B A S T L
INSTRUMENTS

# GRANDPA v1.2 - Assembly Guide

Bastl-instruments.com

INTRODUCTION

This guide is for building Grandpa module from Bastl Instruments. This is an intermediate level kit. You should have basic soldering skills and 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 Grandpa module consists of three 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/

| ASSEMBLY | TOP | BOTTOM |
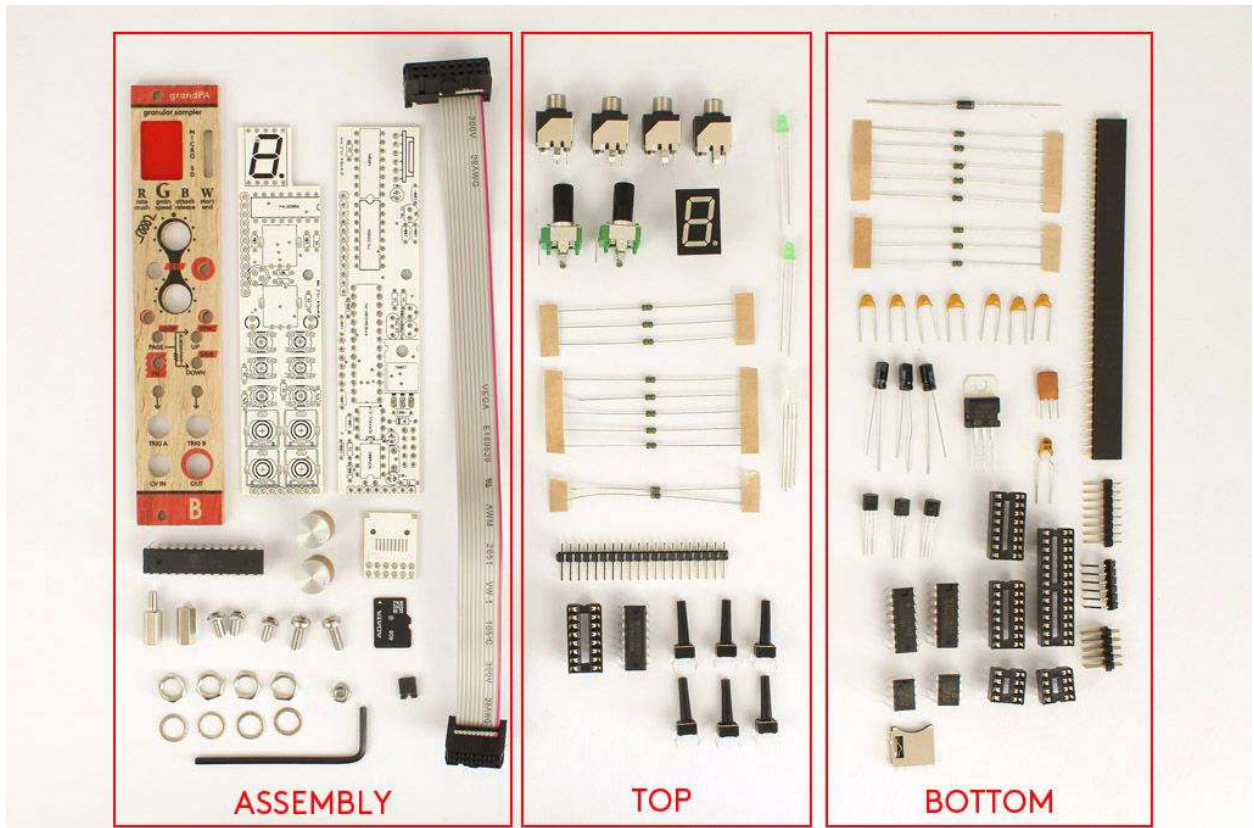
Before starting this kit, prepare the following tools :
- Soldering iron (15-20W)
- Multi-meter
- Flush cutters
- n2. hex screwdriver or allen key (enclosed with kit)
- Phillips screwdriver (cross)
- Wrench No. 8
- Protective eyewear

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.

BOTTOM BOARD

Let's start with the bottom board. Insert and solder 8 **resistors** (3x 100k, 5x 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). 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.
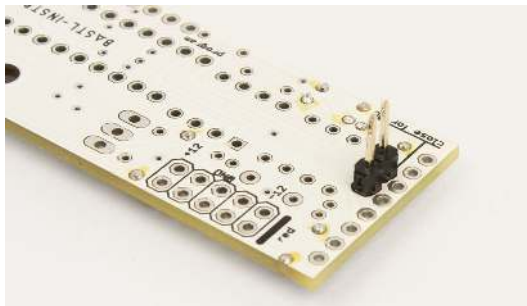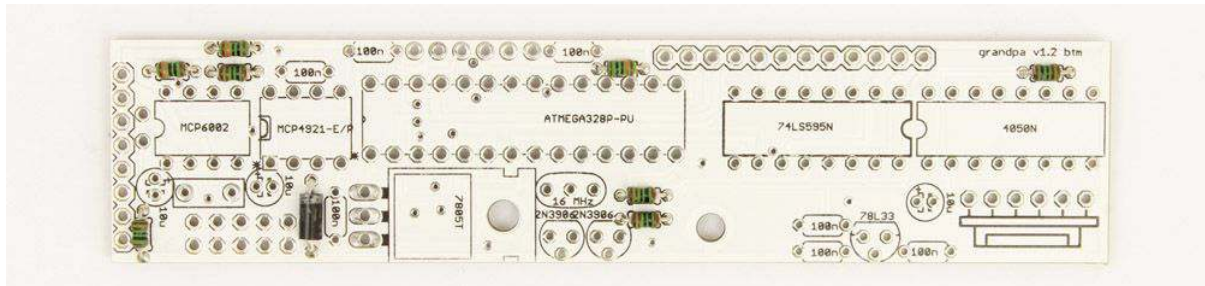

Turn around the PCB and prepare one **2 pin male** header with your flush cutters. First solder in just one of the pins, then take the board in your hand and re-heat that pin while pressing down on the header to align it (be careful though, you don't want to touch the pin you are heating up) wait for it to cool and solder the rest of the pins.)
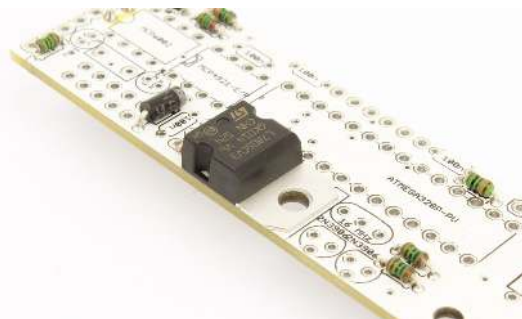

Turn the PCB back and solder the **78L05 voltage regulator**. Bend its legs as close to the body as possible, at a right angle to make sure that it lies flat on the circuit board.

Next place and solder the **IC sockets** (2x 8 pin, 2x 16 pin, 1x 28 pin). **Make sure that the notch on the socket matches the print on the board**. Then add the ceramic **capacitors** (7x 100nF).
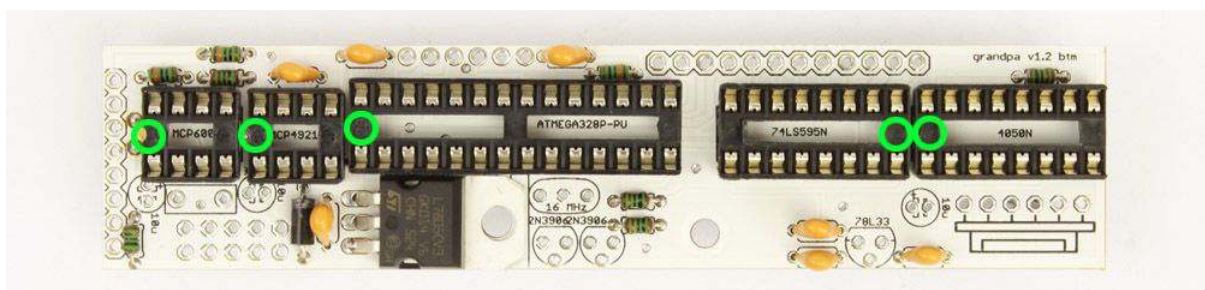
Move on to solder next components in the following order:
- Two **transistors** (**2N3906**; the flat side should match the print)
- **Voltage regulator** (**78L33**; the flat side should match the print)
- **16 MHz resonator** (an orange component with 3 leads)
- **Protective fuse** (marked "PTC" on board; be careful, they look quite similar to capacitors)
- Three **10µF electrolytic capacitors** (these are **polarized**! There is a plus (+) sign on the PCB that should match the longer lead of the capacitor)
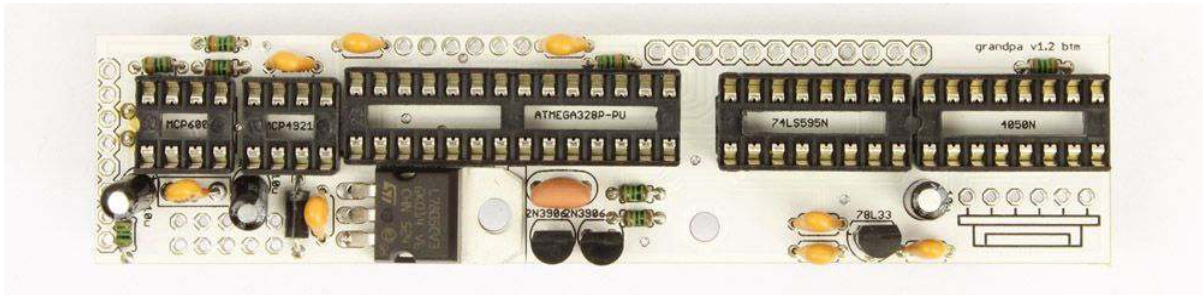

Again turn around the PCB and insert and solder next **male pinheaders**: one **6 pin** and one **2x5 pin**. From the other side solder the **1x6 pin right angle**. Again you should be careful to solder the pinheaders straight and flat with the board.
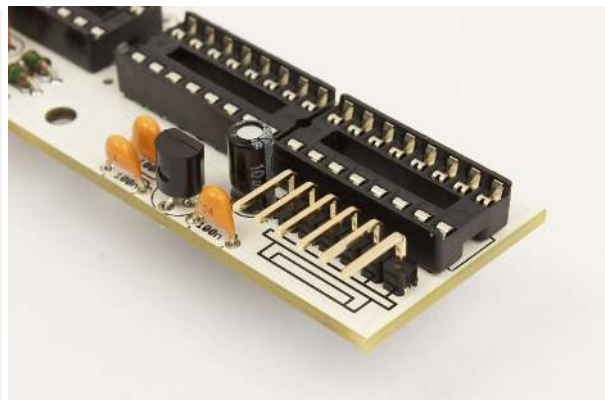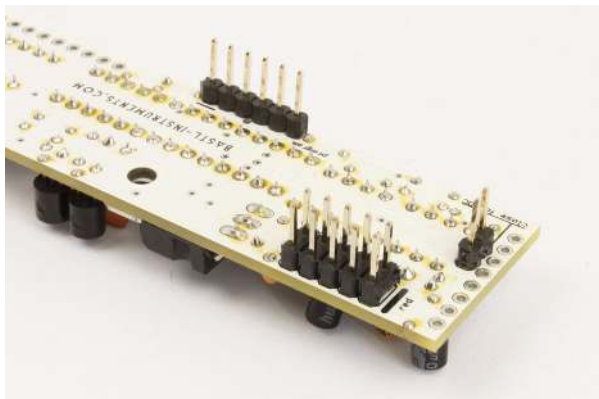
Install a screw with the small nut on the voltage regulator (see the picture).
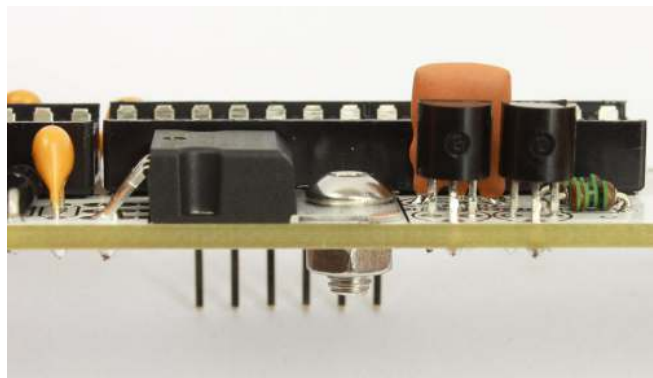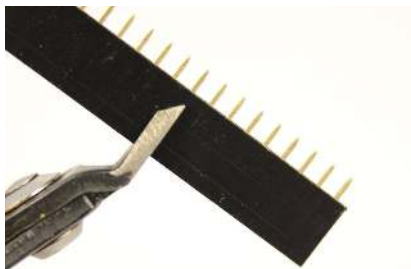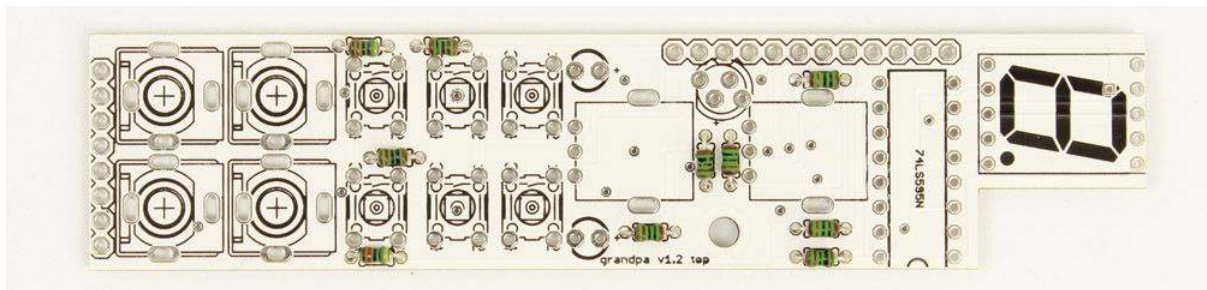
Place the **ICs** into the sockets (Atmega, 74HC595, CD4050BE, MCP4921, MCP6002). There is a notch on each IC that should match with the sign on the sockets. Check the picture.
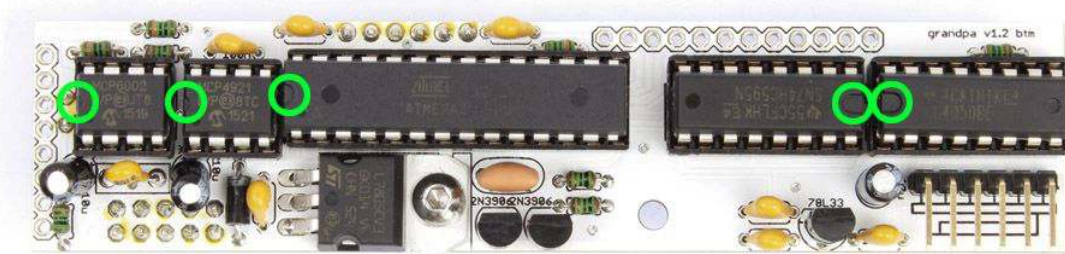

TOP BOARD

Now populate the top. Again start with the remaining **resistors** (2x 47k, 3x 10k, 5x 1k) and solder them.

Prepare pinheaders with your flush cutters now. You need one **8 pin male** and **12 pin male**. Also do the same lengths from the **female** pinheader (you will always lose one pin when cutting the female headers, so be sure to cut it always after the last required pin - check the picture to see where to cut to get 8 pin).
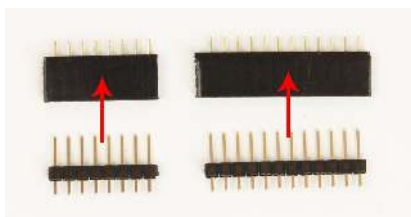
Then to ensure that the headers are properly aligned, screw the **hex screw** and the **11 mm spacer (nut - nut)** on the bottom board. Place the female headers on the bottom board with the male pins inserted. Now **connect the boards** together, mount them with the **10 mm spacer (nut - screw)** and finally, solder the headers to both boards. Unscrew the spacers and disconnect the boards.
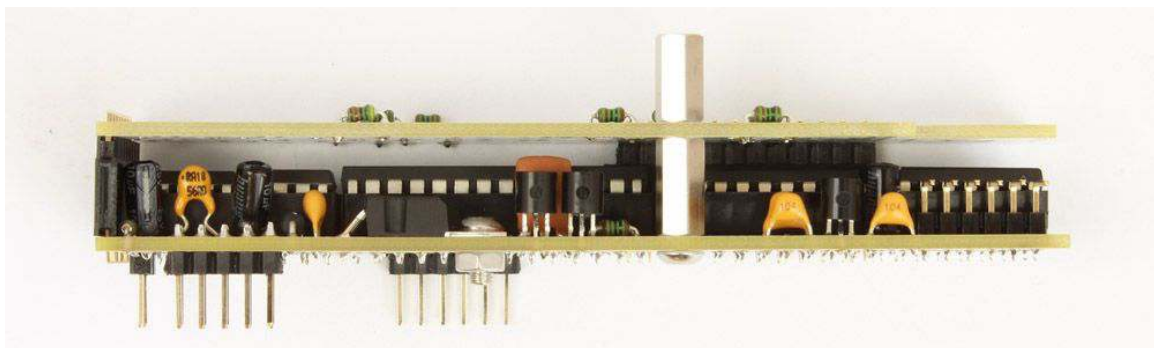
Place the two **potentiometers** to their respected places on the bottom board. Push them well until they **sit absolutely flat** on the board and solder them. Next place the **IC socket** (watch out for orientation) and solder it as well. Then place the **74HC595** chip into the socket. Make sure that it is oriented in the right way. **The notches should match!**

Add next components on the board (**don't solder anything yet**):
- **Mono jacks** (4x)
- **Long buttons** (6x)
- **Green LEDs** (2x, watch out for <u>orientation</u>, the longer lead goes into the plus (+) hole)
- **RGB LED** (again, watch out for <u>orientation</u>, the longest lead should be in the third hole from the top as well as the flat sides of the LED should match the printing)
- **Display** (1x, watch out for <u>orientation</u>, the dots should match)
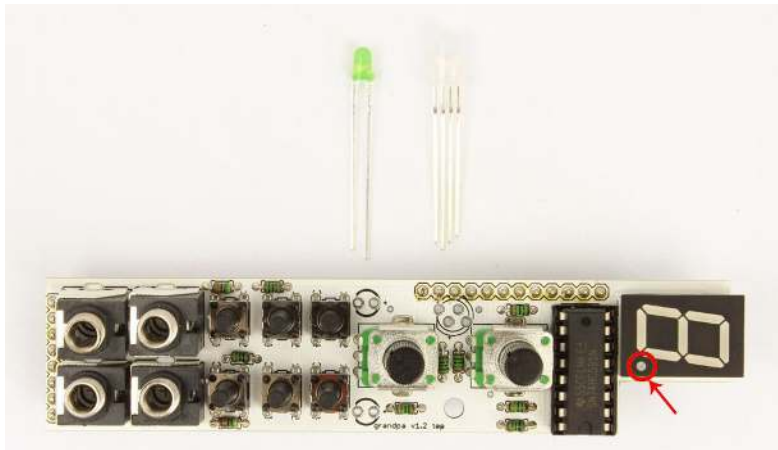
We want to make sure that all the components are properly aligned with the **front panel**: take the **10 mm spacer (nut - screw)** and place it in the opening. Screw the front panel with the **hex screw**. Also secure the jacks to the panel with the **washers** and the **nuts** (Don't tighten the screws and jack washers too much as you may damage the panel). Push the LEDs to fit its head on the panel. Solder all the components.
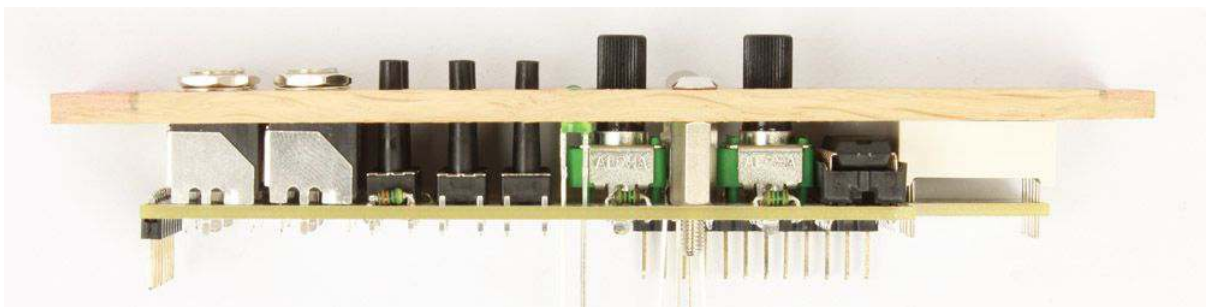
Turn over the board and clip off the leads of the jacks as they might short the capacitor.
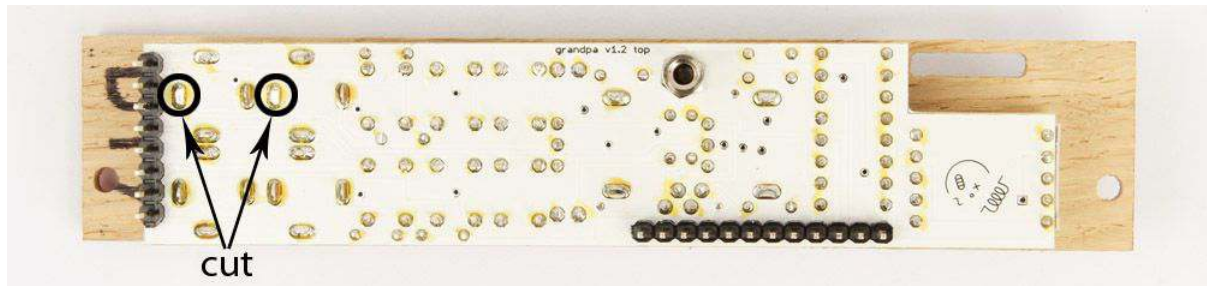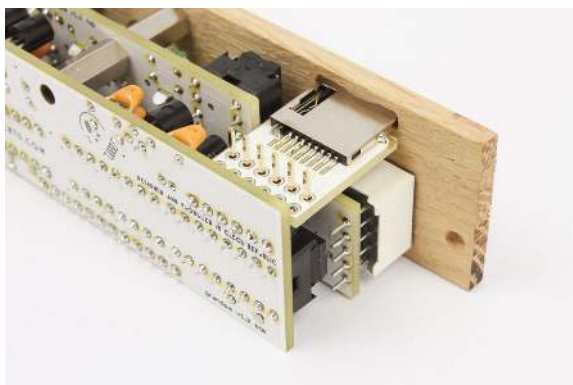

SD BOARD
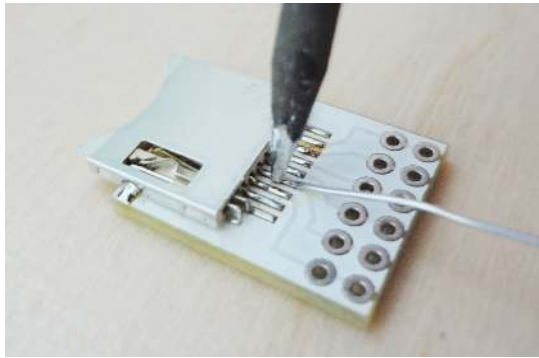
Now it's time for a little challenge. Solder the SD card holder to its little board. It is SMD component but don't let that scare you, it's pretty simple. A fine tip soldering iron is suggested here.


Carefully place the card holder on top and make sure it's aligned properly, maybe hold in place with tweezers. Solder the top side pads to make the card holder stick to the board, check that the holder 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 re-heat them.

Place the SD board on the 6 pin male, connect the boards and solder it.

Congratulations! You have made it through. Now just add the **knobs**, insert the **SD card** with samples, put **jumper** on 2 pin male header on the back side and you are ready to enjoy your new module.
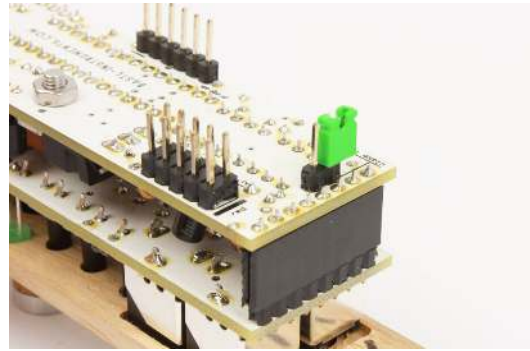
Before you connect anything, make sure that your system is disconnected from power. Also double check the polarity of the ribbon cable, the red cable should match the -12V rail both on the module and on the bus board!

TROUBLESHOOTING

First check out the DIY F.A.Q.

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.