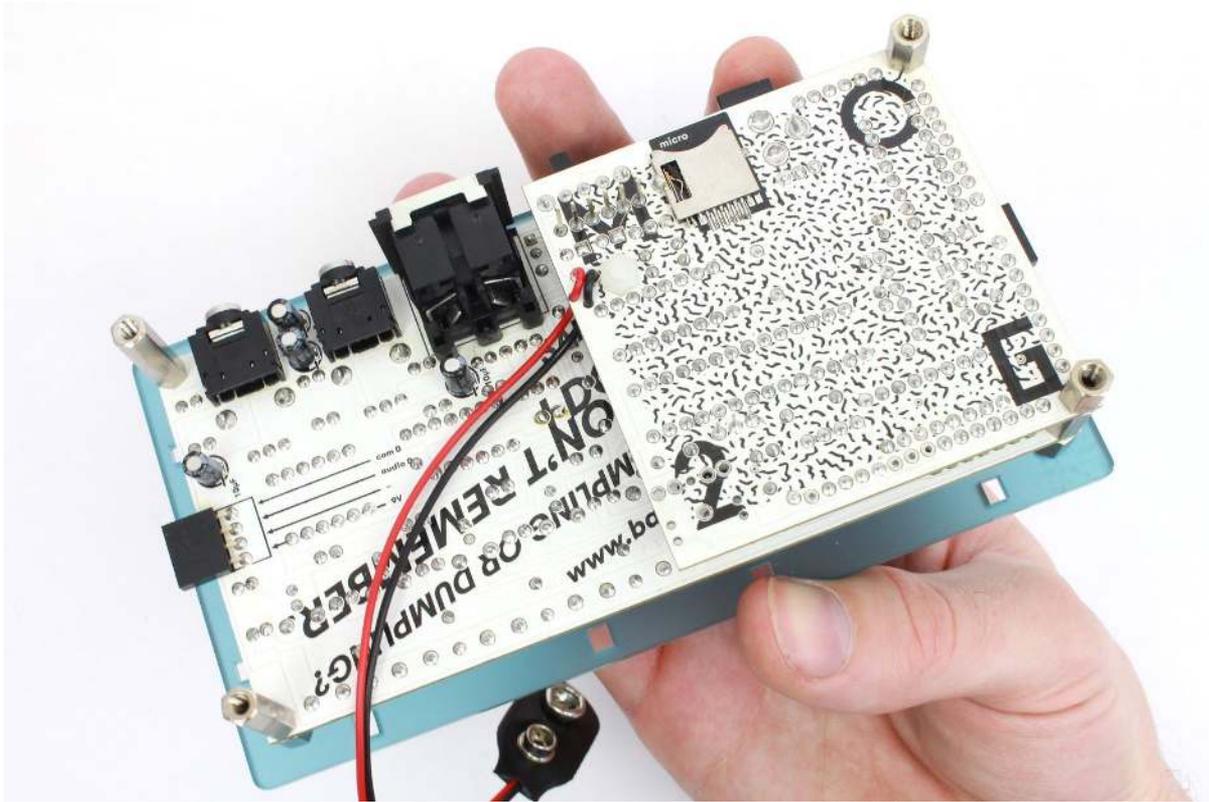




Let's move to the plastic enclosure. Put the front panel on the table facing it back to you. Insert all the buttons in (the red one goes on the "RECORD/SAVE", the black one in the corner).



Take the panel with one of your hand and place the paired PCBs with the other hand on.



Keep the unit in your hand and add the side panels. This can sound easier than to do it but you will handle it!



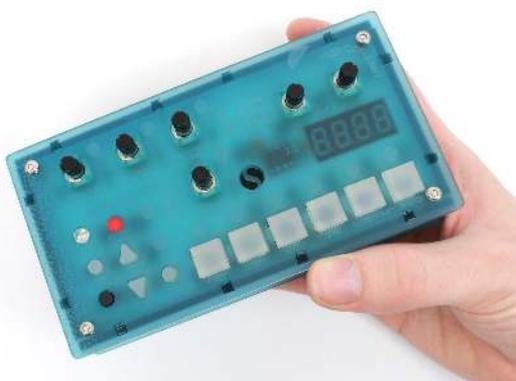
Connect the battery, place the insulating sleeve in (see the photo) and the battery on it.



Place the bottom panel on. Dont screw it yet.



Turn the unit and mount the mushroom head screws on the front panel first. Add also the screws from the bottom.



The last step is to add the rubber rings and insert the micro SD card.



Your MicroGranny is now completely done, 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](mailto: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.