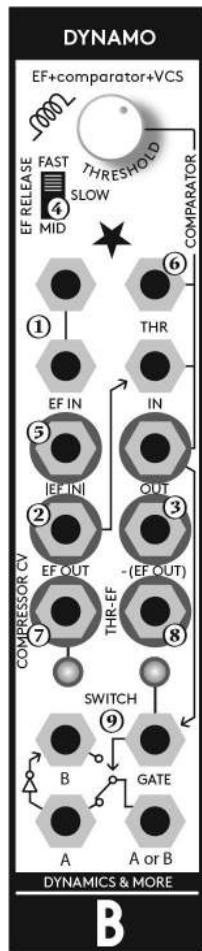


B A S T L INSTRUMENTS

DYNAMO v1.1 - Assembly Guide

bastl-instruments.com



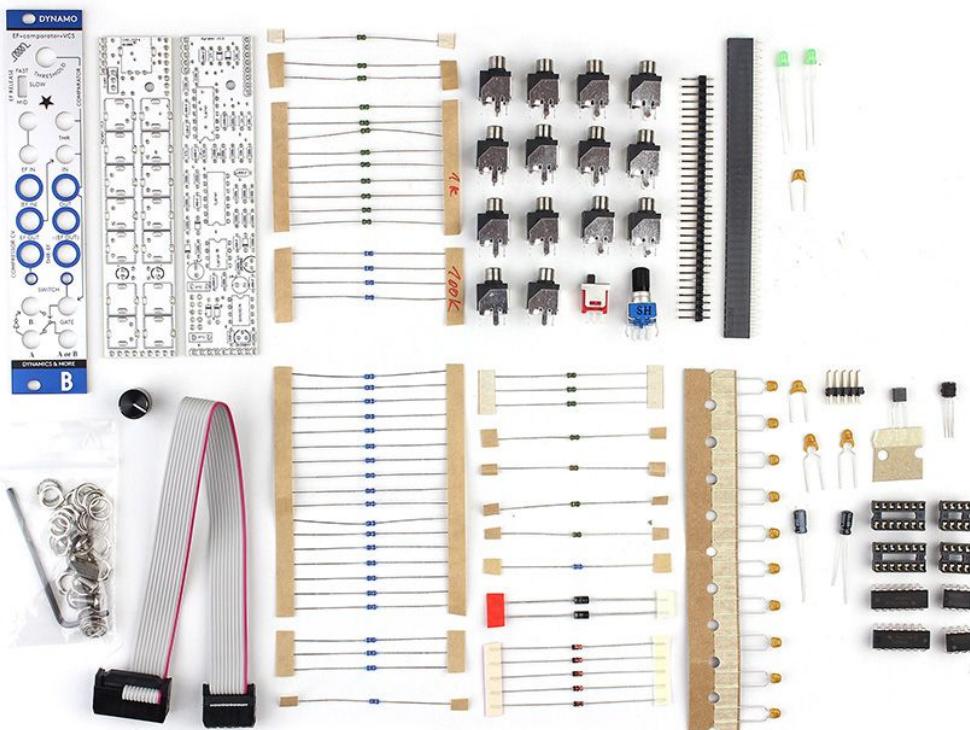
INTRODUCTION

This guide is for building Dynamo module from Bastl Instruments. It is good to have basic soldering skills and to be able to identify electronic components before starting this kit. However if you have never soldered before, check out this [tutorial first](#)¹. We even included some of the best quality solder to help you solder everything faster and better.

The Dynamo kit consists of two boards. All the parts comes in three bags separated for Top board, Bottom board and Assembly parts. See Bill of Materials (BOM) for detailed list.

¹ <http://www.instructables.com/id/How-to-solder/>

BILL OF MATERIALS



DYNAMO v1.1 kit BOM		
SOLDERING TOP		
qty	value	part
9	1k	R-EU_0204/5
4	100k	R-EU_0204/5
1	10k	R-EU_0204/5
2	15k	R-EU_0204/5
1	470nF	ceramic capacitor
1	B100k	linear potentiometer
1		3p - switch
2	diffuse green 3mm	LED
14	jack connector	PJ-301BMB
1	22 pin	male
SOLDERING BOTTOM		
1	1k	R-EU_0204/5
17	100k	R-EU_0204/5
3	10k	R-EU_0204/5
1	47k	R-EU_0204/5
3	200k	R-EU_0204/5
1	220k	R-EU_0204/5
1	330k	R-EU_0204/5
1	470k	R-EU_0204/5
1	1M	R-EU_0204/5

5	1N4148	DIODE-D-5
2	1N4007	DIODE-D-7.5
1	10n	ceramic capacitor
10	100nF	ceramic capacitor
2	10uF	electrolytic capacitor
1	2N3904	NPN, BULK
1	2N3906	PNP transistor, BULK
1	TL072	IC in foam
2	TL074	IC in foam
1	DG419DJ	IC in foam
2	8 pin DIL	DIL socket - in foam
2	14 pin DIL	DIL socket - in foam
2	100mA	fuse
1		male 2x5
1	25 pin	female

ASSEMBLY

1	M3 x 11mm	spacer nut x nut
2	M3 x 6mm_Imbus	screw
2	M3 x 8mm_cross	panel screw + washers
14		jack washers
14		jack nuts
1	imbus	allen key
1	bottom	PCB
1	top	PCB
1		power cable 10-16pin
1		front panel
1		knob

BEFORE STARTING THE KIT...

Before starting this kit, prepare the following tools:

- Soldering iron
- Multi-meter
- Flush cutters
- n2. hex screwdriver or allen key (enclosed with kit)
- Phillips screwdriver
- Wrench No. 8
- Protective eyewear
- Isopropyl alcohol + smaller and clean brush (optional)

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.

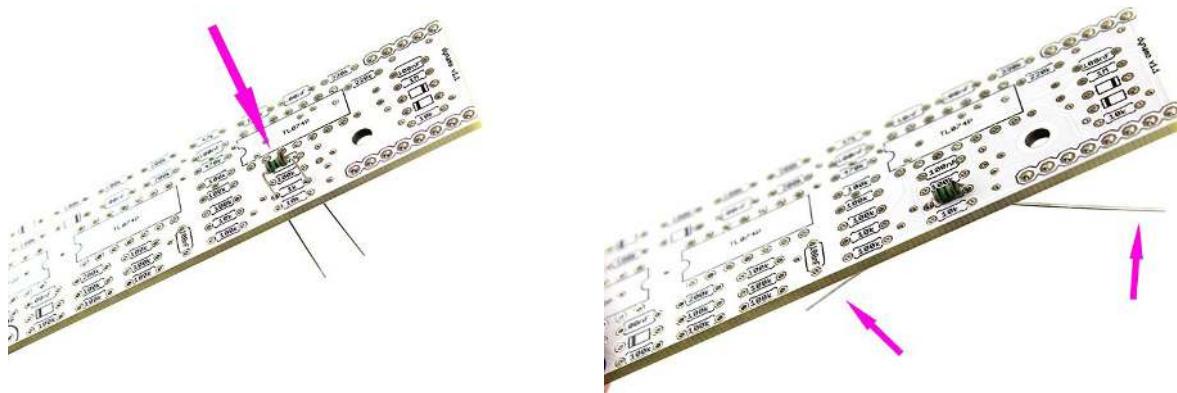
BOTTOM BOARD

RESISTORS

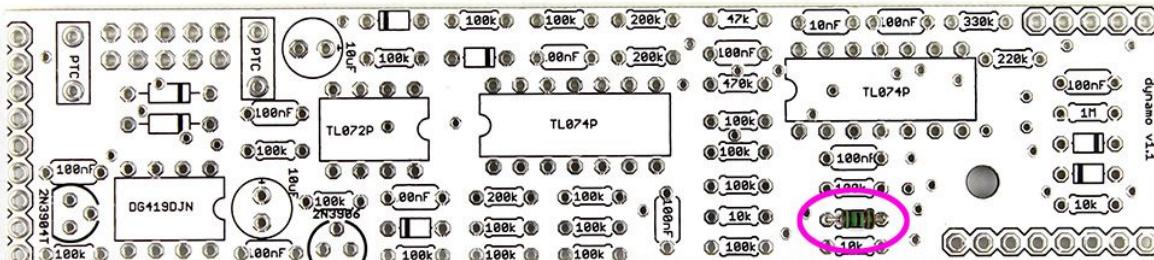
Start with the bottom board parts. First of all, take your time and check the **values** of all **resistors** [using a multimeter](#)² (or you can check the color codes if you are seasoned enough):

- 1k (1x), 10k (3x), 47k (1x), 100k (17x), 200k (3x), 220k (1x), 330k (1x), 470k (1x), 1M (1x)

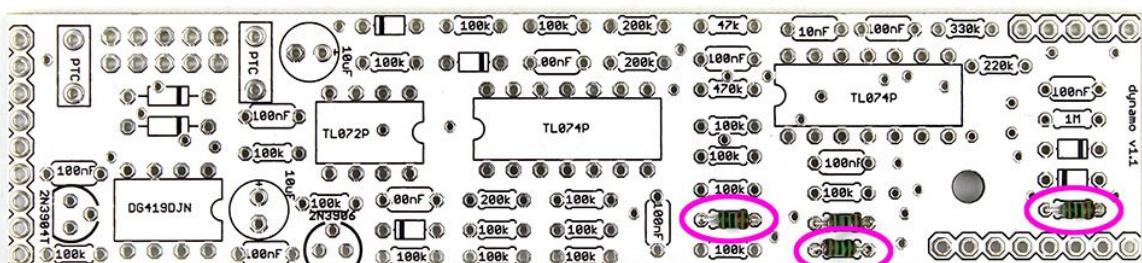
Then solder them on the bottom PCB and snip the leads close to the PCB (be sure to make this step on all remaining leads in the course of this guide).



1k resistor (1x)

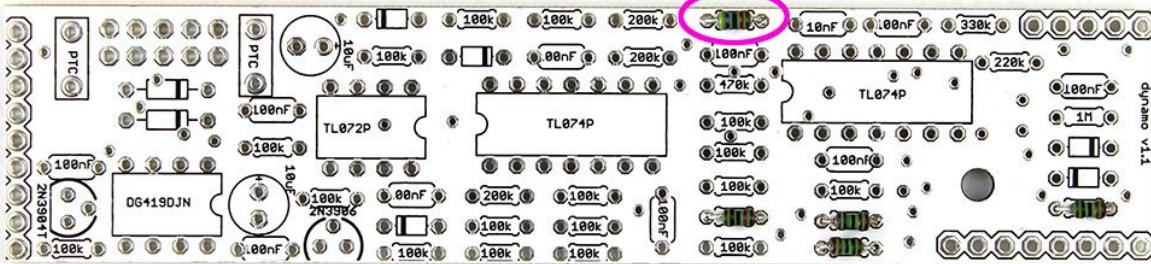


10k resistors (3x)

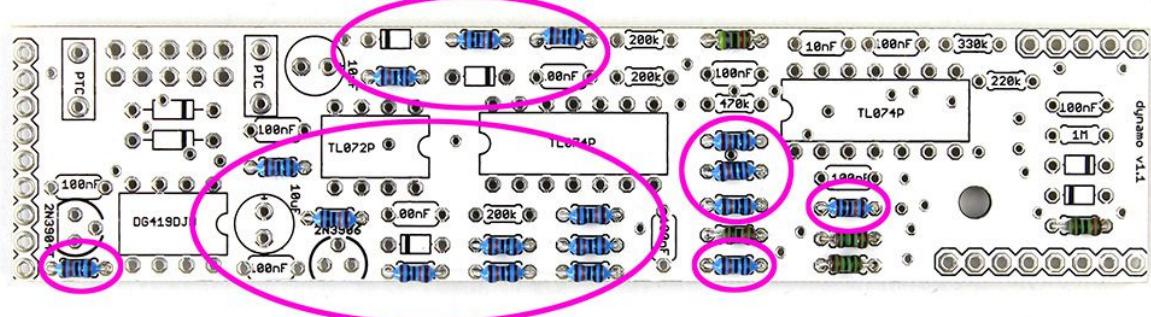


² <https://learn.sparkfun.com/tutorials/how-to-use-a-multimeter/measuring-resistance>

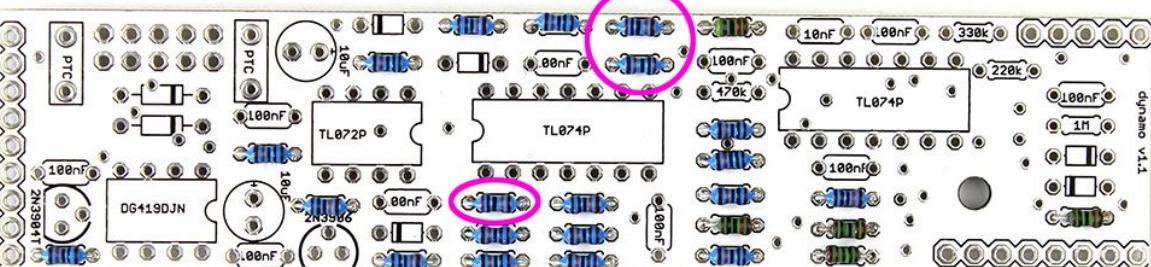
47k resistor (1x)



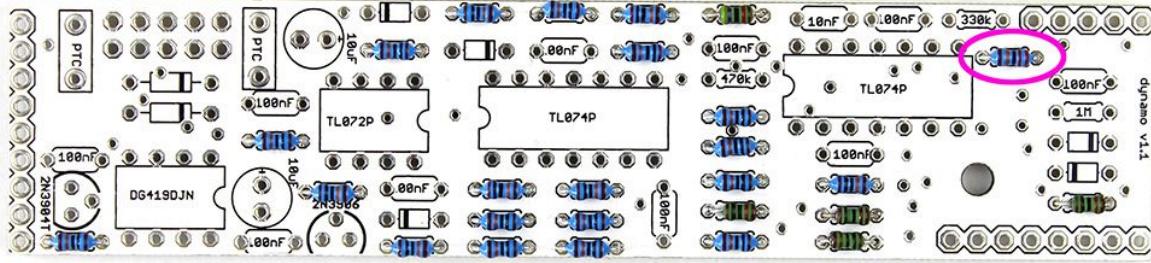
100k resistors (17x)



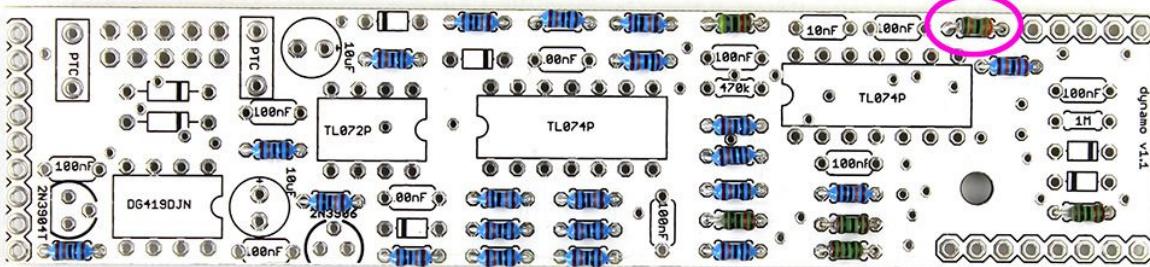
200k resistors (3x)



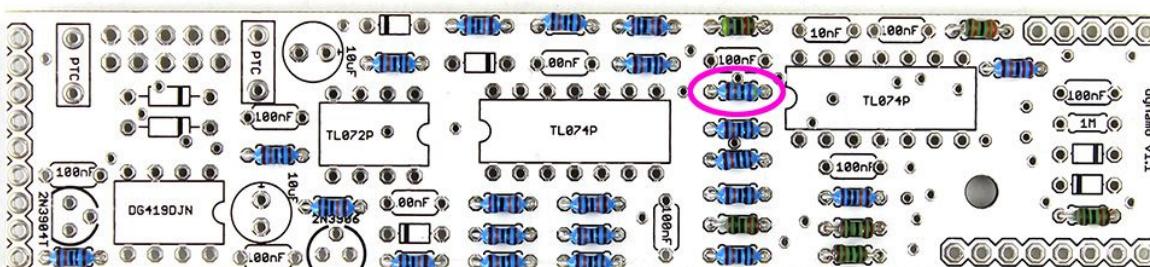
220k resistor (1x)



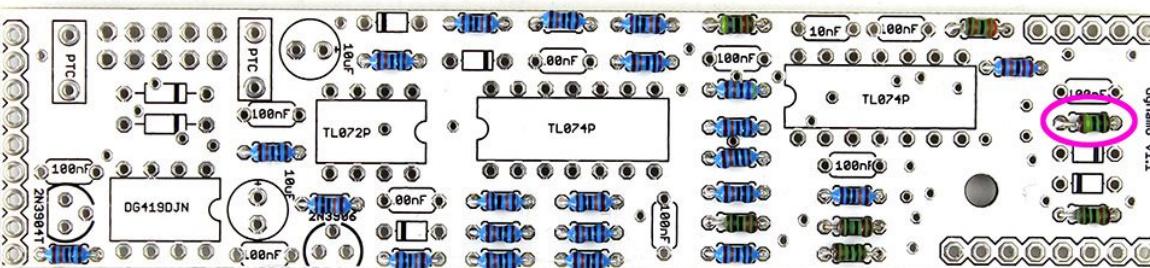
330k resistor (1x)



470k resistor (1x)



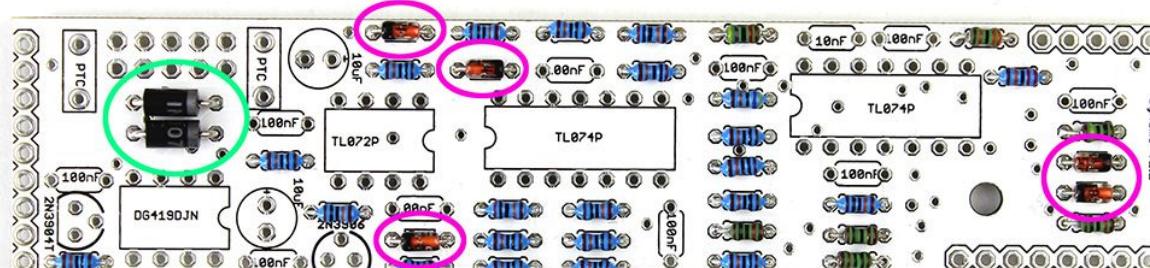
1M resistor (1x)



DIODES

Solder also the **diodes** (1N4148 - 5x, 1N4007 - 2x). Be careful, **diodes are polarized!** Make sure that the marking ring on the diode body matches the marking on the circuit board. Check the photo below.

DIODES (watch out for polarity!)



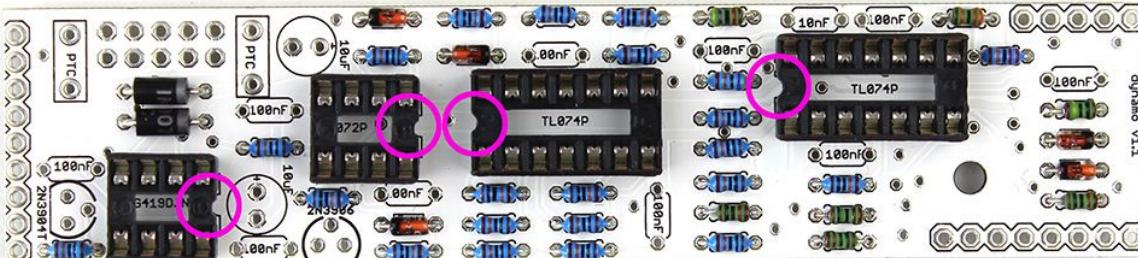
1N4007 (2x)

1N4148 (5x)

IC SOCKETS

Then solder four IC sockets (2x 8 pin, 2x 14 pin). Make sure that the notch on the socket matches the print on the board.

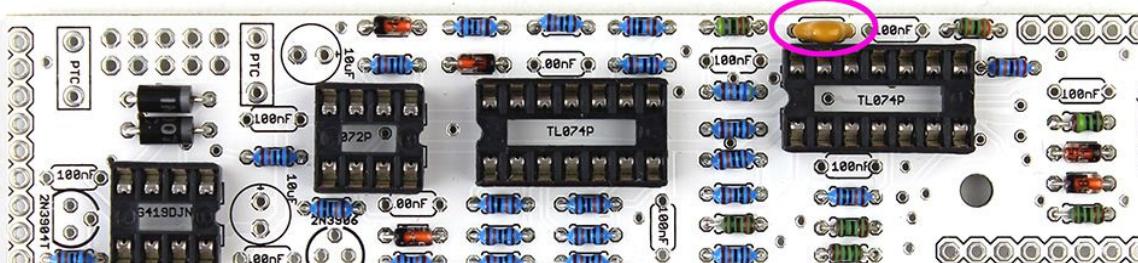
keep an eye on the notches!



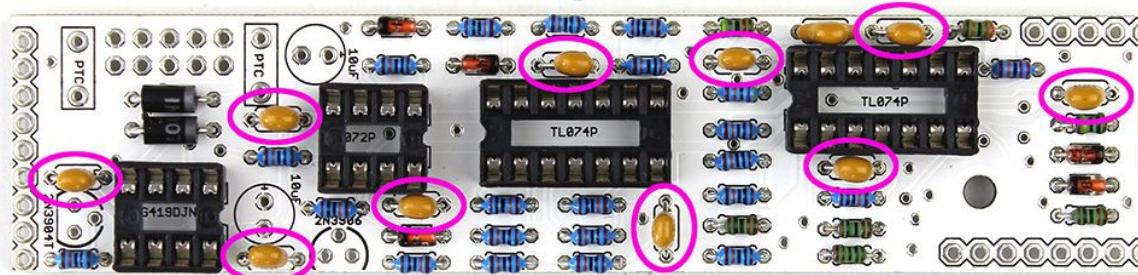
CAPACITORS

Now let's do the **ceramic capacitors**. There is one **10nF** (marked "103" on itself) and **ten 100nF** (marked "104").

10nF cap ("103")

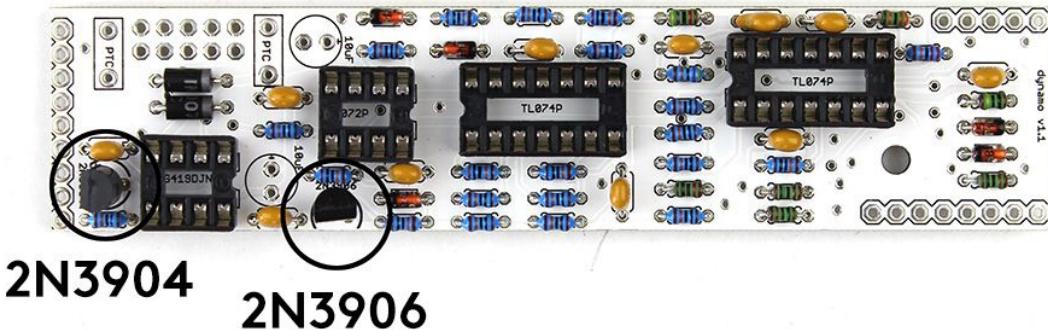


100nF cap ("104")



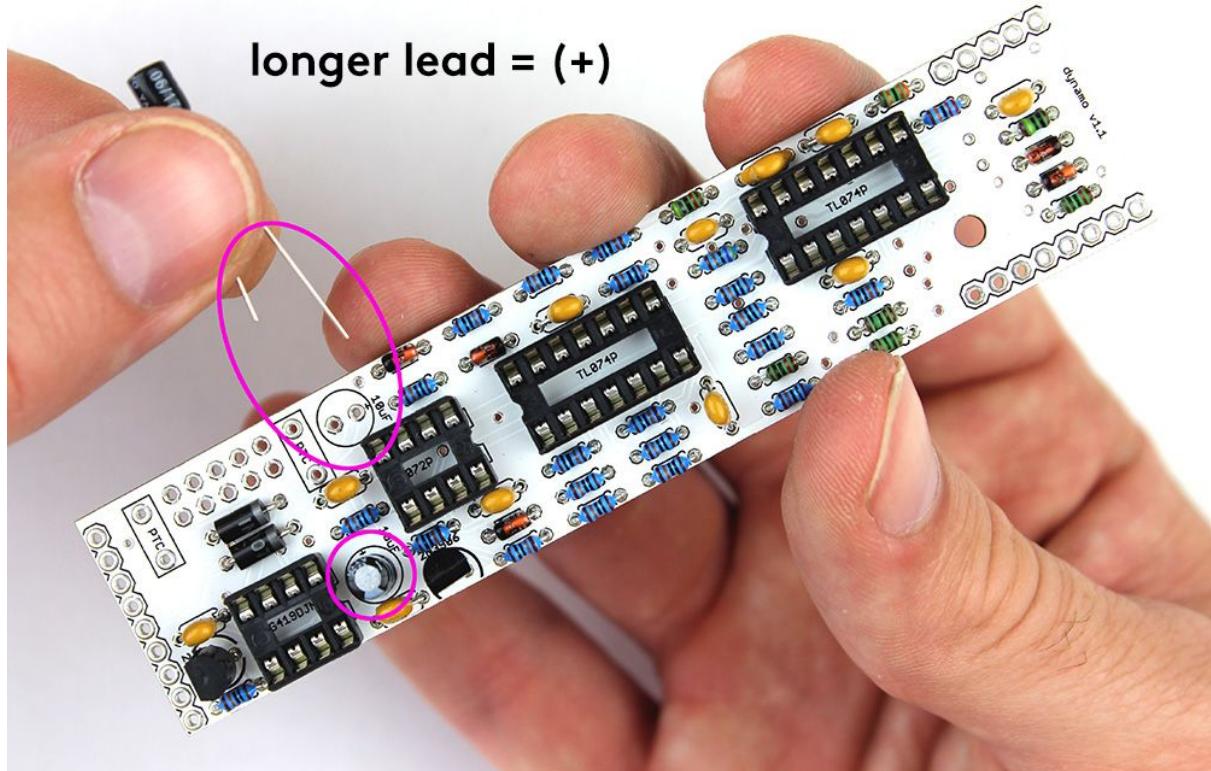
TRANSISTORS

You can add **two transistors** of different values (**2N3904** and **2N3906**). Just be aware of the right placement and orientation! The component has to match the outline on the PCB.



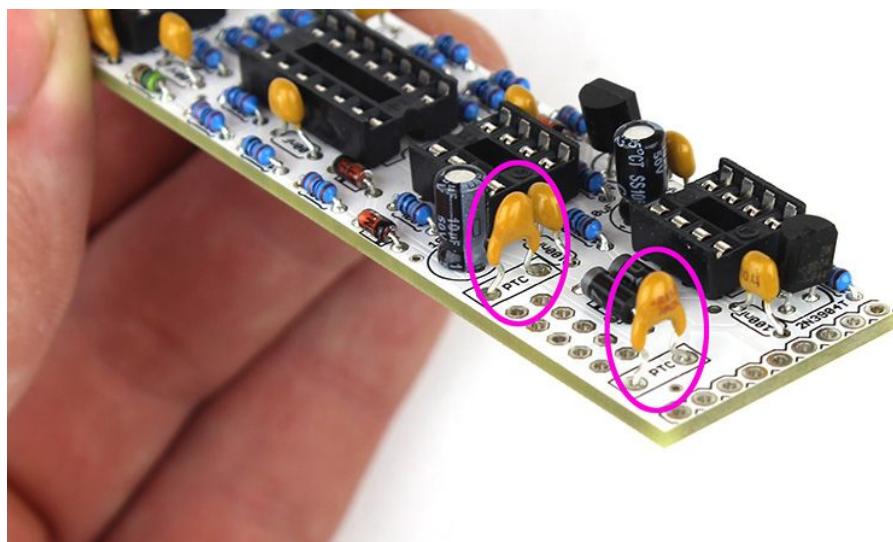
ELECTROLYTIC CAPACITORS

Let's do the **electrolytic caps** (2x $10\mu\text{F}$). These ones are **polarized!** There is a plus (+) sign on the PCB that has to match the longer lead of the electrolytic capacitor (actually the minus (-) side is also marked on the body of the capacitor with a white strip).



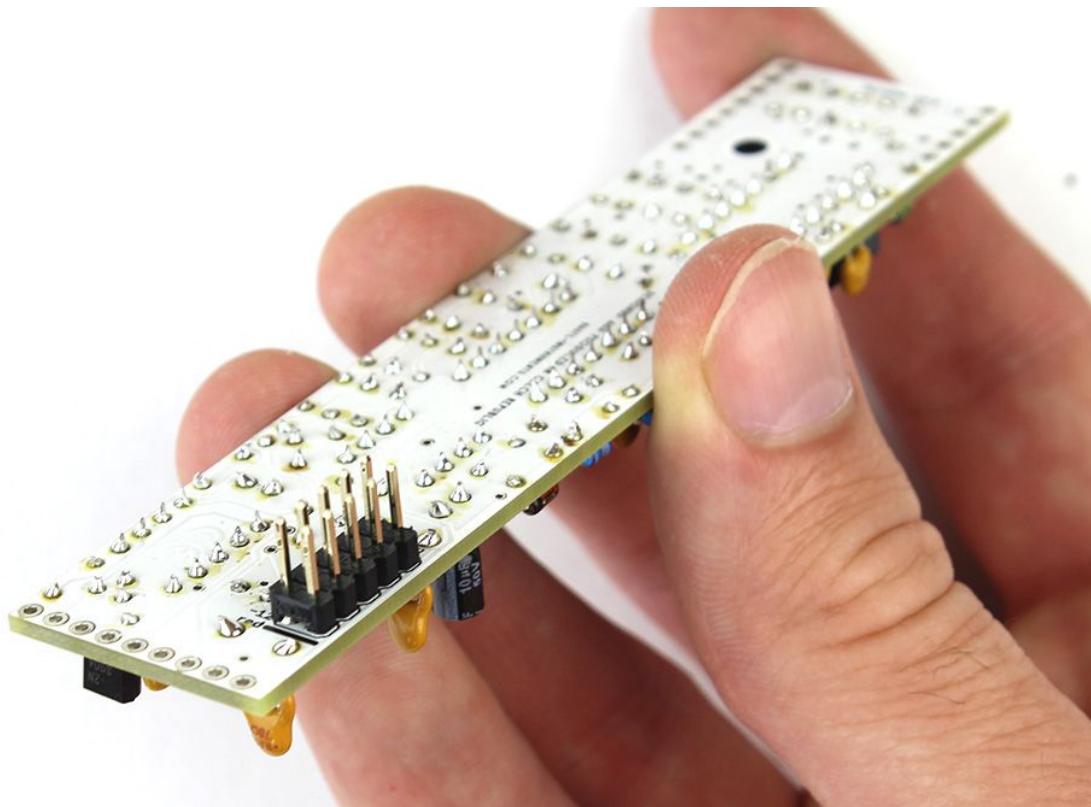
FUSES

Solder the **two fuses** right on the rectangular spot signed “PTC”. These parts look quite similar to capacitors so don’t let it confuse you.



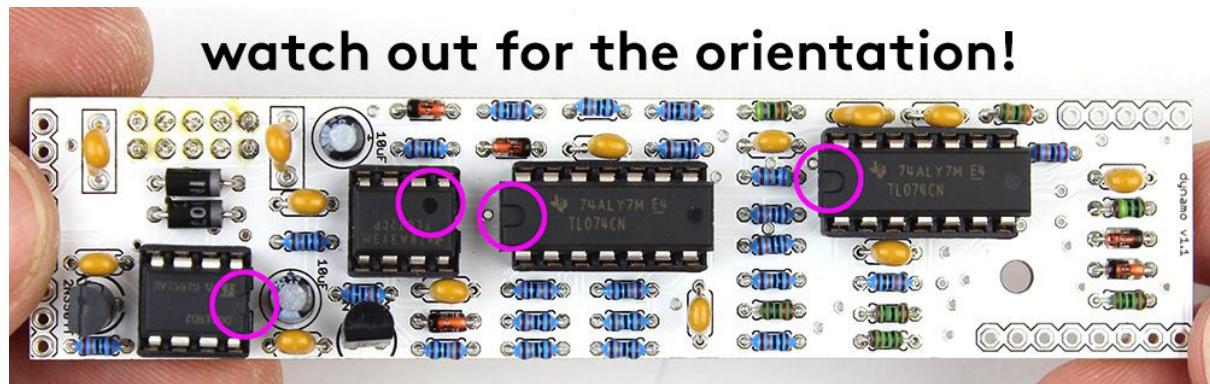
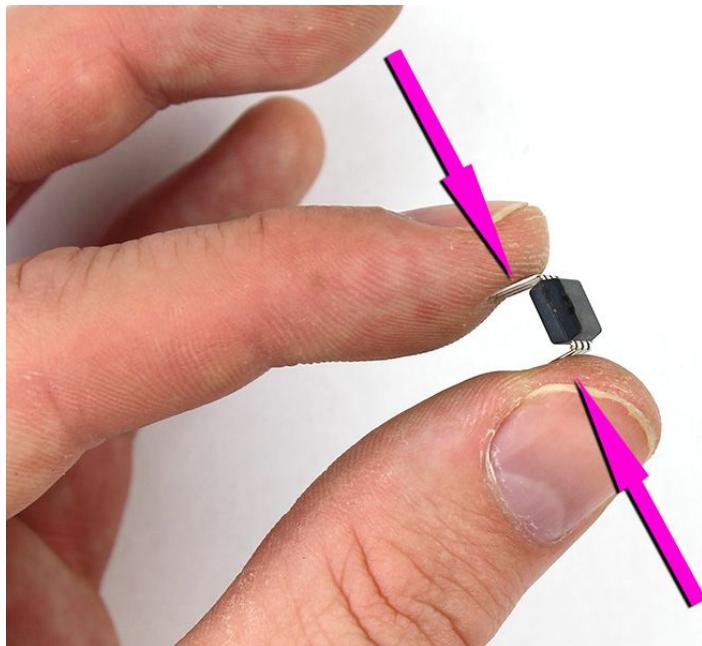
POWER CONNECTOR

Solder the **male pinheader** now. Be careful to solder it straight. You may first solder just one of the pins, take the board in your hand and re-heat that pin while pressing down on the header to align it (be careful, you don't want to touch the pin you are heating up). Wait for it to cool and solder the rest of the pins.



INSERTING ICs

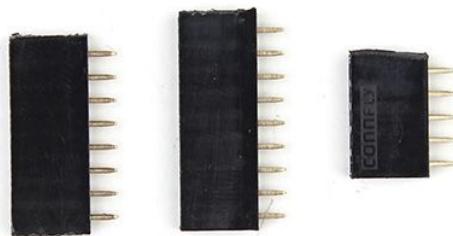
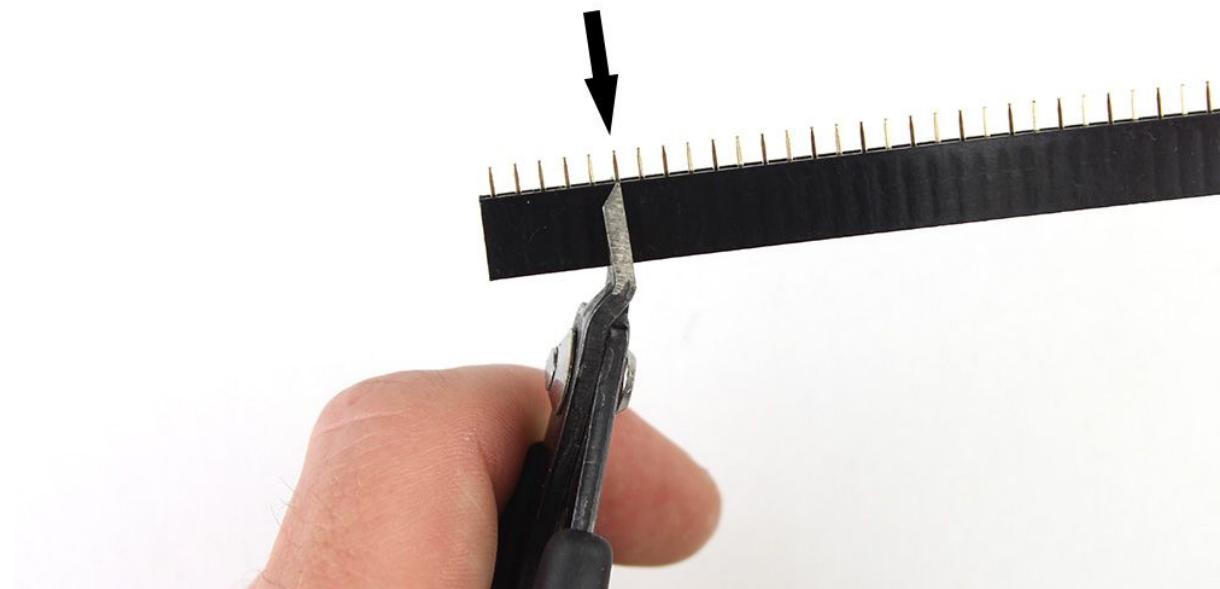
Next don't forget to place four **ICs** into the sockets (1x TL072, 2x TL074, 1x DG419DJ). **There is a notch on each IC that should match with the notch on the socket (for TL072 is relevant the dot on it).** Installing ICs can be also a little tricky. You should bend the IC leads in slightly with your fingers. Then press all the leads into the sockets in one shot.



PREPARING FEMALE HEADERS

As you can see **one female pinheader left**. You can prepare it now. Use your flush cutters to get the lengths of **nine, eight and five pins**. You will always lose one pin when cutting the female headers, so be sure to cut it always after the last required pin - see the picture to check where to cut to get 5 pin. You will use these parts in later steps.

**cut in the place of 6th pin
for getting 5 pin header**



For now you are finally done with the bottom board. Make the last check that all parts are on the right place and everything is properly soldered.

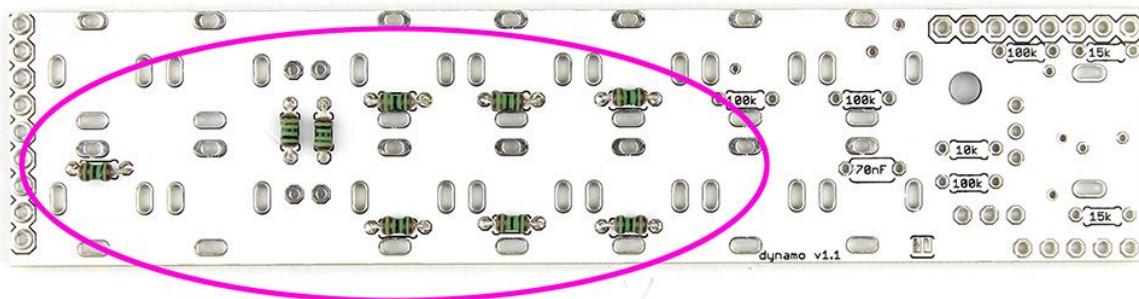
TOP BOARD

RESISTORS

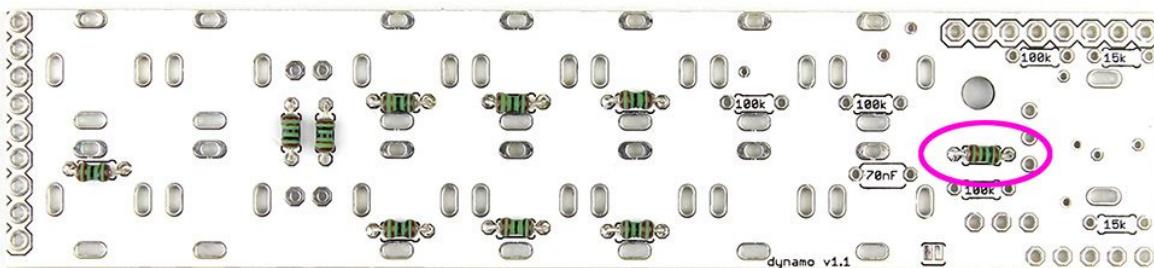
Let's move to the top PCB now. Again, start with the **resistors**:

- **1k** (9x), **10k** (1x), **15k** (2x), **100k** (4x)

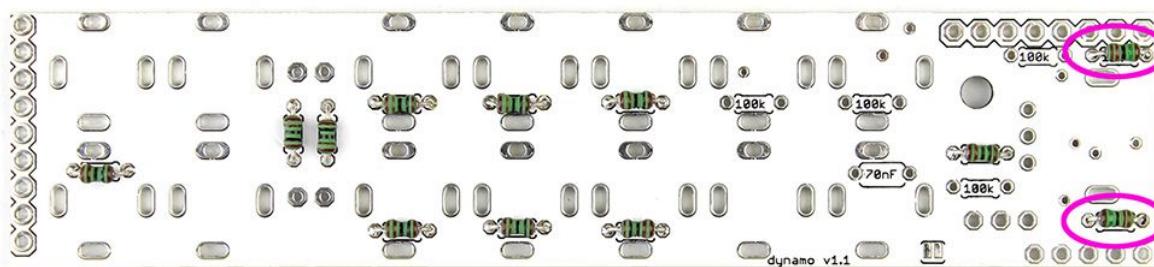
1k resistors (9x)



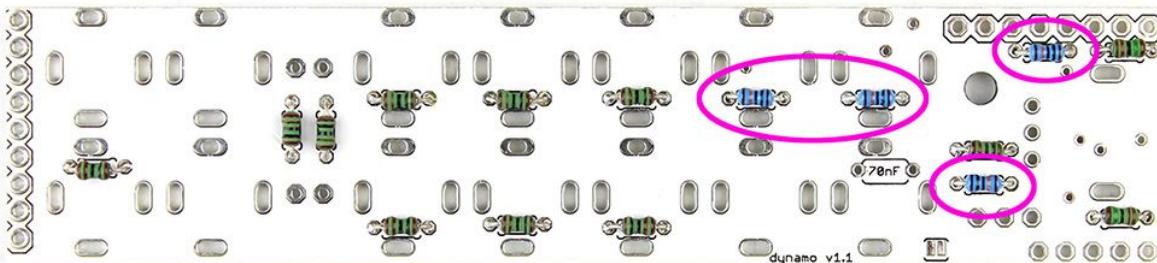
10k resistor (1x)



15k resistors (2x)

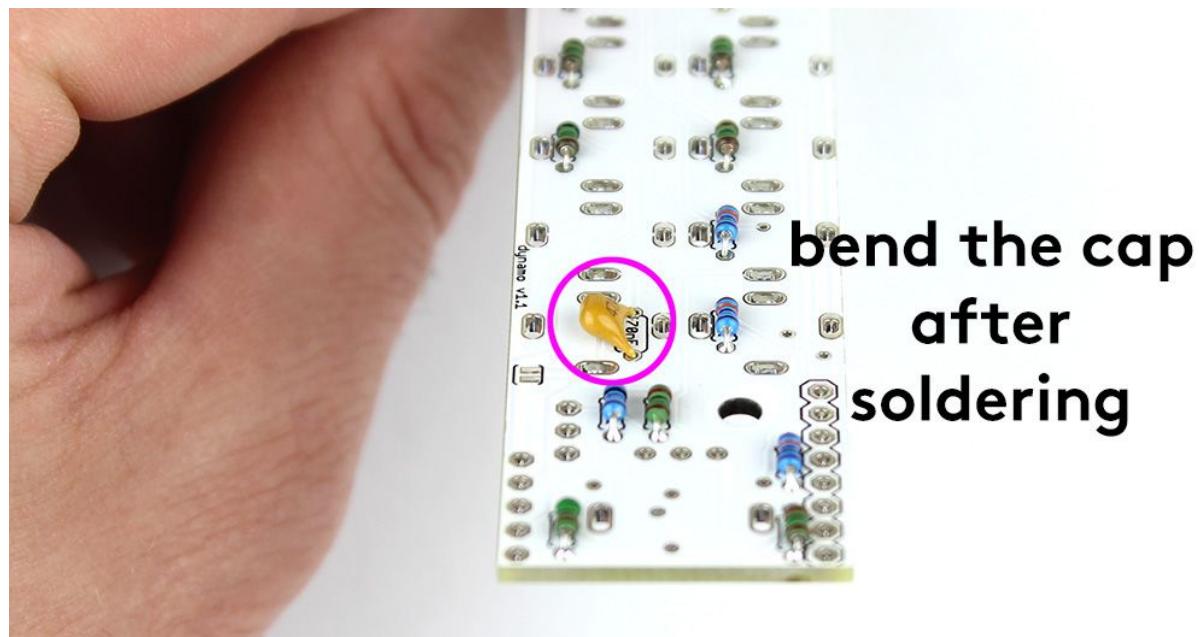


100k resistors (4x)



CERAMIC CAP

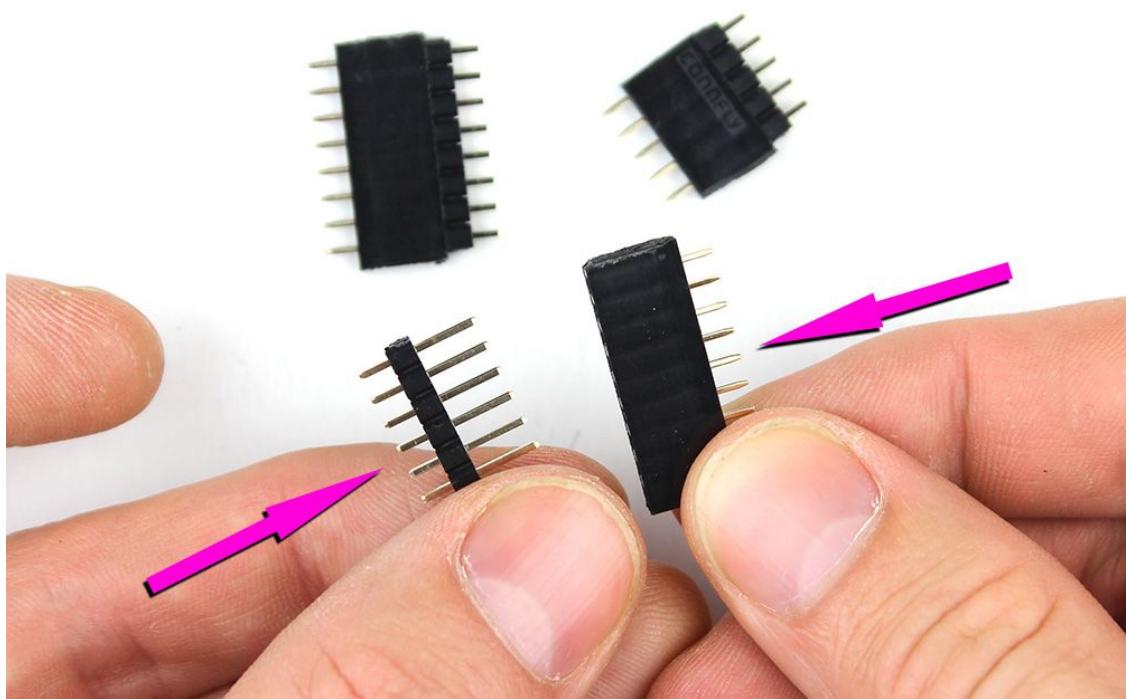
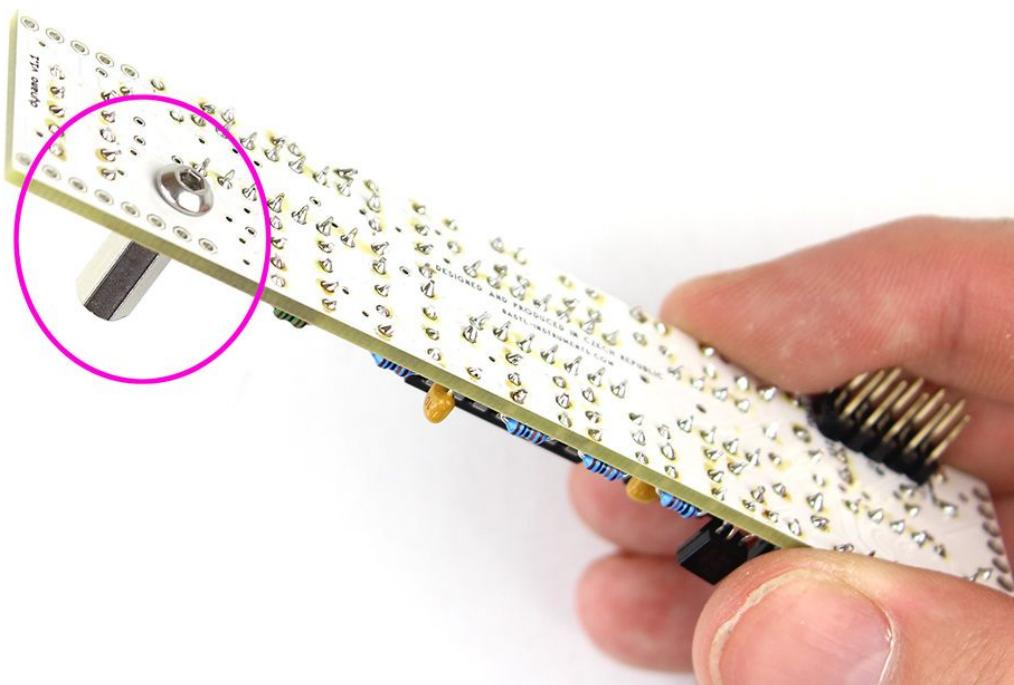
Don't forget to place also the 470nF capacitor on the board. You have to bend the cap after soldering. See the picture below.

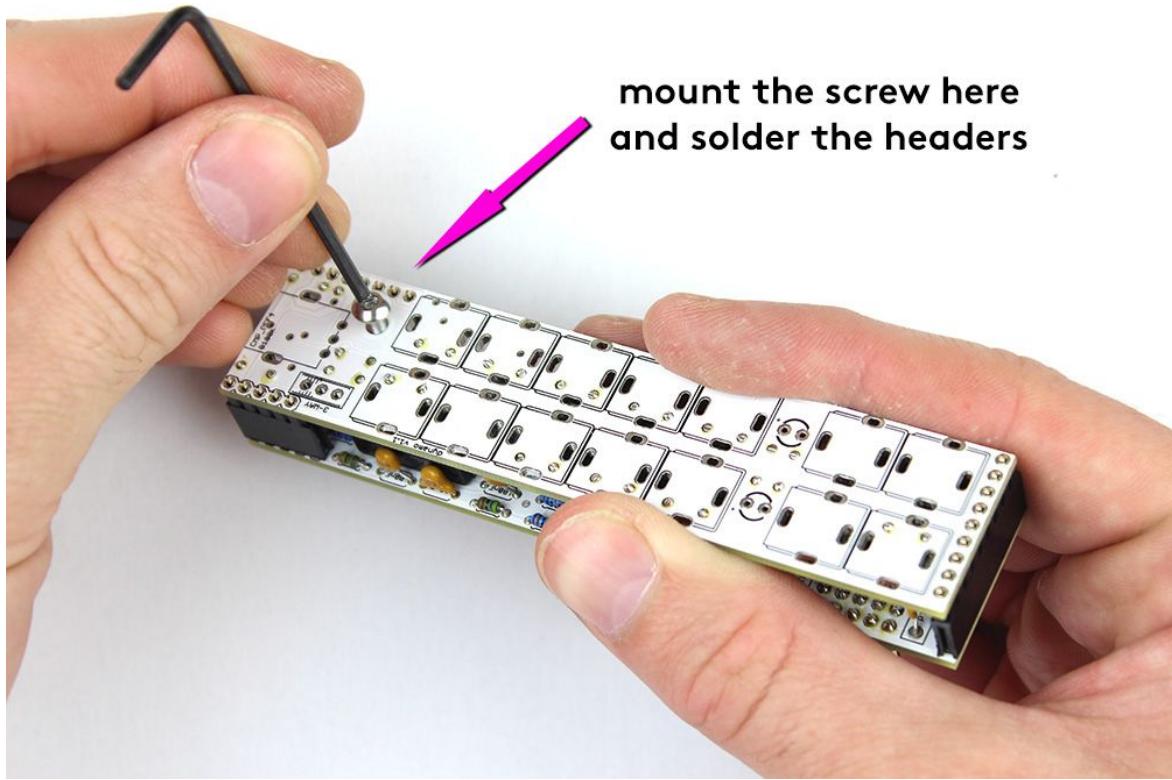
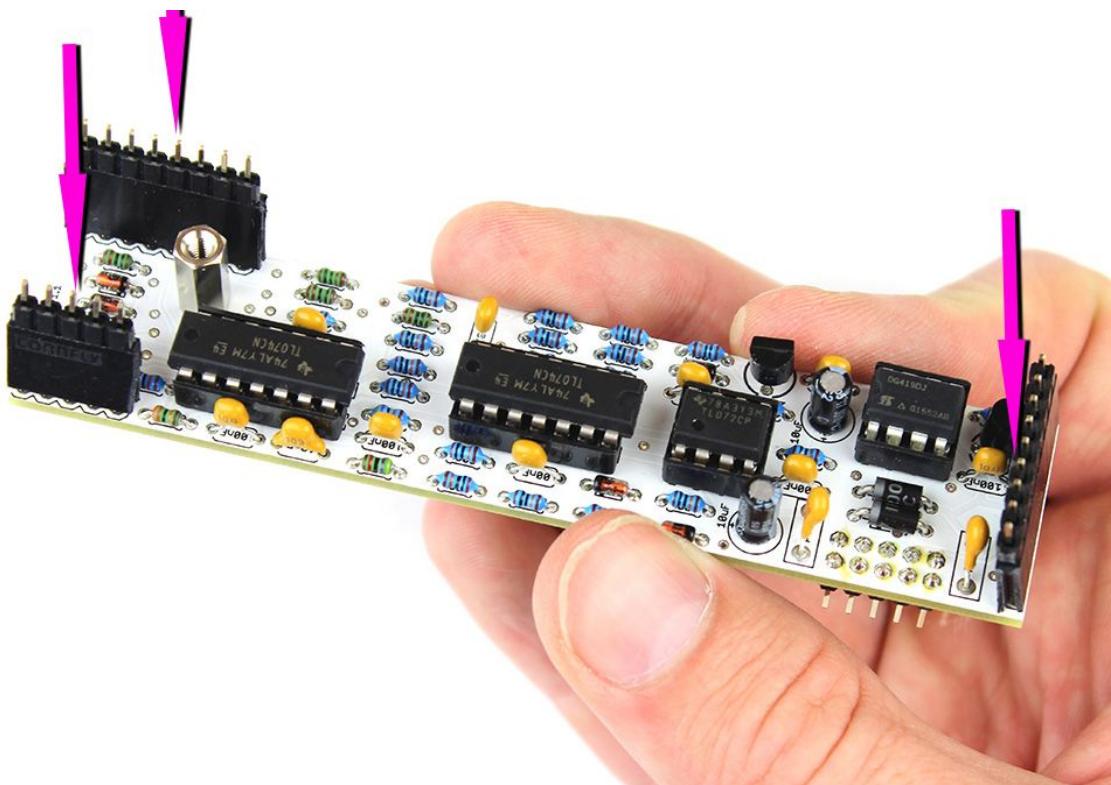


PINHEADERS

Now it's time to connect the boards with pinheaders.

- 1) Mount the spacer with the screw to the bottom board first.
- 2) Insert male headers into the female ones.
- 3) Put the headers on the bottom board facing the female ones down.
- 4) Place the top board on and secure it with the other screw. Check the position and do the soldering finally.

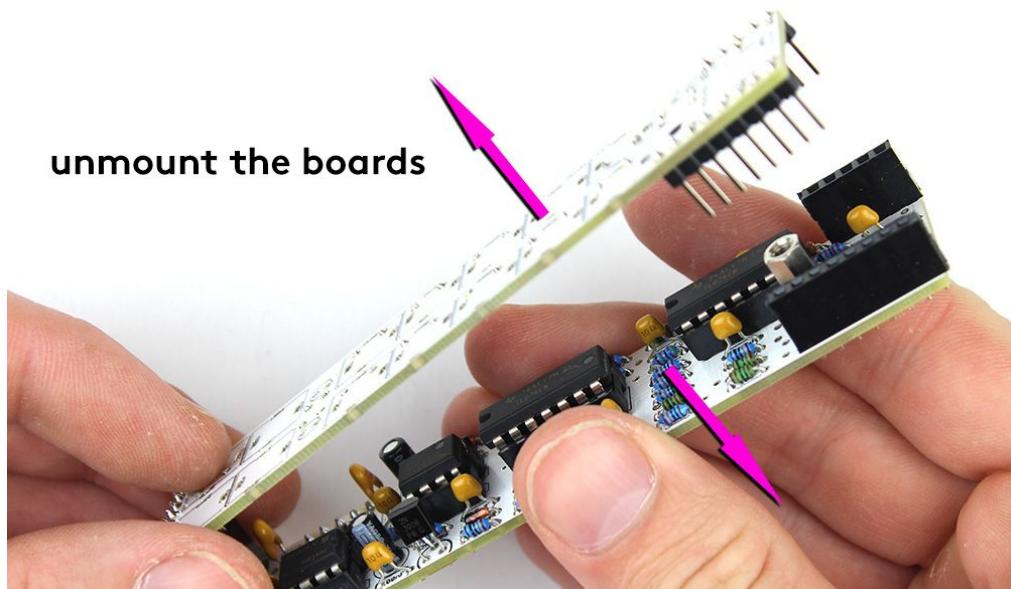




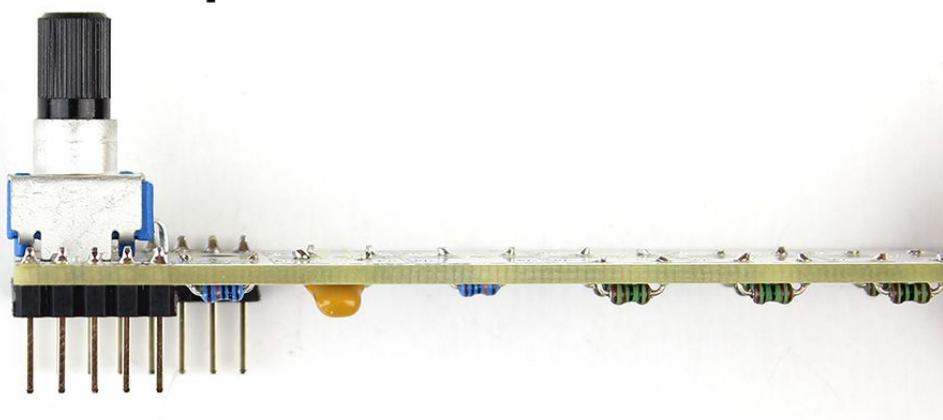
JACKS, POTENTIOMETER, SWITCH & LEDs

You are almost done. Let's do the rest of the components by just putting them in (**no soldering yet!**):

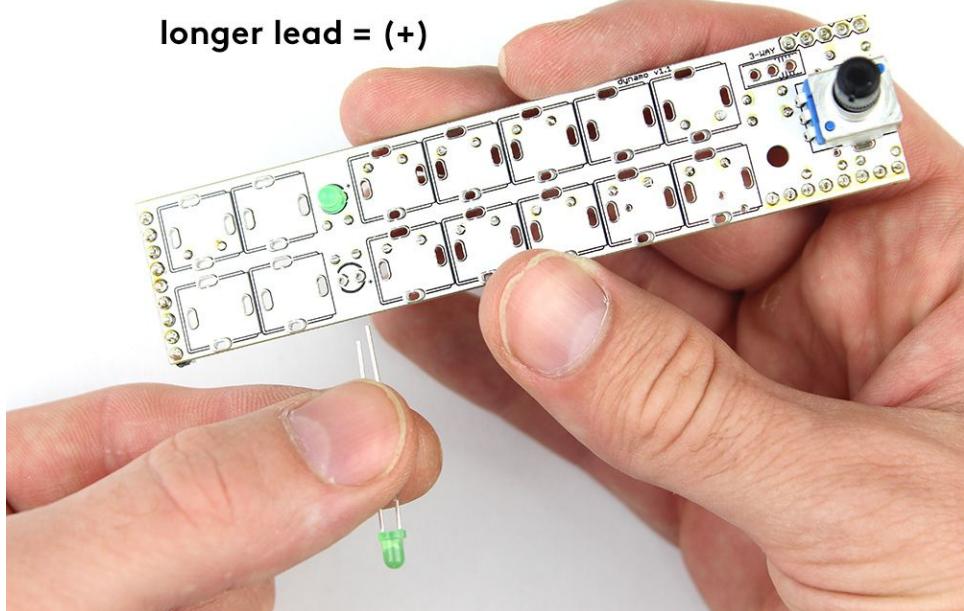
- 1) Unmount the top board.
- 2) Insert the **potentiometer** - be sure it's placed in the right angle and it's right on the board.
- 3) Insert two **LEDs** - **watch out for orientation!** (the longer lead has to go into the plus (+) hole signed on PCB)
- 4) Insert the **switch** - the orientation doesn't matter.
- 5) Insert **jack connectors** (14x).
- 6) Place the **front panel** on and mount the jacks (you don't have to mount them all as you have to unmount them in the next step).
- 7) Check the position of all the parts if they are flat on the board, push the LEDs and switch to the panel and do the soldering.



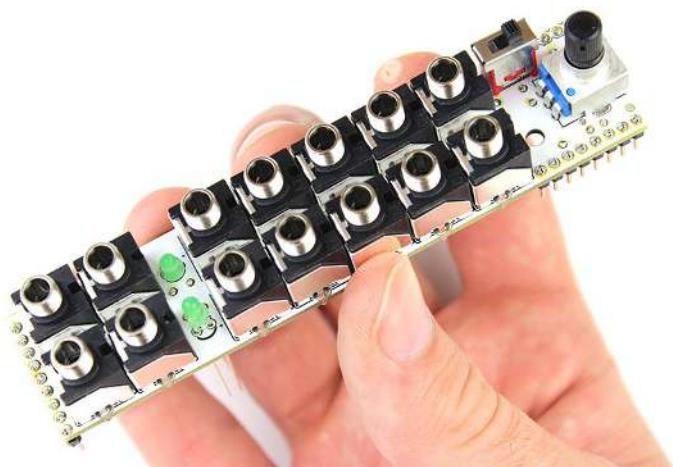
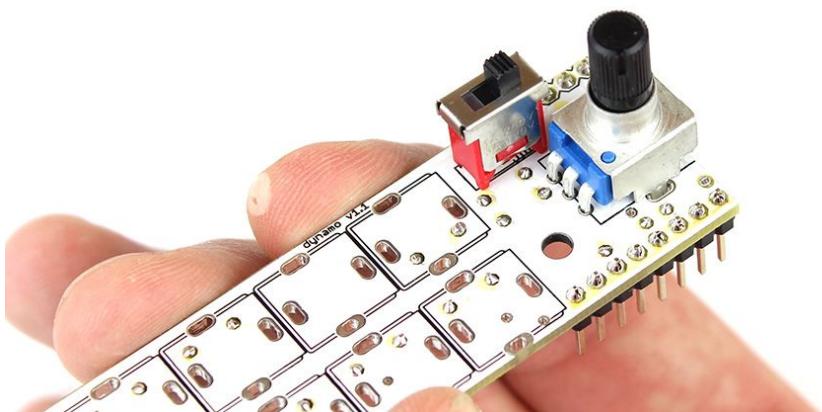
**keep the right angle of
potentiometer**



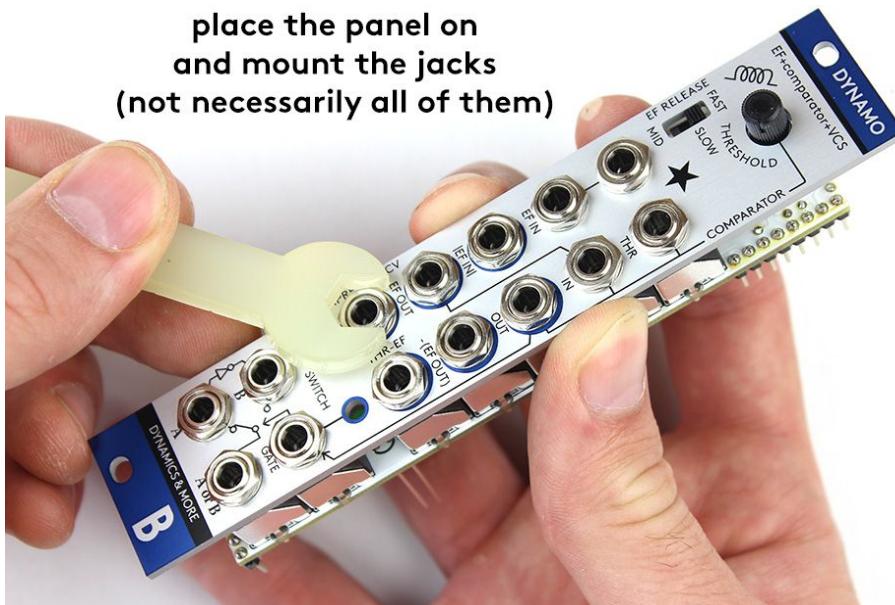
longer lead = (+)



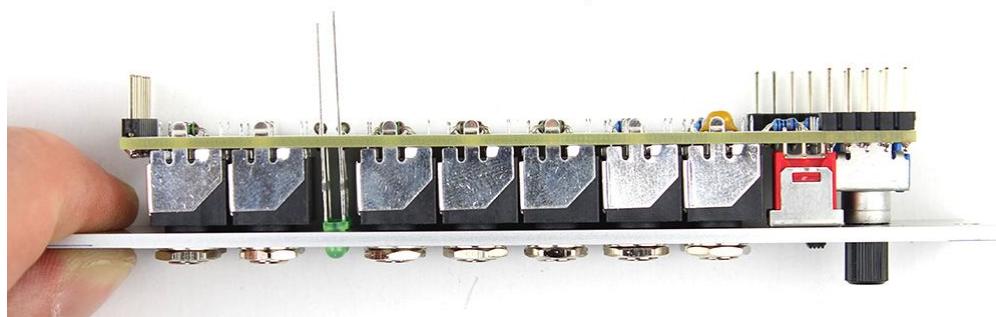
orientation of the switch doesn't matter



place the panel on
and mount the jacks
(not necessarily all of them)



push the switch and LEDs to the panel and
solder all the parts



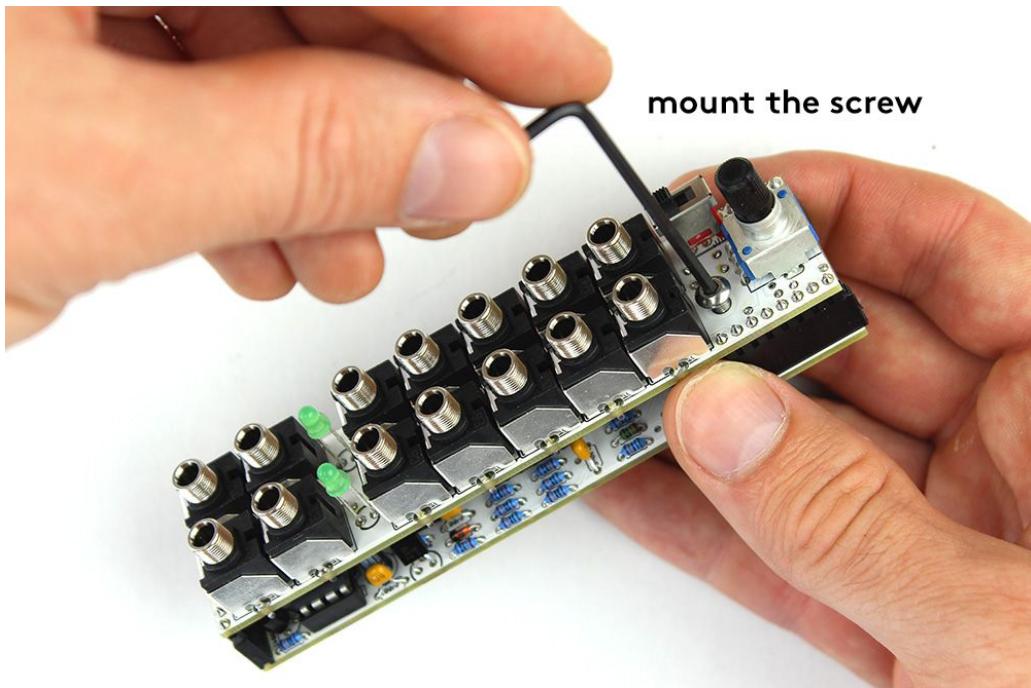
CLEANING (OPTIONAL)

After the soldering is done 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 (be aware to not let it flow into the pots and switch!), 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.



FINAL ASSEMBLY

Congratulations! You have made it through, now just unmount the front panel and add the **screw** to secure both PCBs together. Then put the **knob** on and Dynamo is ready to work. Before you connect anything, make sure that your system is disconnected from power. Also double check the polarity of the ribbon cable, the red cable should match the -12V rail both on the module and on the bus board!



TROUBLESHOOTING

If you have any issues with the module, please check the [F.A.Q.](#) at our website first. You can also reach us here: diy@bastl-instruments.com.