B A S T L
INSTRUMENTS

LITTLE NERD v1.1 - Assembly Guide

bastl-instruments.com

INTRODUCTION

This guide is for building Little Nerd 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 we have found to help you solder everything faster and better.

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[1] http://www.instructables.com/id/How-to-solder/

The Little Nerd module consists of three boards. All the parts comes in four bags separated for Bottom board, Connector board, Pots board and Assembly parts. See Bill of Materials (BOM) for detailed list.
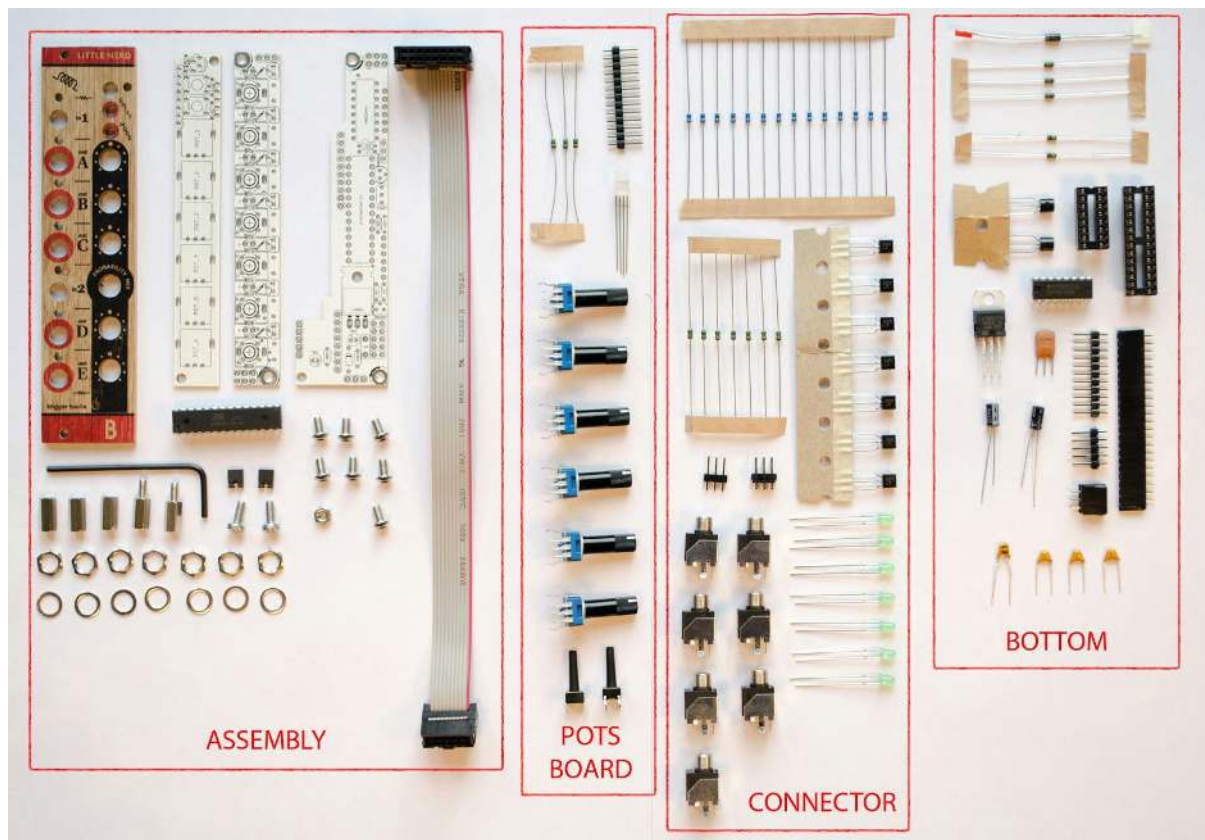
Before starting this kit, prepare the following tools :
- Soldering iron (15-20W)
- Multi-meter
- Flush cutters
- n2. hex screwdriver or allen key (enclosed with kit)
- Phillips screwdriver (cross)
- Wrench No. 8
- Protective eyewear

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.

CONNECTOR BOARD

Let's start with the connector board PCB. Before you start soldering, take your time and find all the **resistors values** using a multimeter[2] (or you can check the color codes if you are seasoned enough).

Now insert and solder **21 resistors** (7x 10k, 14x 1k). Then snip the leads as close to the PCB as you can (be sure to make this step on all remaining leads in the course of this guide).
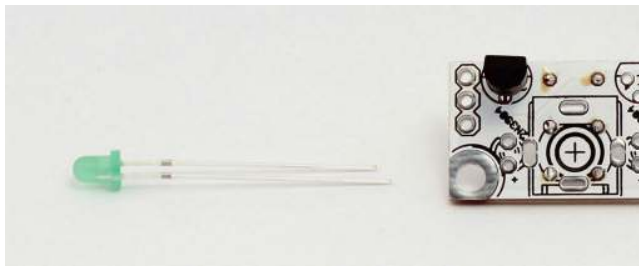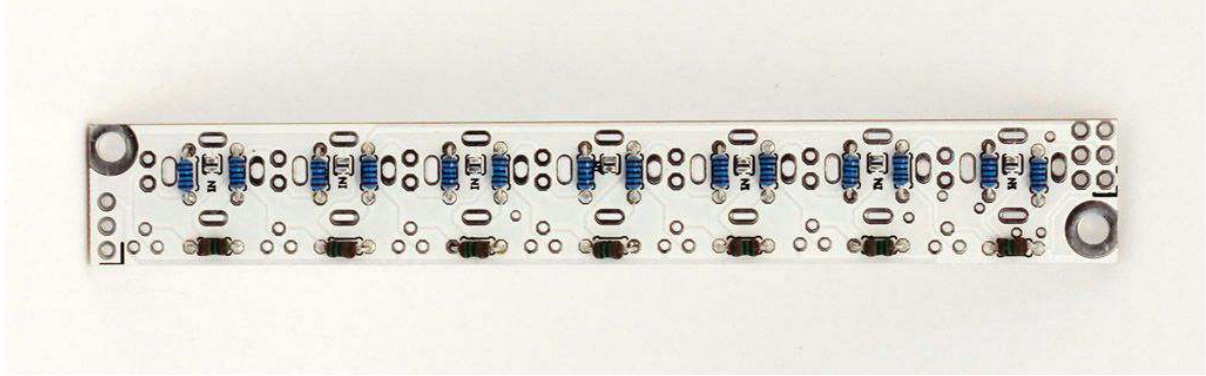

Turn around the PCB and insert **seven transistors (2N3904). Watch out for orientation!** Flat side of transistors must match the outline drawn on the PCB. You may also want to push the leads in the upper part closer to each other to insert the transistors closer to the PCB (although they should not be flat with the PCB).

Next insert seven **jacks and seven green LEDs. Be careful to put the longer lead of LEDs into the plus (+) hole**. Jacks must sit flat on the board, otherwise they will not come easy through the front panel. **Do not solder anything yet**.

[2] https://learn.sparkfun.com/tutorials/how-to-use-a-multimeter/measuring-resistance
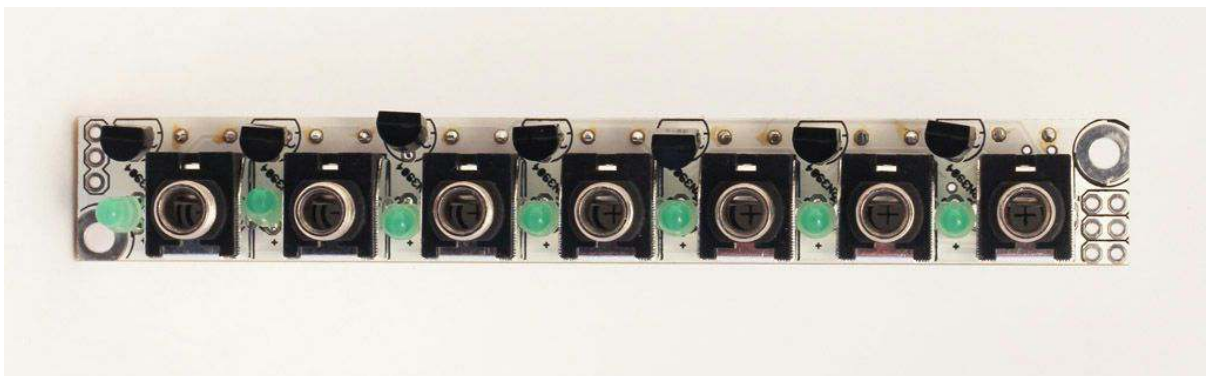
Now take the **front panel** and lower it down on the connector board. Hold it together and mount it with two **jack nuts** on the first and the last jack connector (you do not have to tighten them too much as you may damage the wooden panel).
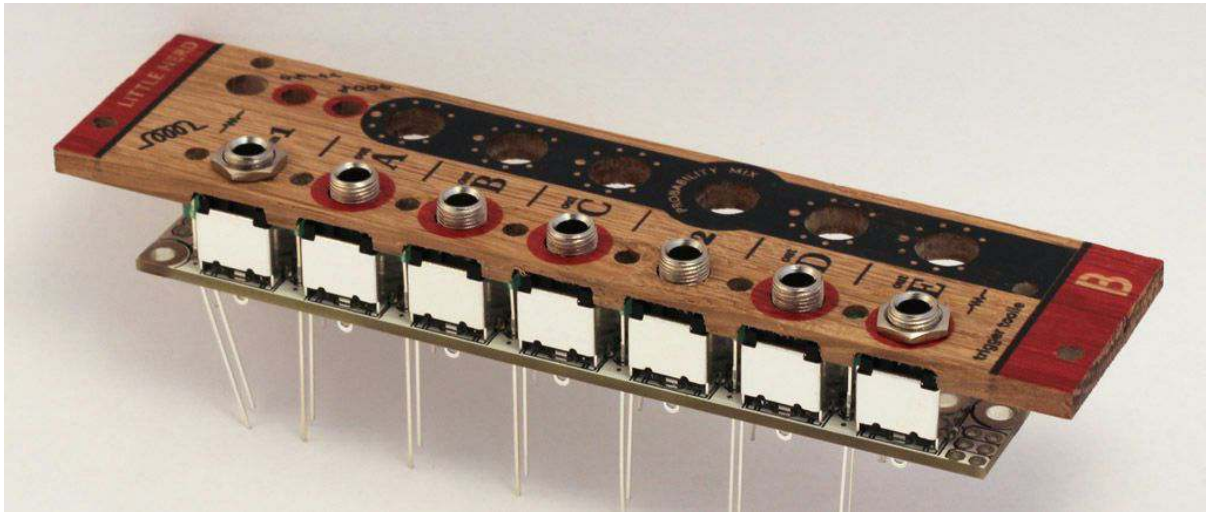
Then turn around this unit facing it with PCB upwards. Now push the LEDs leads to fit their heads on panel. **Make sure that everything is properly aligned**. Finally you are ready to solder all the components
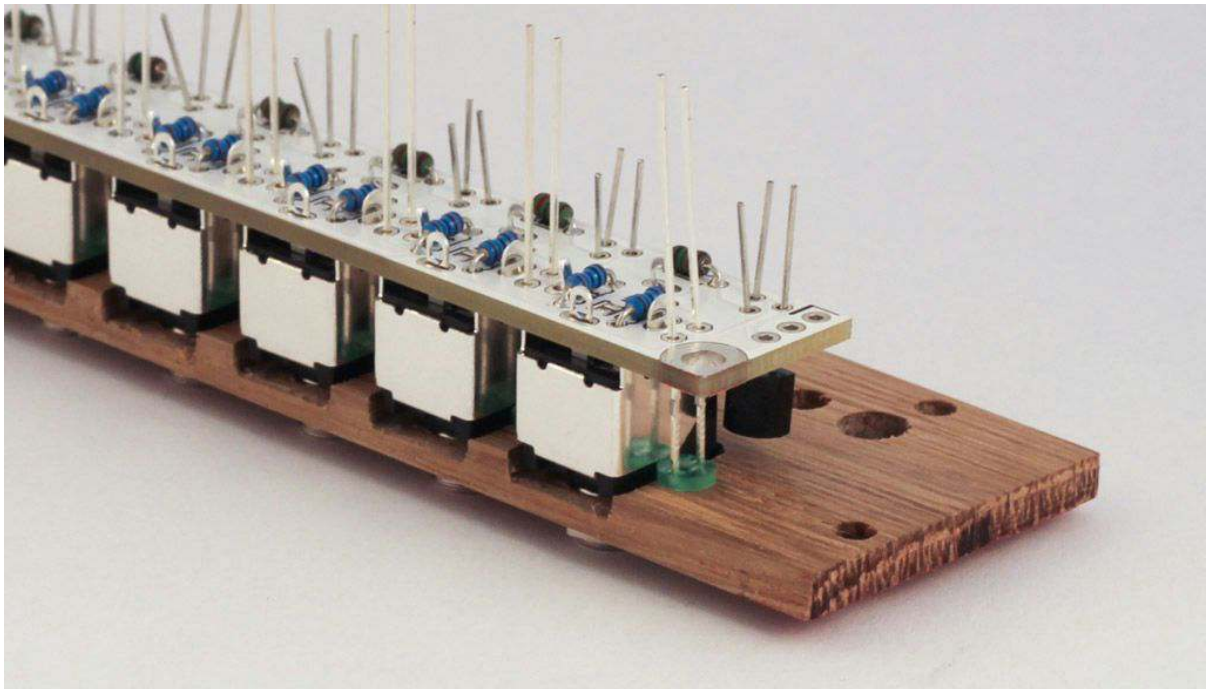
The last thing to solder is to close two **solder jumpers** indicated by "IN" under the first and fifth jack connector. This normalizes the input to ground when nothing is plugged in. See the image below.
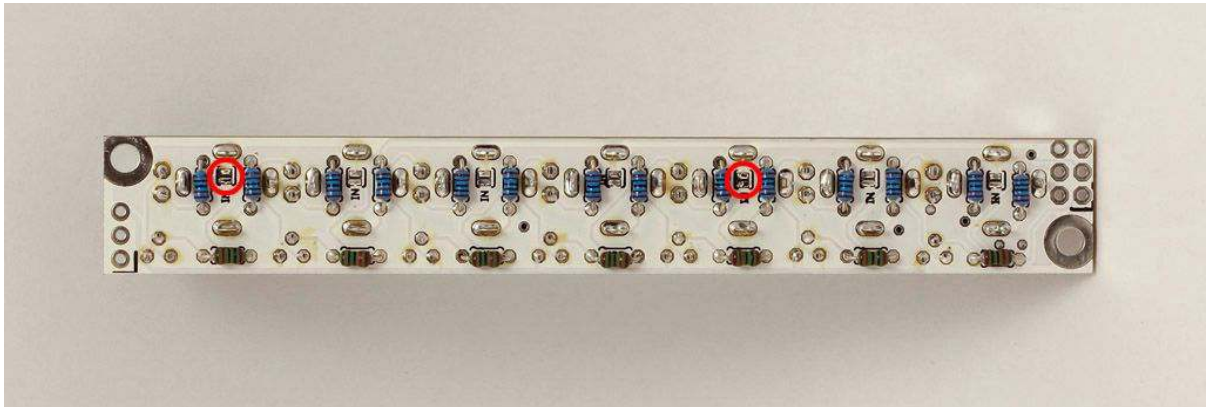
Unmount the connector board from the panel. As you can see some **male pinheaders** left. You will use them in another step.

POTS BOARD

Next you will build the pots board. Firstly insert **three resistors** (15k) and solder them. **You should be aware to let enough space for the 5 pin holes on the side** (you will be soldering a male pinheader there later).
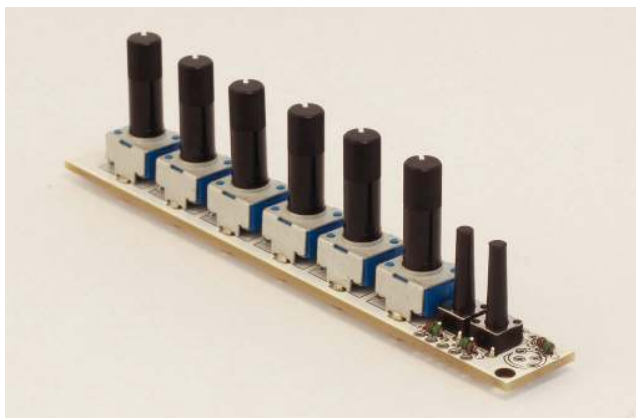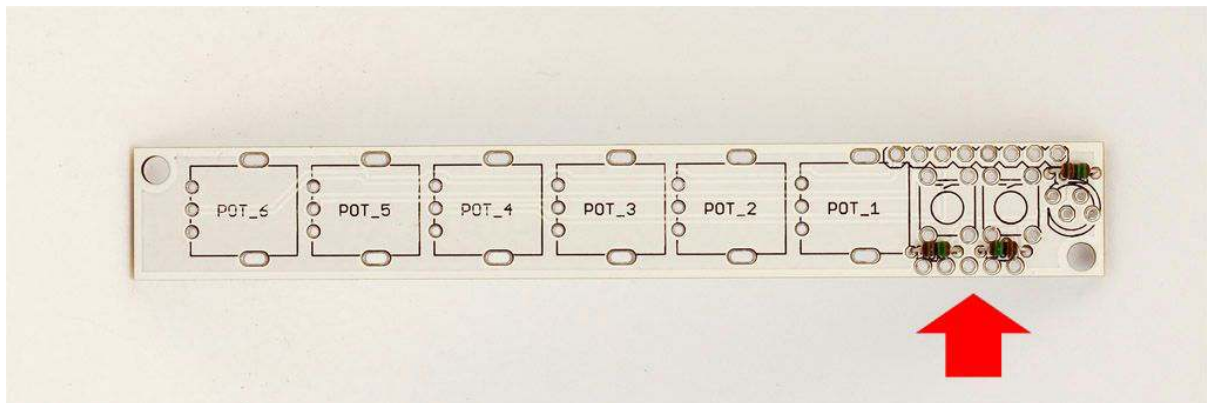
Take the **six potentiometers** and put them on the board. They have to sit right on the board and stand vertically. You can start soldering only one leg of each pot, then check the alignment and make an adjustment if needed. Solder the other legs. Then let's insert and solder **two small buttons**.

Now you want **one 1x5 and one 1x8 male pinheader**. If it is necessary cut the required length with your flush cutters. Then put them from the other side and solder them. **Be careful to solder the pinheaders straight**! You may first solder the middle pin, then take the board in your hand and re-heat that pin while pressing down on the header to align it (be careful though, you don't want to touch the pin you are heating up). Wait for it to cool and solder the rest of the pins.
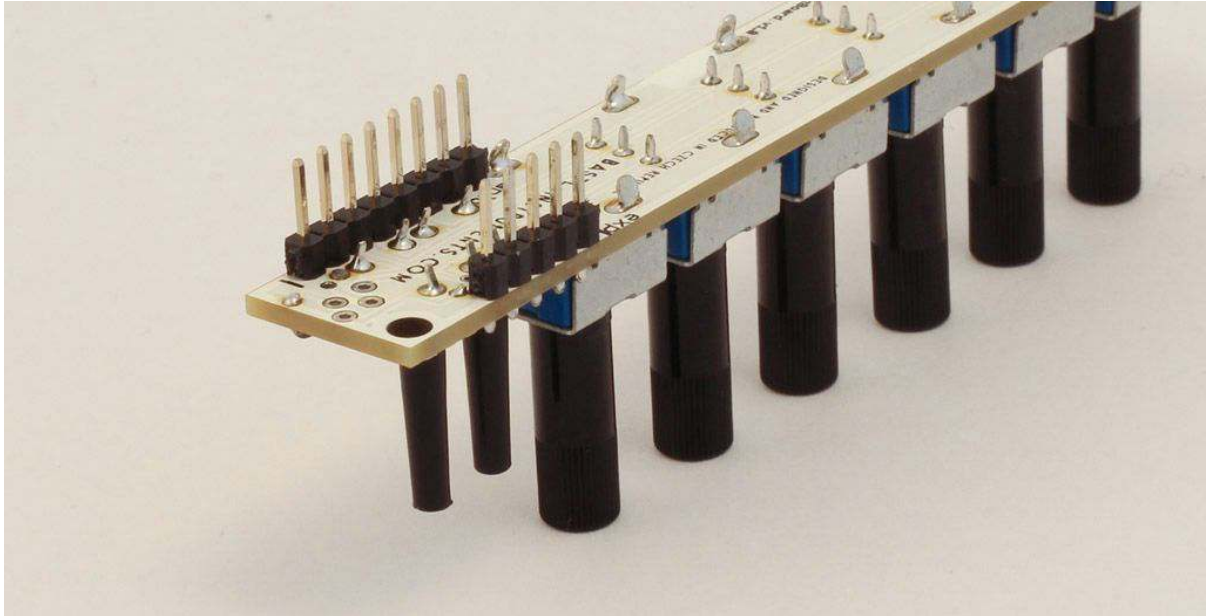
Now it is time to insert **RGB LED. The longest lead should be in the third hole as well as the flat sides of the LED should match the printing**. See the picture to check the orientation. **Do not solder yet**!

Before soldering LED you should mount the board to the wooden panel first. **Take two screws along with two 10 mm spacers and fix them with the panel**. Then let the board go through and secure it with **nut and 11 mm spacer**.
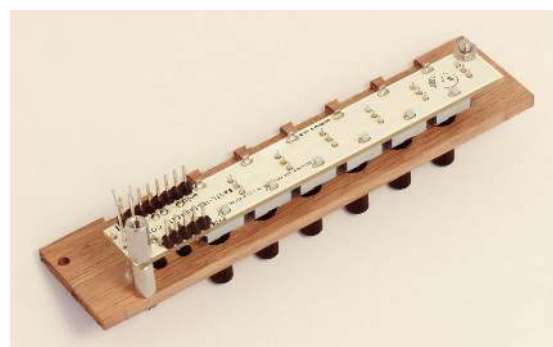
Push the LED leads to fit it's head on panel and solder it. You can keep the board on panel.

BOTTOM BOARD

Now let's make the bottom board. Again start with **the resistors**. There are five of them (3x 10k, 2x 1M) and they are pretty signed on the board. After that solder the **1N4007 diode**. **Be careful, diodes are polarized!** Make sure that the marking ring on the diode body matches the marking on the circuit board.
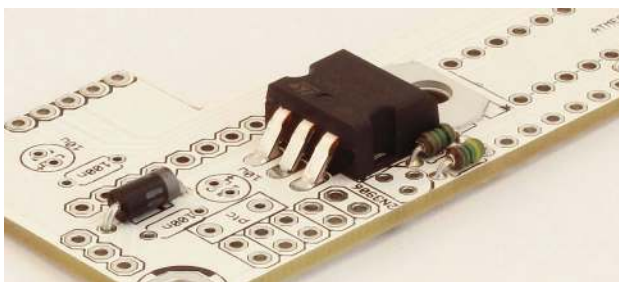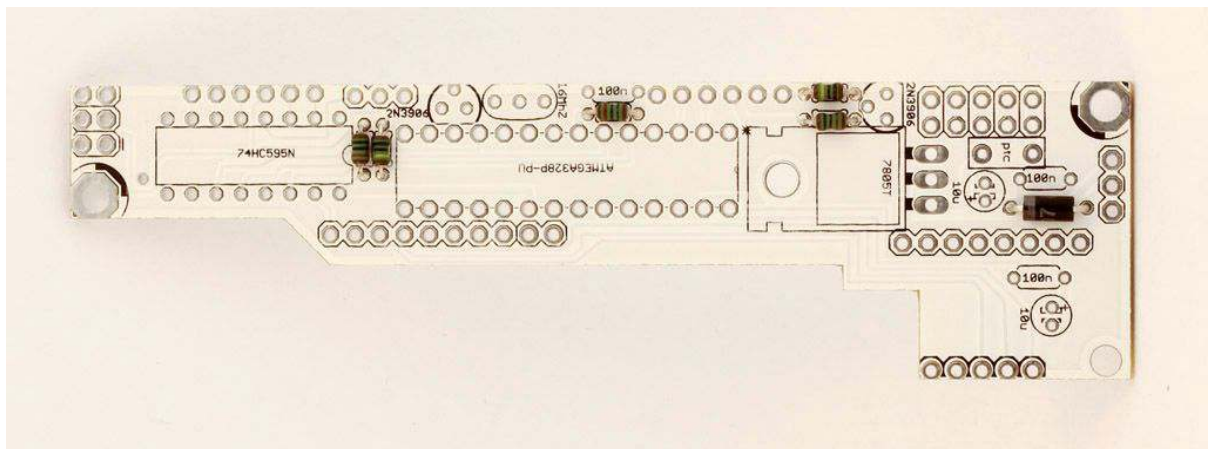

Next solder the **7805 voltage regulator.** Bend its legs as close to the body as possible, at a right angle to make sure that it lies flat on the circuit board.

Then solder two **IC sockets** (1x 14 pin, 1x 28 pin). **Make sure that the notch on the socket matches the print on the board**.
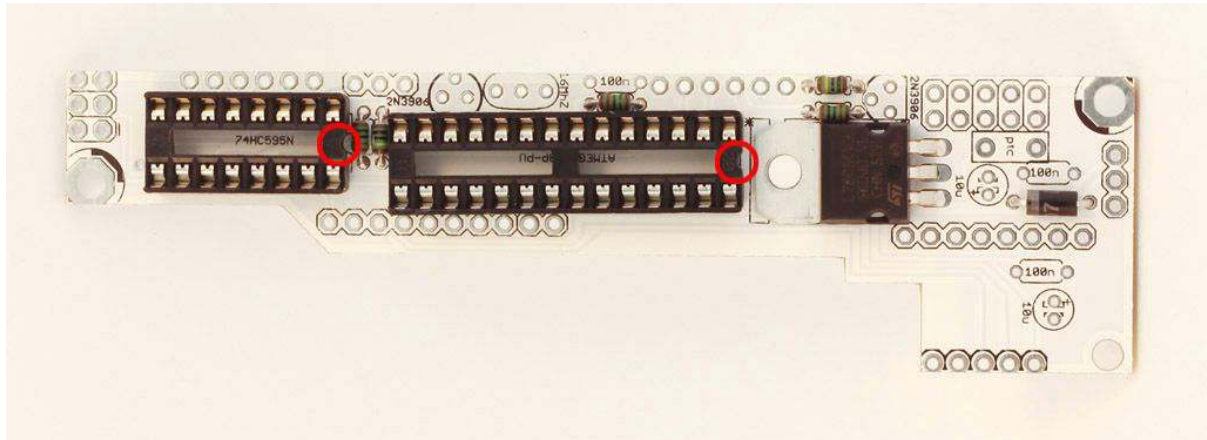
Now let's do some other parts. There are **three 100nF capacitors** (marked 104), **one protective fuse** (it looks quite similar to a ceramic capacitor but is placed in the "PTC" rectangular) and one **16MHz resonator** (the orange component with 3 leads). None of these parts are polarized so you can insert them in any direction.
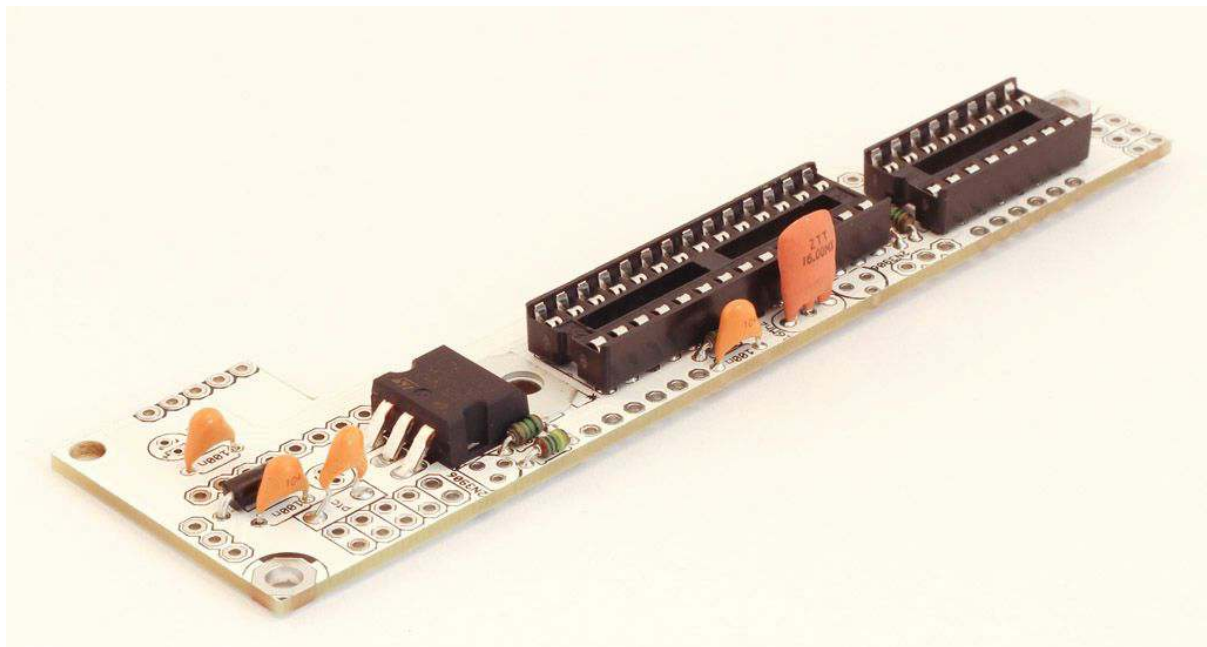

It is time for more capacitors. Insert two **10µF electrolytic capacitors** and solder them. However be careful, **these are polarized**! There is a plus (+) sign on the PCB that should match the longer lead of the capacitor (actually the minus (–) side is also marked on the body of the capacitor with a white strip).
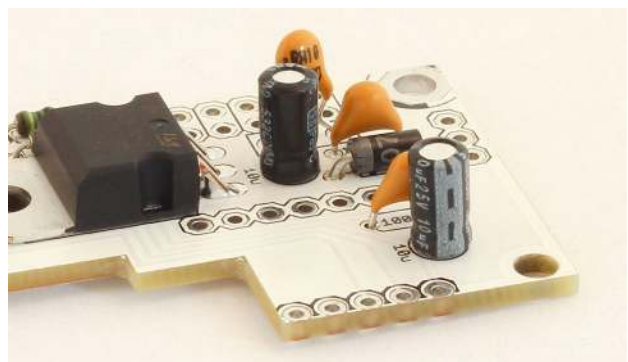
Now insert **two transistors (2N3906)**. Again, **watch out for orientation!** Flat side of transistors must match the outline drawn on the PCB. You also want to push them closer to the PCB. Next don't forget to place the **ICs** in the sockets (1x Atmega, 1x 74HC595). **There is a notch on each IC that should match with the sign on the sockets**. Check the picture.
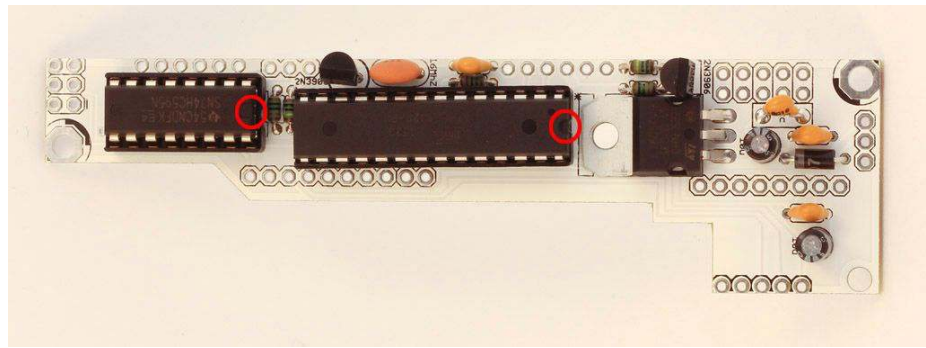

Turn around the PCB and prepare the four following **male pinheaders** parts with your flush cutters: **2 pin, 3 pin, 6 pin and 2x5 pin**. You can see their placement on the next picture. Again you should be careful to solder the pinheaders straight.
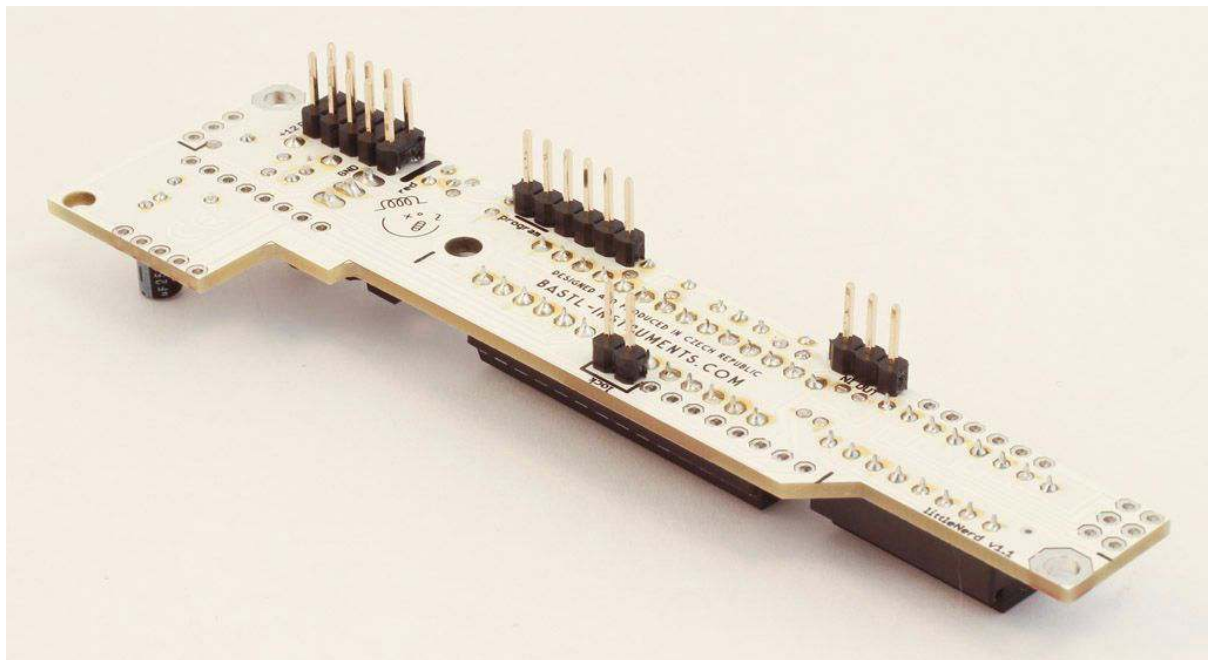
MOUNTING OF THE BOARDS

You are almost done now. You have to finally connect all the boards together. Take the bottom board and connector board first. **Prepare two 3 pin headers (male and female), two 2x3 pin headers (male and female) and pair them together** as shown on the picture. The female headers goes on the bottom board. Use **two 11 mm spacers and four screws** to get the boards together. Now solder both female and male pinheaders.
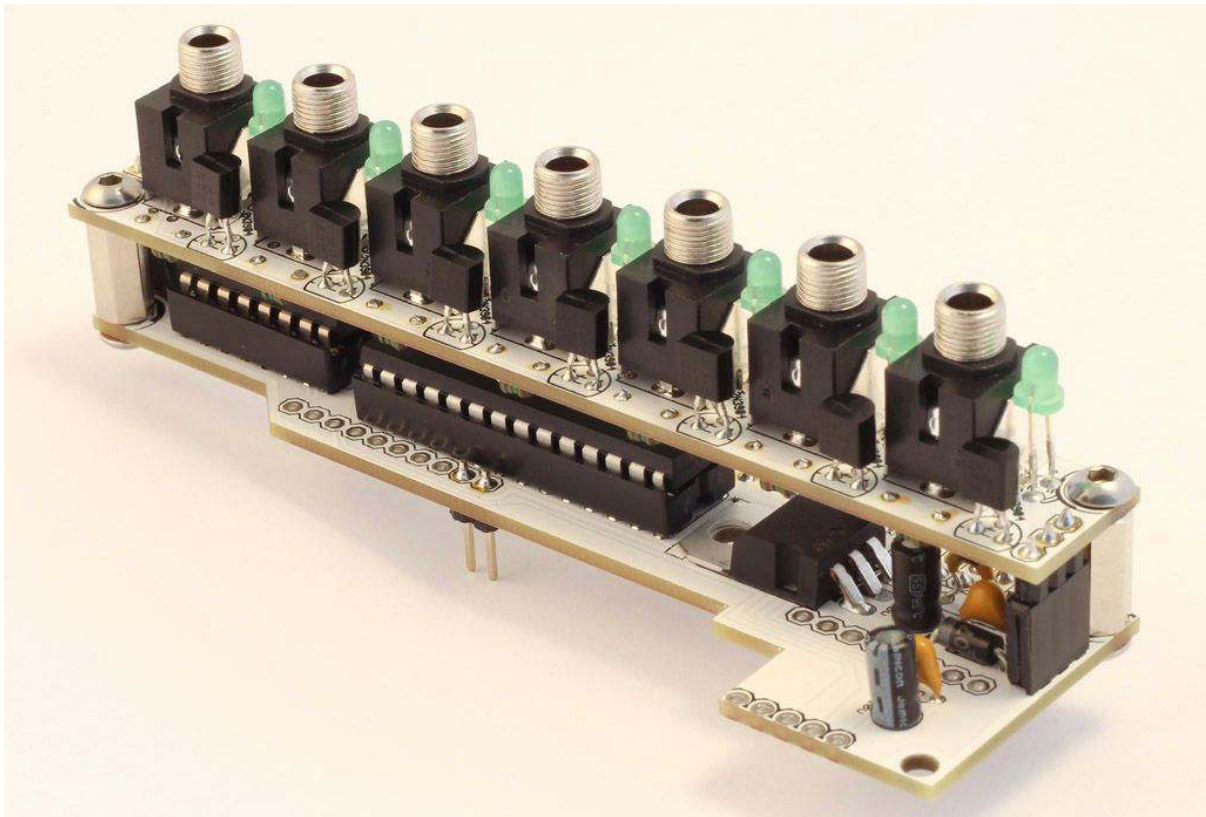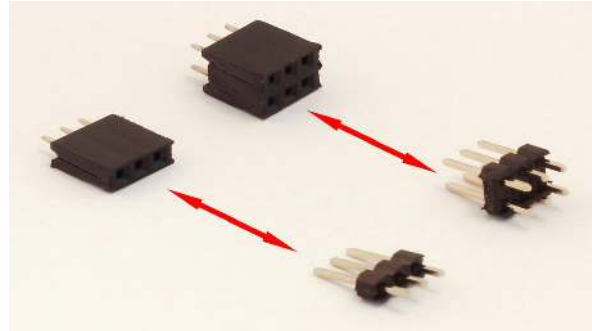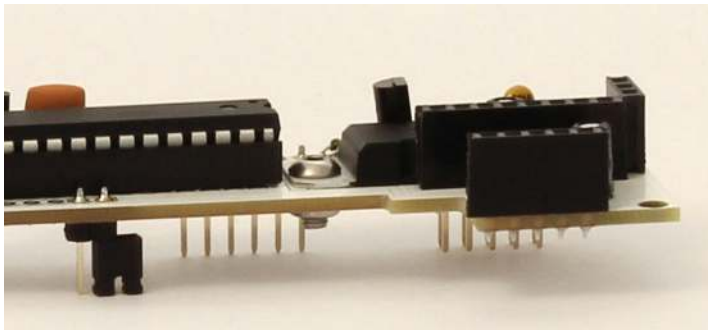

Now prepare **two female headers (5 pin, 8 pin)**. Press it on pots board male headers and then take the two units, put them together (use the last screw for mounting) and solder the female headers on bottom board.
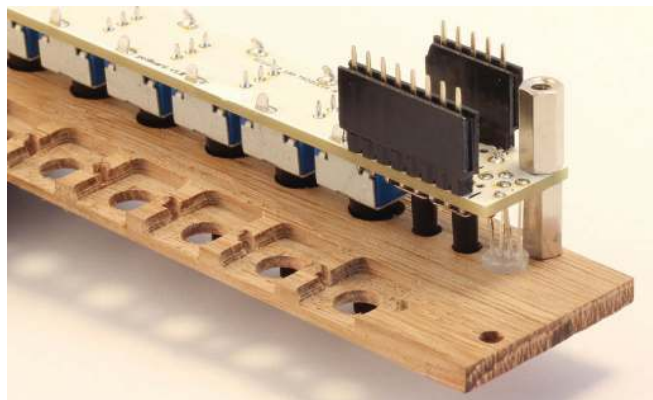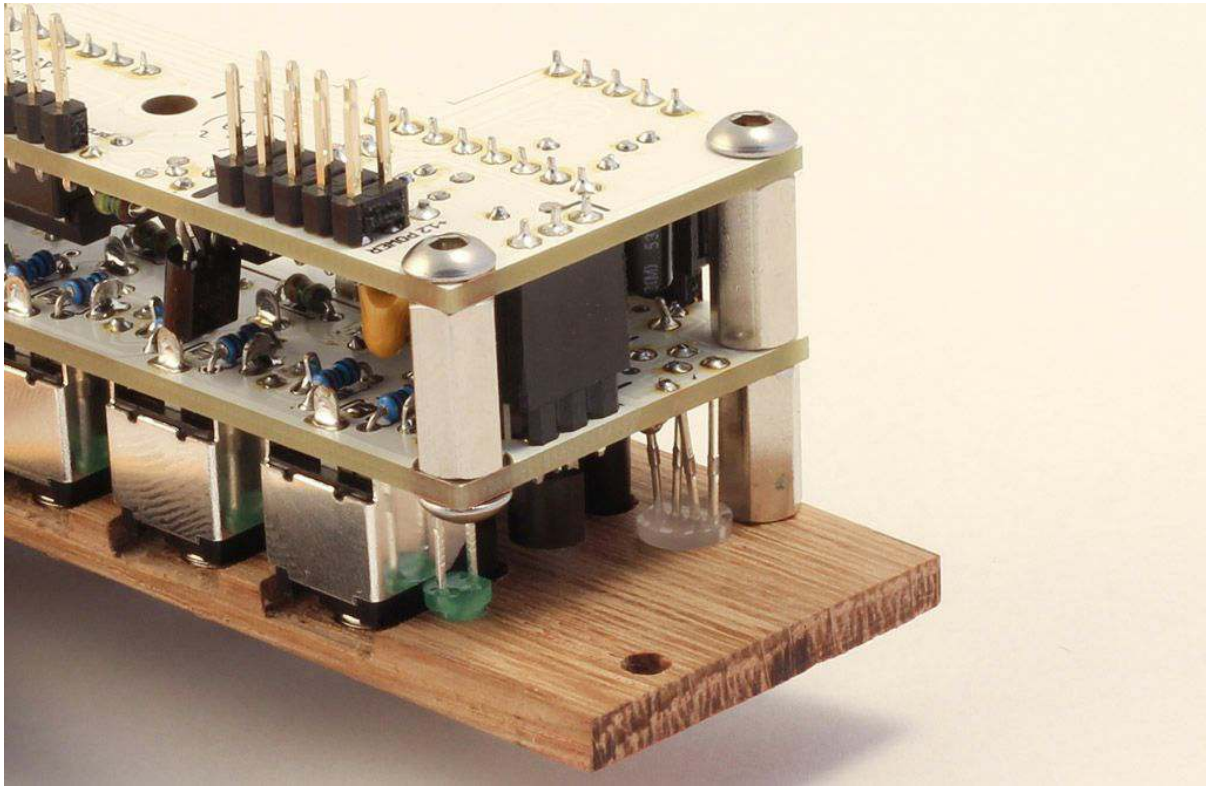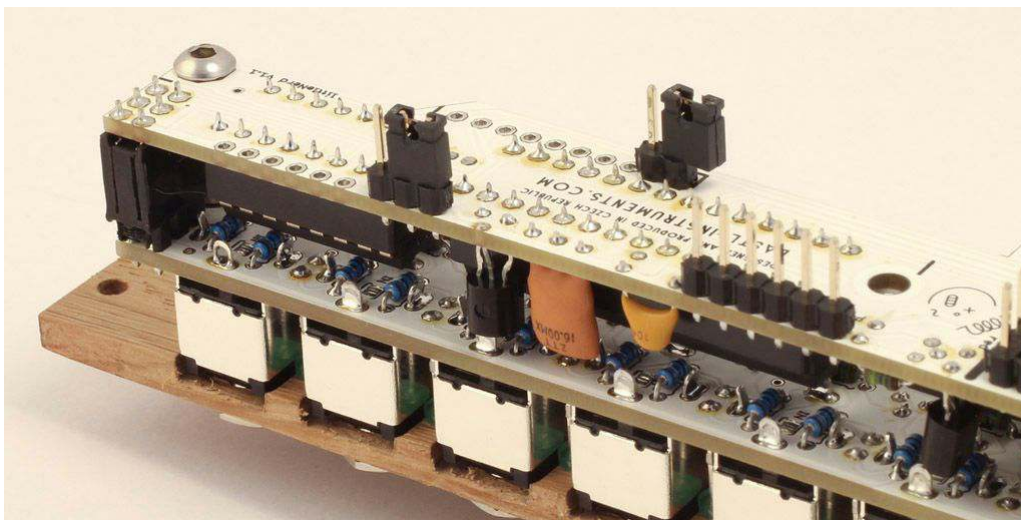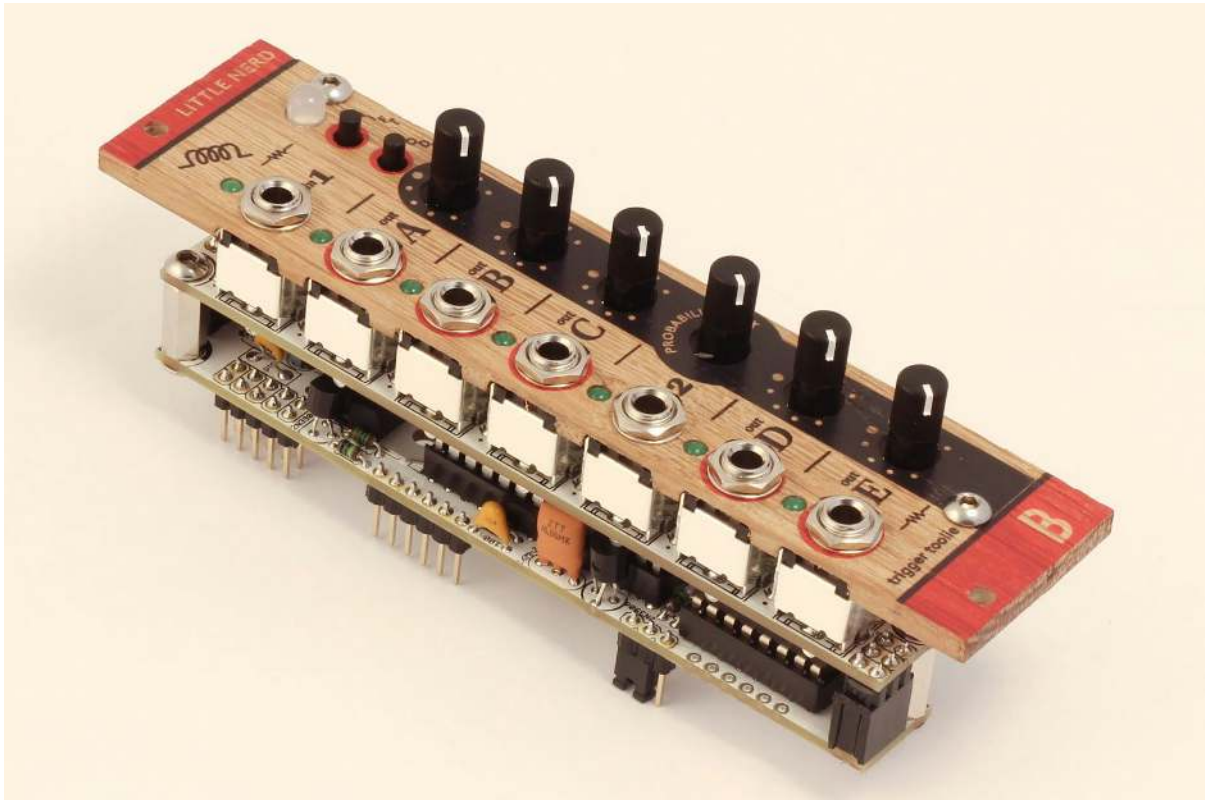
FINAL ASSEMBLY

Congratulations! You have made it through, now just secure the jacks to the panel with **the washers and the nuts** (keep in mind not to tighten the jack nuts too much as you may damage the panel!), install two **jumpers** and a **screw with the small nut** on the voltage regulator (see the pictures).

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

This may be the common problems and solutions:

Inputs don't work as they should
- Check out the soldered joints again. If needed heat up them and add a bit of solder.
- See the installed positions of jumpers (see page 11)
- Check out the ICs orientation (see page 9)

RGB LED is not working how it should
- Is it oriented the right way? (see page 6)

If you are having some more trouble, the best thing is to take a nap! Especially late at night!

If you are still in trouble, you can send the detailed description of the problem with enclosed high-resolution photos on diy@bastl-instruments.com.

If you think that you are unable to make the module work on your own, consider our "Come to Daddy" service.