

# B A S T L INSTRUMENTS

## CINNAMON v1.1 - Assembly Guide

bastl-instruments.com

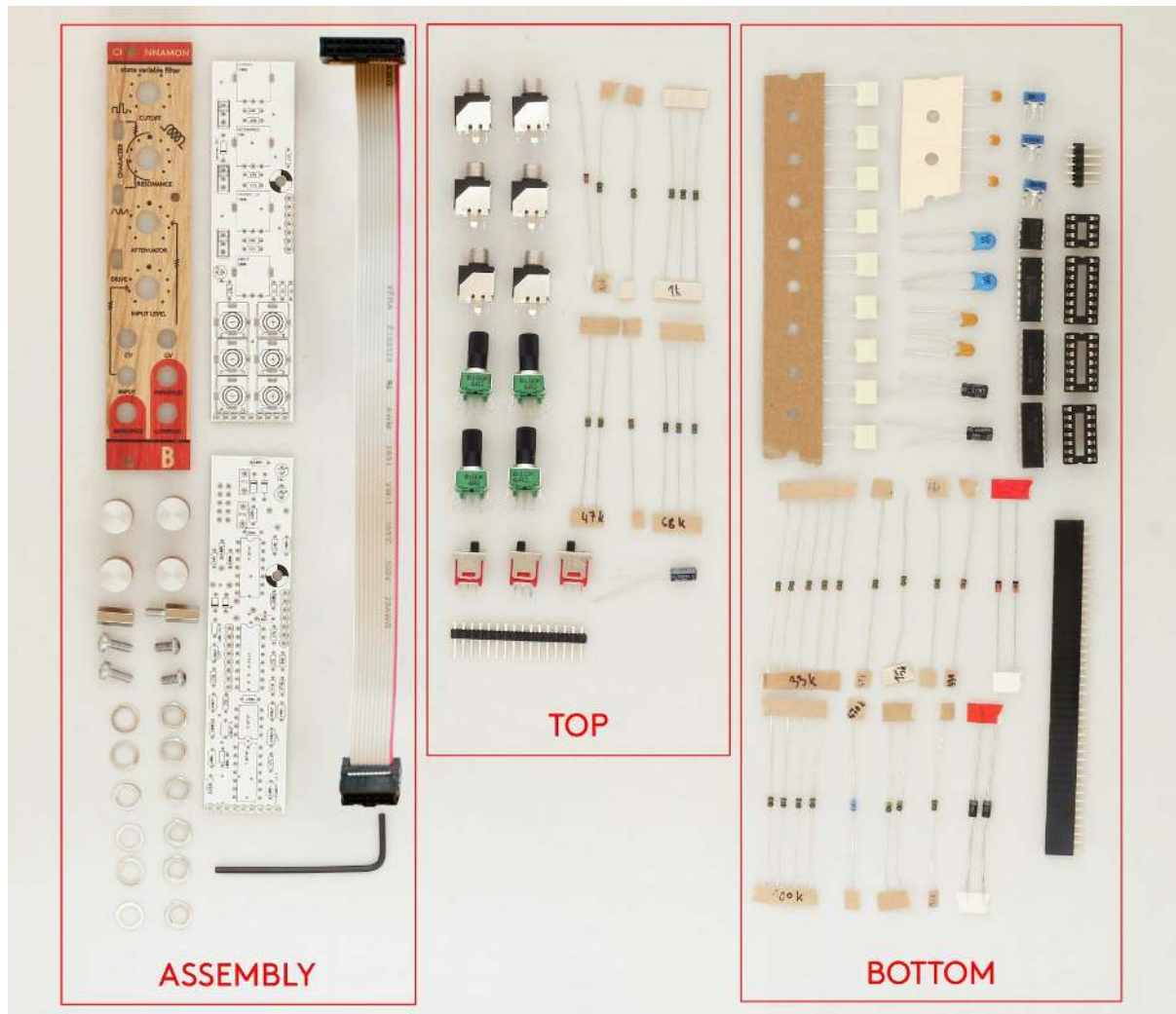


### INTRODUCTION

This guide is for building Cinnamon 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](http://www.instructables.com/id/How-to-solder/)<sup>1</sup>. We even included some of the best quality solder to help you solder everything faster and better.

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

The Cinnamon 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.



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
- Wrench No. 8
- Protective eyewear

After the Cinnamon is built it should be calibrated. You can use your mobile device with installed tuner application for this purpose. For details see the Calibration part below.

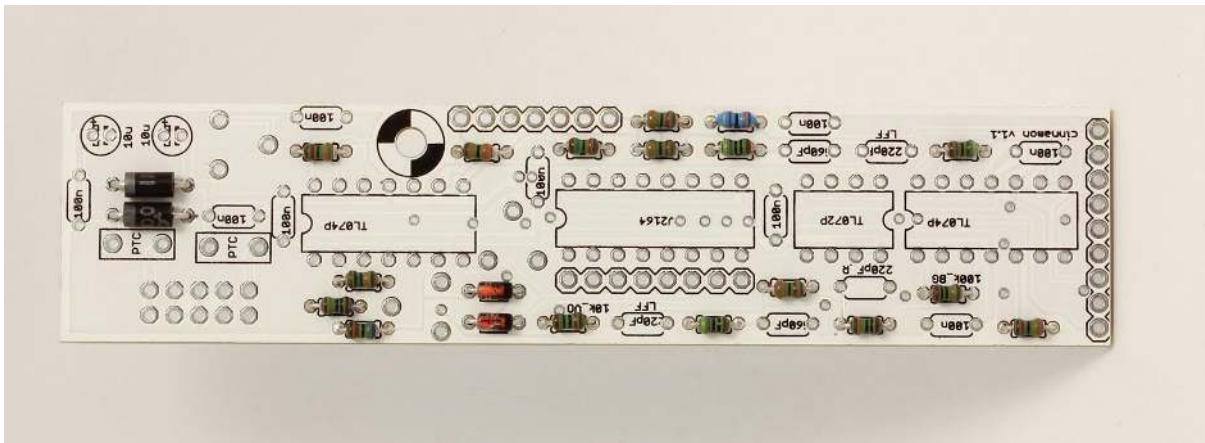
We suggest that you work in a clean and a well lit and ventilated environment to avoid accidents or losing any of the small components.

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

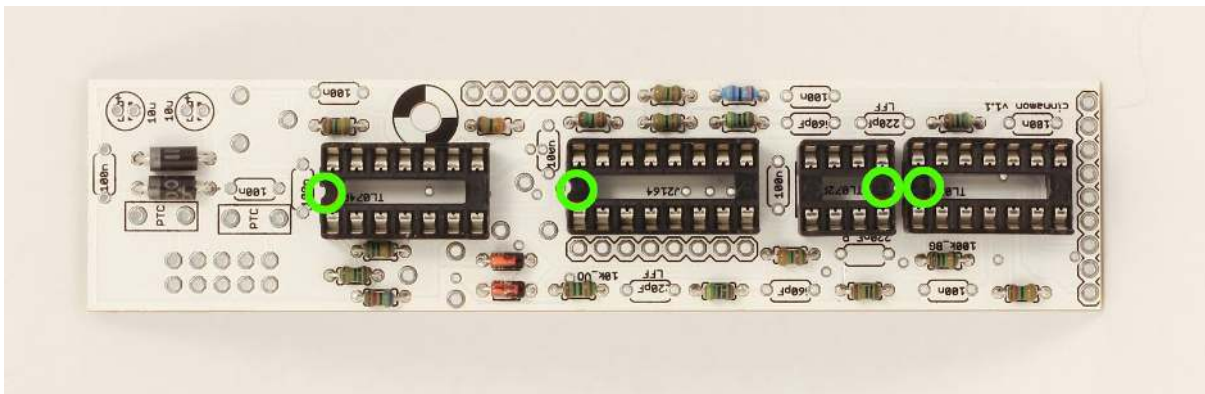
## BOTTOM BOARD

You will start with the bottom board PCB. Before you start soldering, take your time and find all the **resistors values** [using a multimeter](https://learn.sparkfun.com/tutorials/how-to-use-a-multimeter/measuring-resistance)<sup>2</sup> (or you can check the color codes if you are seasoned enough).

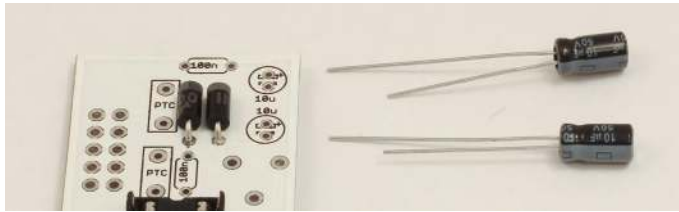
There are many types of resistor values on the bottom PCB (5x 33k, 4x 100k, 2x 470R, 1x 10k, 1x 68k, 1x 47k, 1x 470k, 1x 330k, 1x 15k). Be careful to insert these 17 **resistors** on the right place and solder them. Then snip the leads as close to the PCB as you can (be sure to make this step on all remaining leads in the course of this guide). After that solder the **diodes**. There are four of them (1N4148 2x, 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.



Then solder four **IC sockets** (1x 8 pin, 2x 14 pin, 1x 16 pin). **Make sure that the notch on the socket matches the print on the board.**

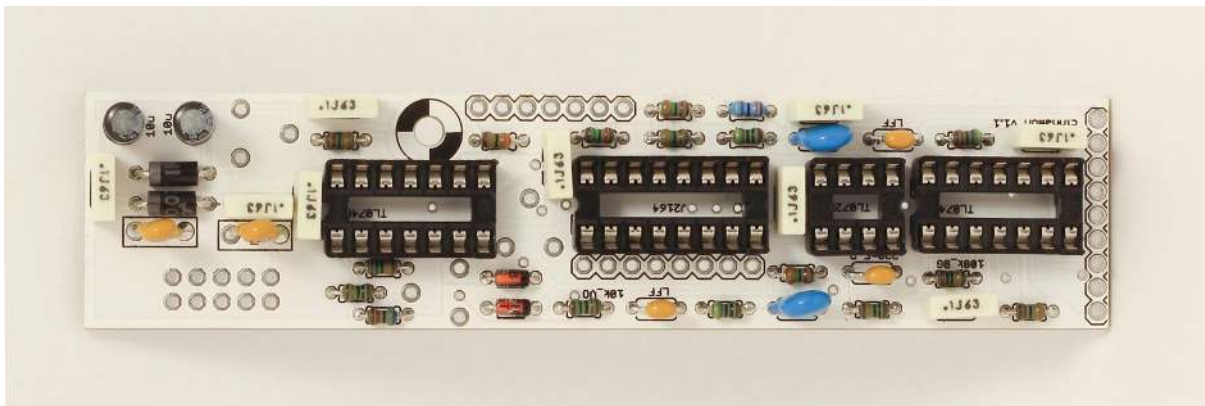


<sup>2</sup> <https://learn.sparkfun.com/tutorials/how-to-use-a-multimeter/measuring-resistance>

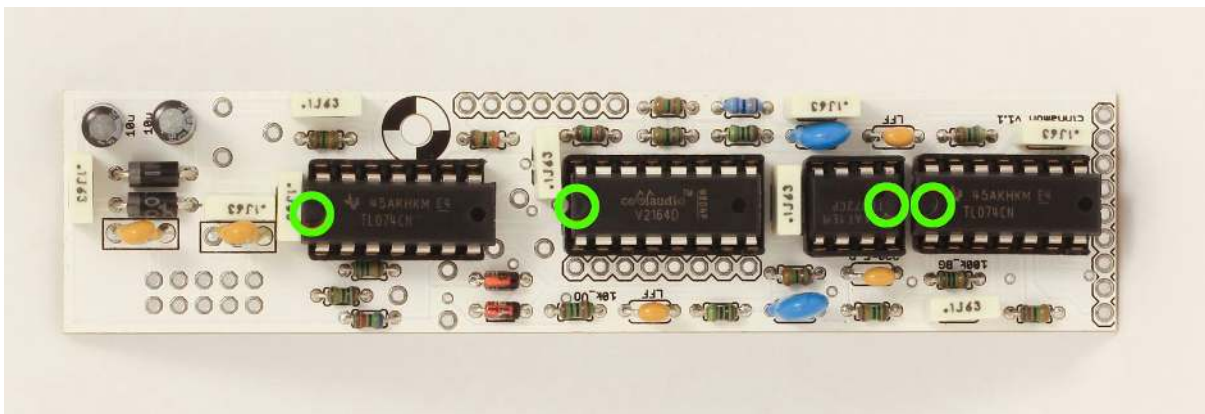


Now let's do some **capacitors**. You can start soldering in the following order. There are **three 220pF** (marked 221), **nine 100nF** polyester ones, **two 560pF** (marked 561) and **two 10μF** electrolytic ones **which are polarized**. There is a plus (+) sign on the PCB that should match the longer lead of the electrolytic capacitors

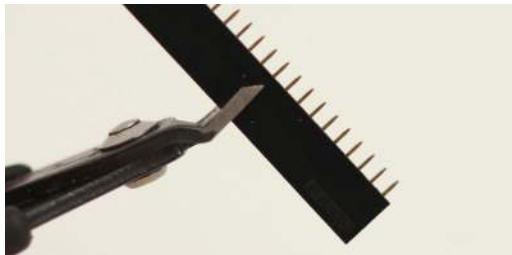
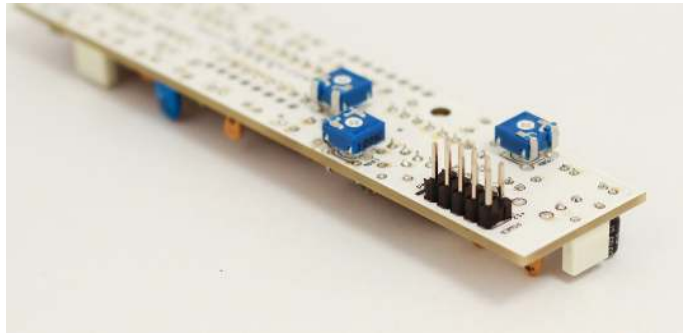
(actually the minus (-) side is also marked on the body of the capacitor with a white strip, see the picture). Then you add **two protective fuses** (they look quite similar to a ceramic capacitors but are placed in the "PTC" rectangular). Check out the picture below to see how your PCB should look like now.



Next don't forget to place four **ICs** into the sockets (1x V2164D, 1x TL072, 2x TL074). **There is a notch on each IC that should match with the notch on the socket. For TL072 is relevant the dot on it.**



Turn around the PCB and solder three **trimmers** according to their **values (5k, 100k, 250k)**. Then prepare the **2x5 male pinheader** with your flush cutters if it is necessary and solder it. Be careful to solder the pinheaders straight. You may first solder one of the pin, 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.

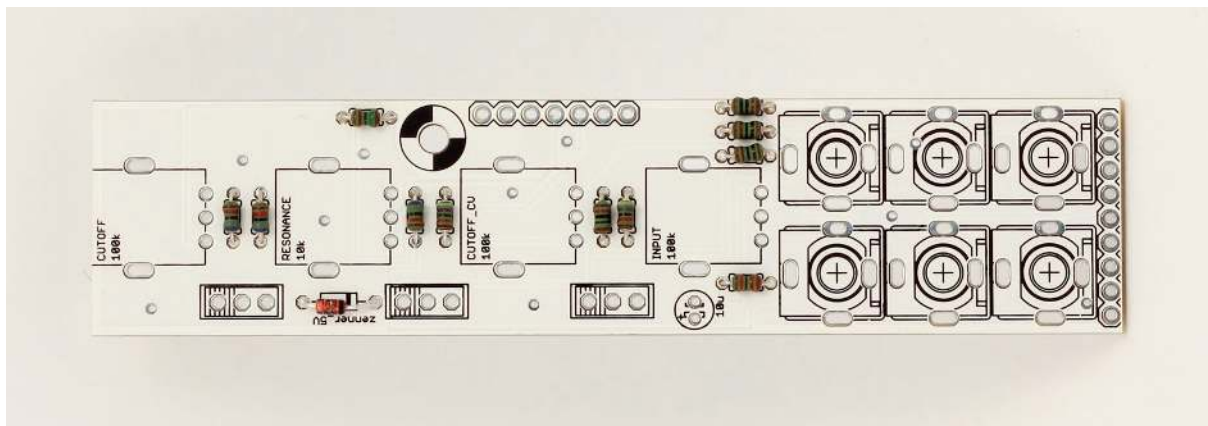


As you can see **one female pinheader left**. You can prepare it now. Use your flush cutters to get **1x9 and 1x7 pinheaders** (you will always lose one pin when cutting the female headers, so be sure to cut it always after the last required pin - see the picture to see where to cut to get 9 pin). Then keep them as you will use them in the later step.

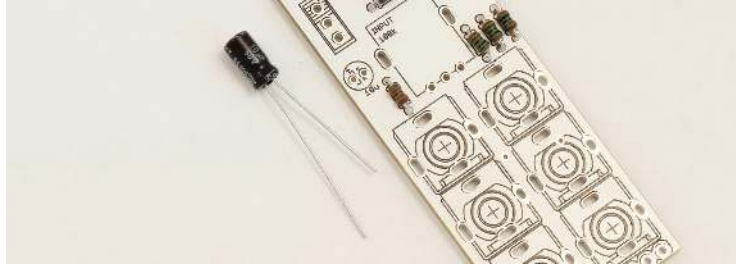
For now you are finally done with the bottom board. Make the last check that all parts are on the right place and everything is properly soldered.

## TOP BOARD

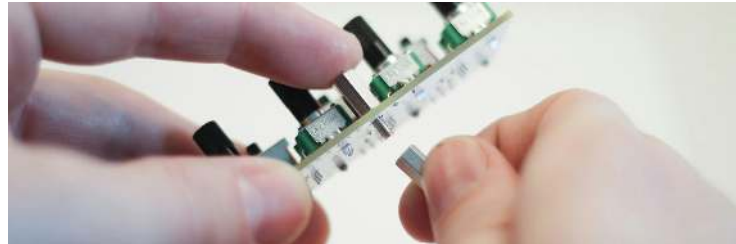
Now let's do the top PCB. Insert and solder all **11 resistors** (1k 3x, 1k5 1x, 10k 1x, 22k 1x, 47k 2x, 68k 3x). Do the same with the **Zener diode (watch out for orientation here!)**.



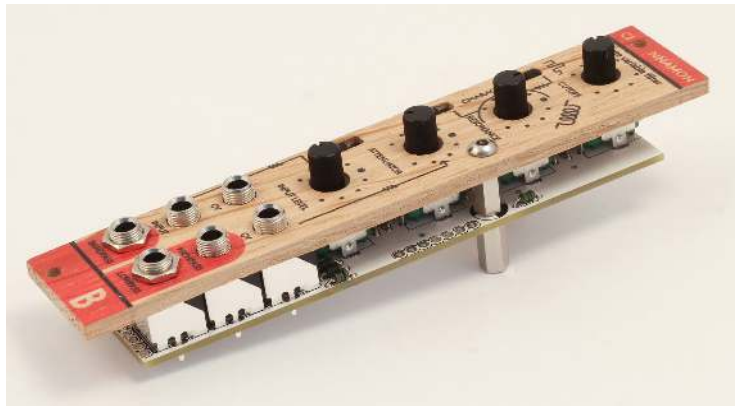
There is also another one **10 $\mu$ F electrolytic capacitor** to solder. Don't forget that **this one is polarized**. The longer lead goes into the plus (+) hole.



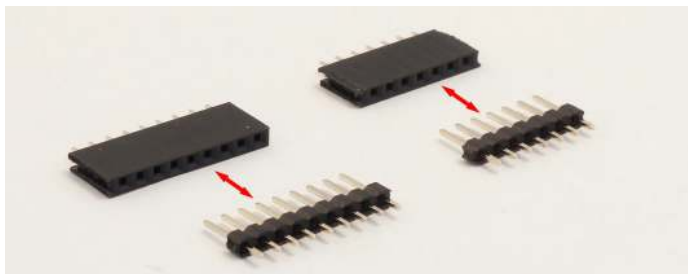
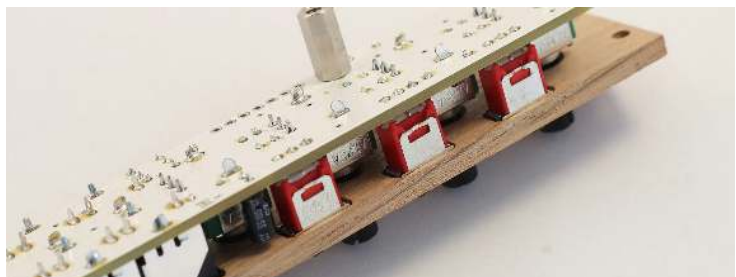
Next insert four **potentiometers (3x 100k, 1x 10k - see the board for right placement)**, three **switches** and six **jack connectors**. There should be no space between the jacks and the PCB. **Do not solder anything yet**. Then put the **spacers** through the opening in the PCB and mount them together.



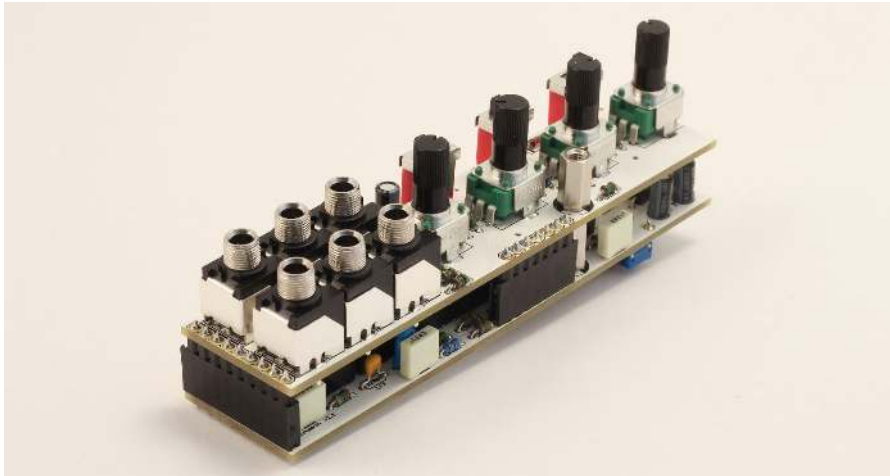
Take the front **front panel** and lower it down on the top board. Hold it together and mount it with two **jack nuts** on the last two jacks (you do not have to tighten them too much as you may damage the wooden panel) and with a **screw** into the spacer (you can use the enclosed allen key).



Then turn this unit facing it with PCB upwards. **Push the switches** to be sure that they come through the panel. Make sure that everything is properly aligned. Now you are finally ready to solder all these inserted parts. Then unmount the panel from the top board.



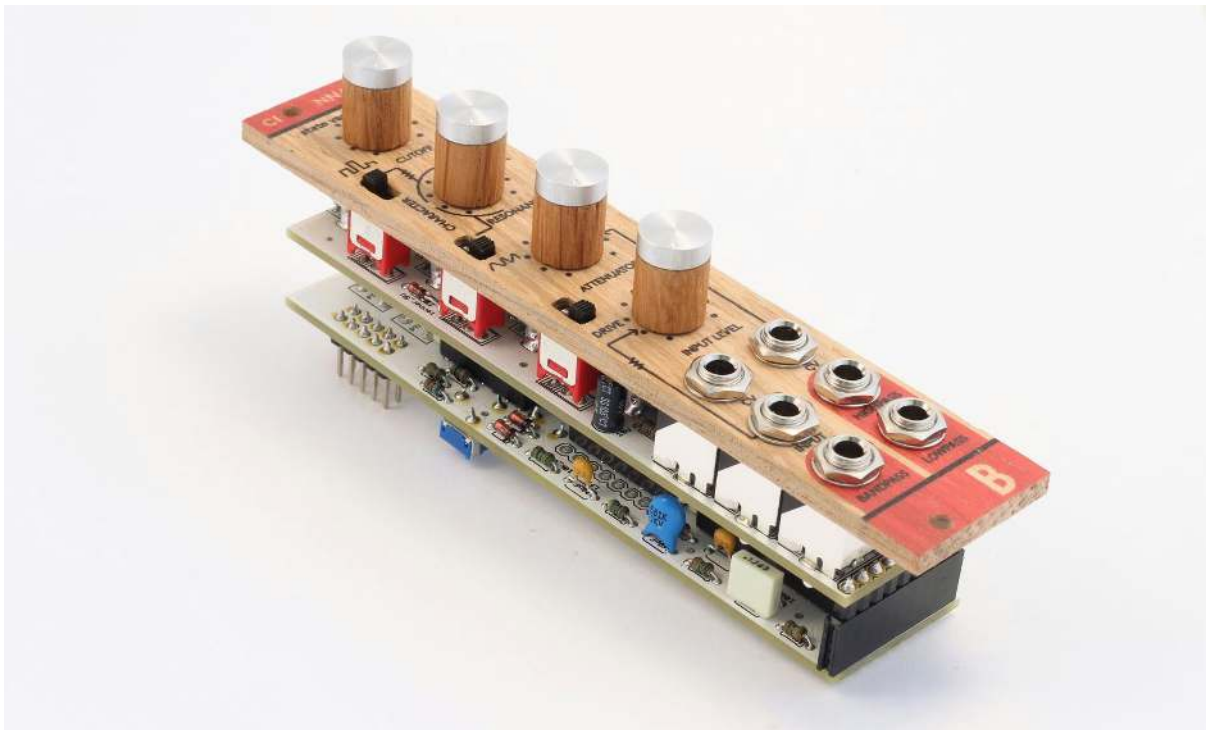
Before the last soldering, prepare the **pinheaders**. You need **1x9 and 1x7 male** pinheader so again use your flush cutters to get these. Now pair the male and female headers from the bottom board together as shown on left.



You can mount the boards finally together. Use the prepared **pairs of pinheaders** and place them between the boards. The female headers goes on the bottom board. Then use the **screw** on the bottom to secure the boards. Now solder both female and male pinheaders.

## FINAL ASSEMBLY

Congratulations! You have made it through, now just put the **front panel** on the top board again and secure it with **washers, nuts and screw** (keep in mind not to tighten the jack nuts and screws too much as you may damage the panel!) and don't forget to put **knobs** on.



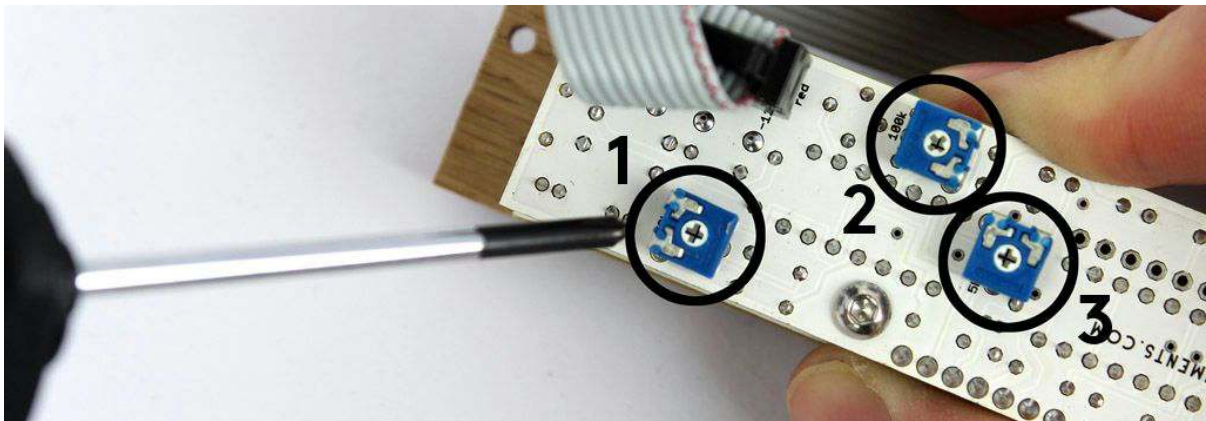
Before you connect anything, make sure that your system is disconnected from power. Also double check the polarity of the ribbon cable, the red cable should match the -12V rail both on the module and on the bus board!

## CALIBRATION

At last you have to do the calibration of Cinnamon. You need a tool for measuring frequency (relates to point 3 below) and a screwdriver for turning the trimmers. You can use one of free tuner apps for mobile phones (e.g. Tuner T1 for iPhone or Pano Tuner on Android worked pretty well in our testing).

So basically there are 3 things to calibrate:

1. **A sine wave shape at maximum resonance**
2. **A shape of saw wave for saw switch**
3. **voltage scaling on the volt per octave input**



**ad 1)** Send Lowpass output to mix. Turn all switches down. Set RESONANCE to full and CUTOFF at nine o'clock and adjust the state of maximum resonance with first trimmer. You should be able to tune it on the edge of self oscillation so it is great for pinging, or you can tune low distortion sine wave (factory settings) or distorted sinewave.

**ad 2)** Set CUTOFF a little bit more than in previous point and turn the drive switch up. You should adjust the second trimmer until you like what you hear. As you turn the sine wave tilts into sawtooth but the tuning also drops. You can tune some of the common intervals (e.g. fourth) by turning the switch up and down.

**ad 3)** Turn all switches down. Set CUTOFF at twelve o'clock as precisely as you can. Adjust the third trimmer until you measure 1000 Hz and that's it! This process is approximate but really close to the results of precise calibration we do on our testing station. For more precise calibration you have to connect your volt per octave source and play octaves (1 volt differences) and listen if you hear an octave interval or measure if you get double frequency. Please note that cinnamon usually tracks well only in the sinewave mode.

## TROUBLESHOOTING

- Check the [F.A.Q.](#) on our website
- Are you sure you have placed the right values of trimmers and potentiometers?

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](mailto:diy@bastl-instruments.com). Consider our "[Come to Daddy](#)" service if you think that you are unable to make the module work on your own.