

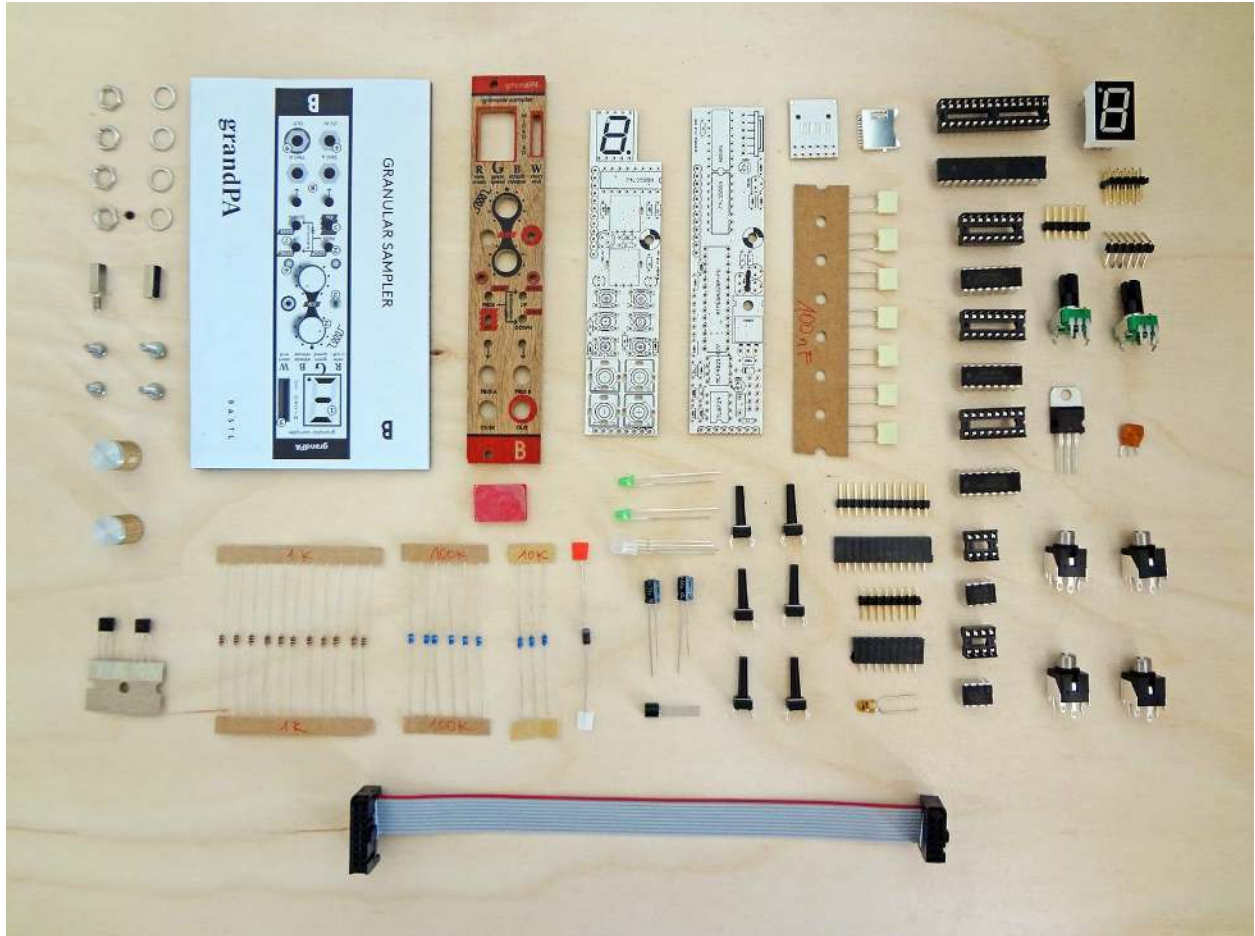
GRANDPA v1.0 Assembly

Before starting this kit, prepare the following tools: Soldering iron (15-20W will do), flush cutters, no.2 hex screwdriver or allen key and phillips screwdriver. Also briefly go through this guide and make sure that you understand all the steps, if you are having any troubles don't hesitate to seek help at the forum. We suggest that you work in a clean and a well lit environment to avoid accidents or losing any of the small components.

IMPORTANT!

If you have never soldered before, check out this great [tutorial first](#).

And please check that your boards are the same version as this guide and that your kit contains the following items:



BOM – BILL OF MATERIALS

6 x 100k resistor	1 x MCP6002	1 x 2x5 male header
3 x 10k resistor	1 x micro SD slot	1 x right-angle header
11 x 1k resistor	1 x 5mm ca RGB led	1 x ribbon cable
7 x 100nF capacitors	1 x 7-segment	2 x pot knob
2 x 10uF capacitors	2 x 3mm diffused green LED	1 x micro SD slot
1 x 1N4007 diode	1 x 16MHz resonator	1 x 11mm nut - nut spacer
4 x jack connector	2 x linear potentiometer	1 x 10mm nut - screw spacer
1 x MCU	6 x 17mm small button	4 x jack washers
1 x 7805 voltage regulator	1 x 100mA fuse	4 x jack nuts

1 x 78L33 voltage regulator	1 x 28pin DIL socket	2 x 6mm screws
2 x 2N3906 transistor	2 x 8 pin DIL socket	2 x 8mm screws
1 x CD4050BE	3 x 16 pin DIL socket	1 x Front panel
2 x 74HC595	1 x female header	1 x micro SD Card
1 x MCP4921	1 x male header	1 x display window
3 x PCB		

The GRANDPA module consists of three boards, the top board is used for all of the UI components, the bottom board is the heart of the sound generating circuit and a small SD card holder board.

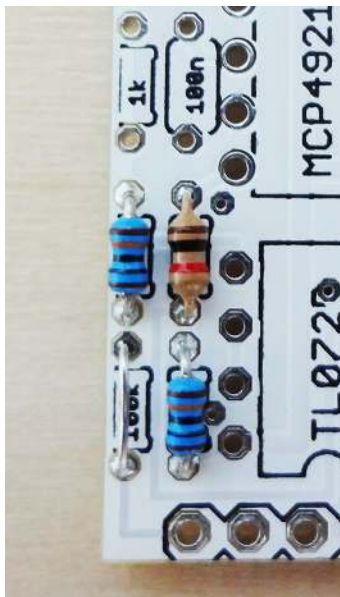
Bottom board

Lets start with the bottom board, with the shortest and smallest parts.

Take a strip of resistors and look up the values printed on the circuit boards. Start with the 100K and 1K. Place them through the board, solder them and clip off the excess leads.

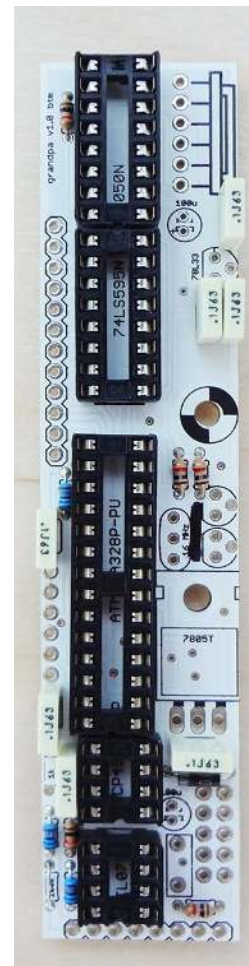
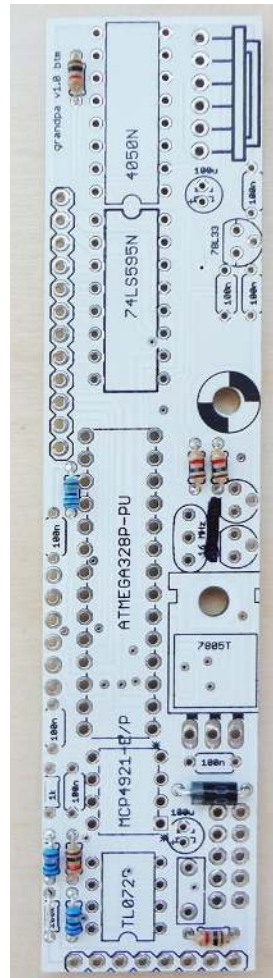
Attention!

Wrong label on the board. The 100K resistor from in the lower left part is omitted and instead just solder in one of the cut off leads from the other resistors. Also the 1K above it is completely omitted.



Next solder the power protection diode. Be careful though, diodes are **polarized!** Make sure that the marking ring on the diode body matches the marking on the circuit board.

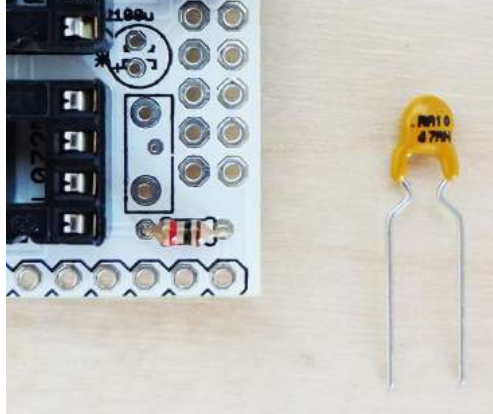
By now your board should look like this:



Next place and solder the sockets. Make sure that the notch is in the **same direction** as printed on the circuit board. The ATMEGA and MCP4921 circuit board prints have a little * **orientation mark** instead of a notch. Both should be facing downwards.

Then add the capacitors, there are seven 100n capacitors (marked 104). They might be in ceramic or polyester film package, don't worry they are not polarized.

Now move on to the protective fuse. It looks quite similar to a ceramic capacitor but is placed in the blank rectangular marking on the board.



Next solder in the two 2N3906 transistor, their mark on the PCB is crossed out. You might have to straighten its leads a little bit. Also solder the 78L33 voltage regulator, be careful though, they look quite similar. And their **orientation** should match the print.

Now solder the 16MHz resonator, its an orange component with 3 leads, don't worry it's not polarized. Your board should look like this now.

Bottom board back side

Take the 16 pin power connector and place it also on the back side of the board. It might be tricky to solder it straight, but you can place something like your cutter under the board to hold it level. Also 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. Do the same for the programming header.

ATTENTION!

Wrong label on the board. The 100uF electrolytic capacitors are replaced with 10uF.

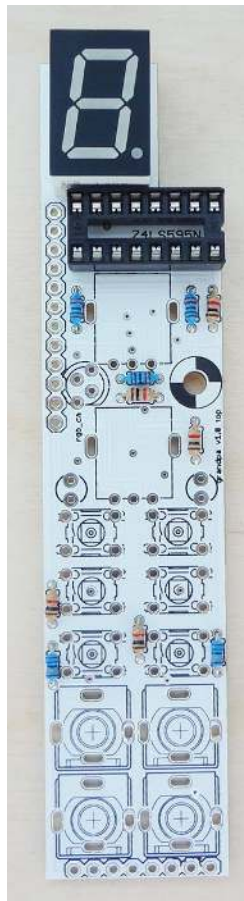
Now, it's time for more capacitors. Take the two 10uF electrolytic capacitors and place them on front side of the board. Be careful, these are polarized! capacitors and should be soldered the right way in.

There is a + marking on the circuit board that should match the long lead of the capacitor, the - side is also marked on the body of the capacitor with a white strip.





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



Top board

Now populate the top. Again start with the remaining resistors and solder them in.

Then solder the IC socket and the display. Make sure that the notch on the socket matches the print on the board, and that the display is oriented the same way as the print on the board.

Next ensure that the headers are properly aligned, screw the hex screw and the standoff on bottom board. Place the female headers on button board with the male pins inserted. Now place top board, screw with the standoff screw and finally, solder the headers to both boards. Just like in the image below.

Enclosure assembly

Before you continue with the UI components, insert the screen window into the front panel.

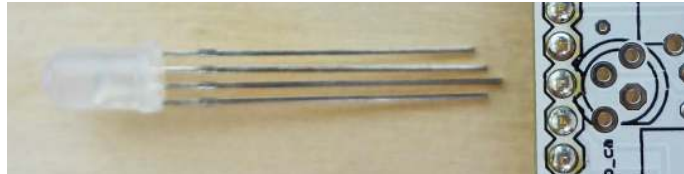
Place the plastic screen window in the opening with the protective film facing upwards. You might have to file the panel opening a little bit if you are not able to fit it in. Make sure it is sitting flat and push it all the way in until it's level with the panel. You may have to press the panel flat against a table. Then take off the protective film.



Also place the 74LS595 chip in its socket. Make sure that it is **oriented properly!** The notches should match!

Continue with the rest of the UI components, Place the two potentiometers to their respected places on the board. Push them well until they **sit absolutely flat** on the board, but don't solder them yet.

Next, place the mono jacks on the board, the buttons and the LEDs.



The LEDs are **polarized** so make sure that the **long leg (+)** is facing **upwards**. Also the notch on led and circuit board should match.

The RGB LED **long lead** should be in the third **hole** as well as the notches should match, like in the picture below. Still don't solder anything yet.

Again we want to make sure that all the components are properly aligned with the front panel, so take the standoff and place it in the opening. Check that all the components came through and then screw the wooden front panel with the second hex screw. Also secure the jacks to the panel with the washers and the nuts.

Important!

Don't tighten the screws and jack washers too much as you may damage them!

The LEDs should have some **space off the board**, or else they won't come through the panel, like in the image below.

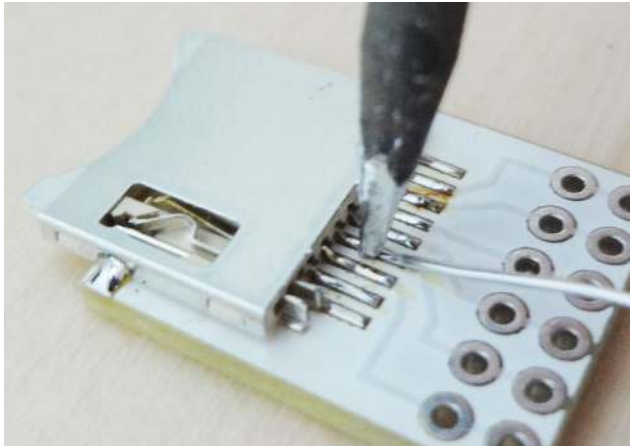
Solder the LEDs and rest of the components.

Turn over the board and clip off the long leads of the jacks or 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.

Then 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 they don't bridge.



Alternatively you can apply some solder to all the pads before placing the card holder and then re heat them.

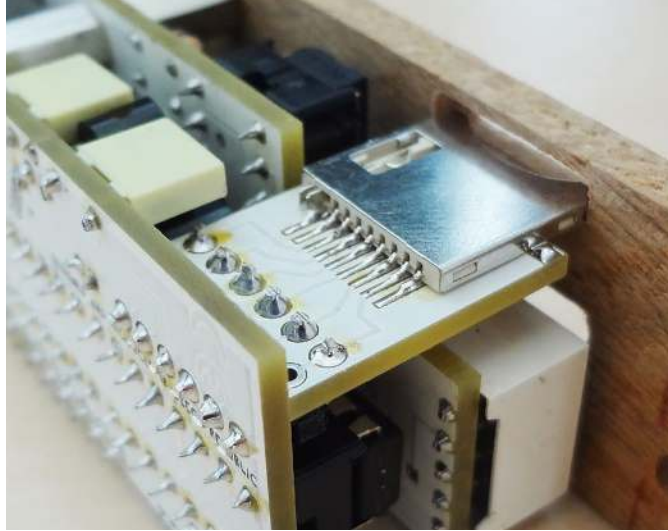


Super mega important!!! Respect chip polarity.

Before connecting the boards together again, insert the IC chips into their sockets of the bottom board. Again make sure that the **notch** on the chips is **facing the same direction** as the notch on the sockets.



To finish soldering the SD board, take the right angle headers and insert them into the tip holes on the board, also insert them in the bottom board and screw both boards back in place. The SD card holder should be well aligned with the opening on the front panel but also sit flat on the bottom board. Turn your module on the side and solder the SD board sockets.



Congratulations! You have made it through, now just add the knobs, insert the SD card with samples 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!