AtoVproject 16n Rework - DIY Kit

Introduction

First of all, thank you very much for purchasing one of our DIY kits. This manual is aimed at guiding you step by step through the process of assembling an AtoVproject 16n Rework. If you have any questions or if you are missing a part please contact us at Support@atovproject.de.

Required tools and materials

First, to successfully build this DIY kit, you will need a few tools and materials.

- **Soldering Iron**
    - No need for a high-end iron. Temperature control is preferable, to avoid burning the flux in your solder and leaving residue. With prolonged use, higher than necessary temperatures will damage your soldering iron tip. In our workshop we use **TS-100** digital soldering irons.
- **Solder**
    - We recommend **lead-free** solder as it is gentler on the environment and your health.
    - We have tested a lot of solder over the years and we now recommend the **Stannol Kristall 611 TSC - Sn96.5Ag3Cu0.5.** For a good all-rounder we would recommend 0.7 mm diameter solder. This is a truly no-clean solder; leaving very little residue, a great finish and with odorless flux fumes. (They do not sponsor us, we just very much like their product and we use them in our production line -Bonus- Their customer service is great!)
- **Side cutter**
    - We like flush cutters but side cutters will also work. Any cheap cutters will do but higher quality tools will last longer.
- **Multimeter**
    - This is important to have for testing and troubleshooting. **Use a multimeter with continuity mode.** Our reliable and inexpensive multimeter recommendation is the **ANENG AN8009**.
- **Flux (optional but recommended)**
    - Liquid no-clean flux is sufficient for such a build. In our workshop we use **Stannol 32-10/i** no-clean flux pen.

Secondly, to build this kit you need to know how to solder. If you want to learn how to solder, our recommendation is to purchase an inexpensive DIY kit from your local electronics shop. This will allow you to train yourself at soldering and build confidence before building a more complex kit.

If you need a small refresh on soldering techniques, here is a tutorial
https://www.youtube.com/watch?v=Qps9woUGkvI

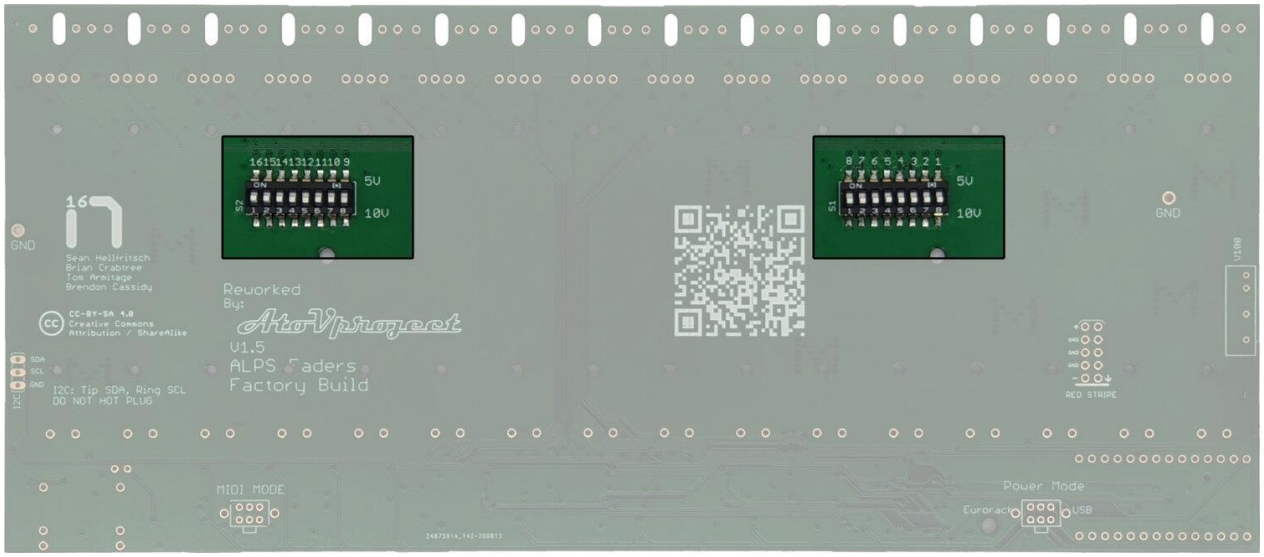
Part 1 - Back Side

Open Bag 1. Make sure this bag contains all the parts.

This bag should contain:

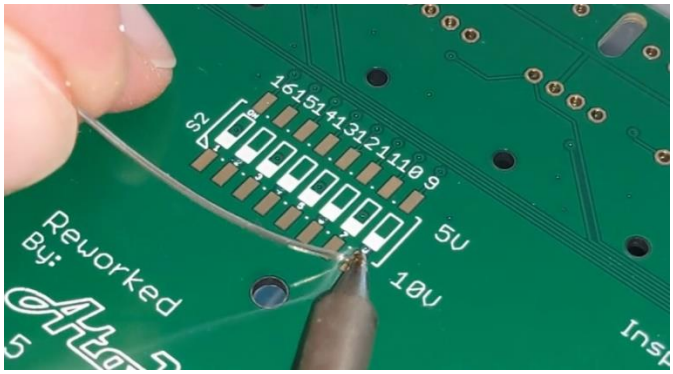
- 2x 8DIP switch
- 2x Toggle switches
- 1x 2*5 header
- 1 Power regulator (B0512LR)
- 1 40pin header
- 1 LED
- 12x M3 black
- 3x 10mm standoff
- 6x Washers (For mounting the module to the case/Eurorack rails)

Step 1 - SMD switch soldering

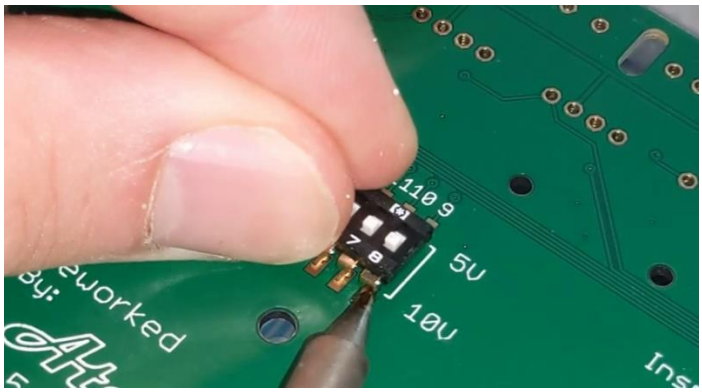


The first step is to solder the two SMD DIP switches. **DO NOT PANIC!** Despite being SMD, these parts are big enough to be handled without tweezers. We included a few little GIFs to guide you in the soldering procedure for this part. Please see below.

1 - Tin one of the pads

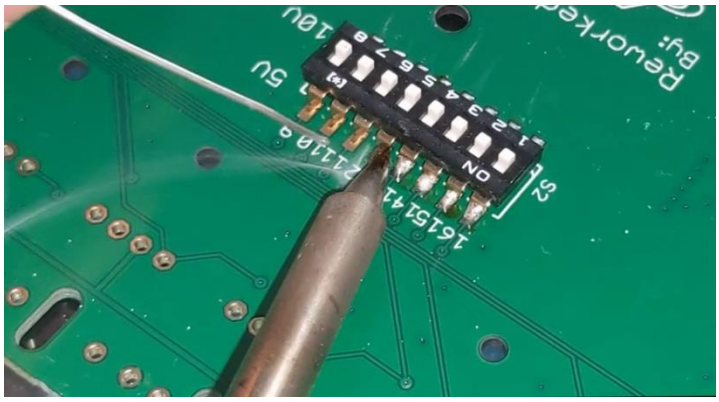


2 - Solder one of the switch pins



The switch will function when installed in either direction. The orientation is purely aesthetic.

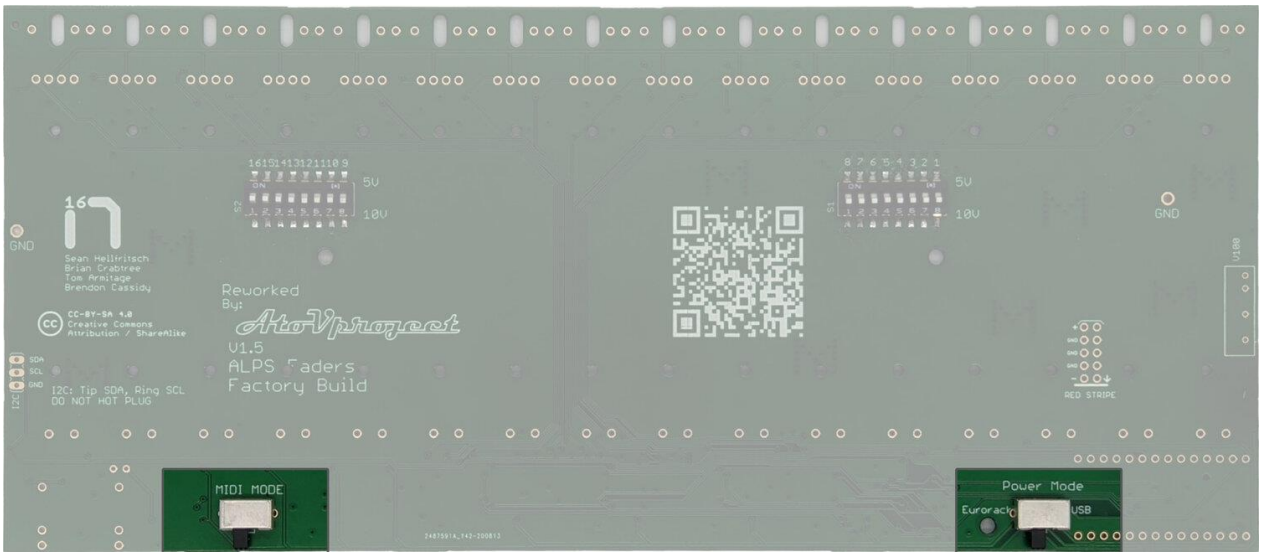
3 - Solder the rest of the pins



Proceed by soldering the pin furthest away from the initial pin (i.e. the pin holding the switch in place). Perform the same operation on the top side of the switches.

Apply flux and reheat the joints to make them look pretty.

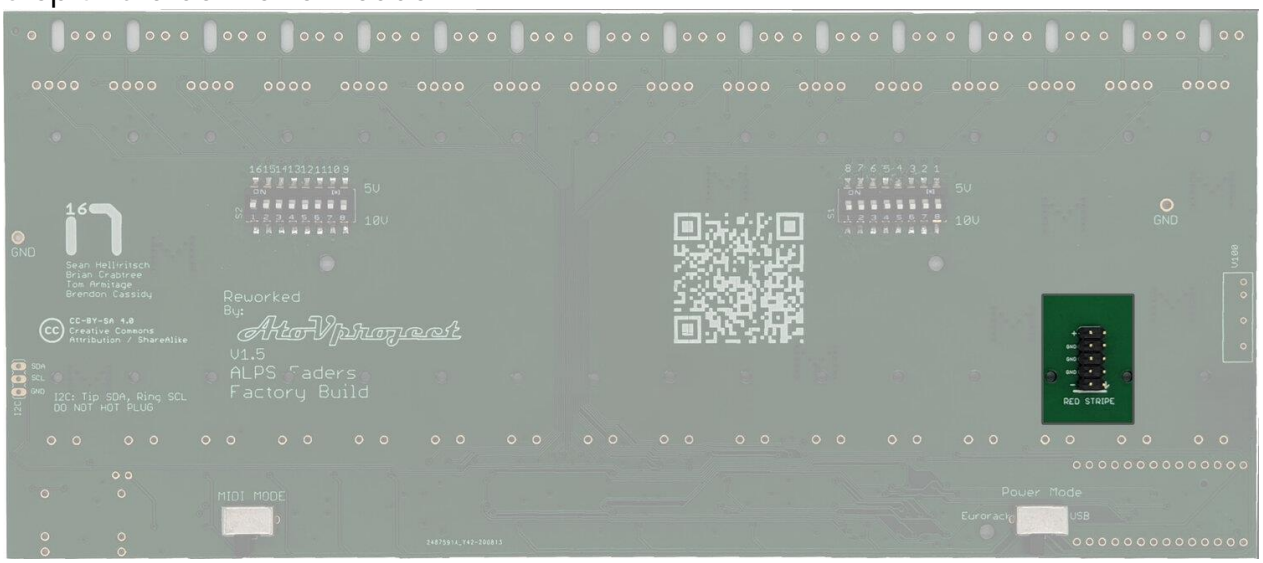
Step 2 - Toggle switches



Start by soldering one pin of each switches. Check if they are flush against the PCB. If they are not, reheat the joint and push the switch in place.

When everything is nice and tidy, solder the rest of the pins.

Step 3 Eurorack Power header

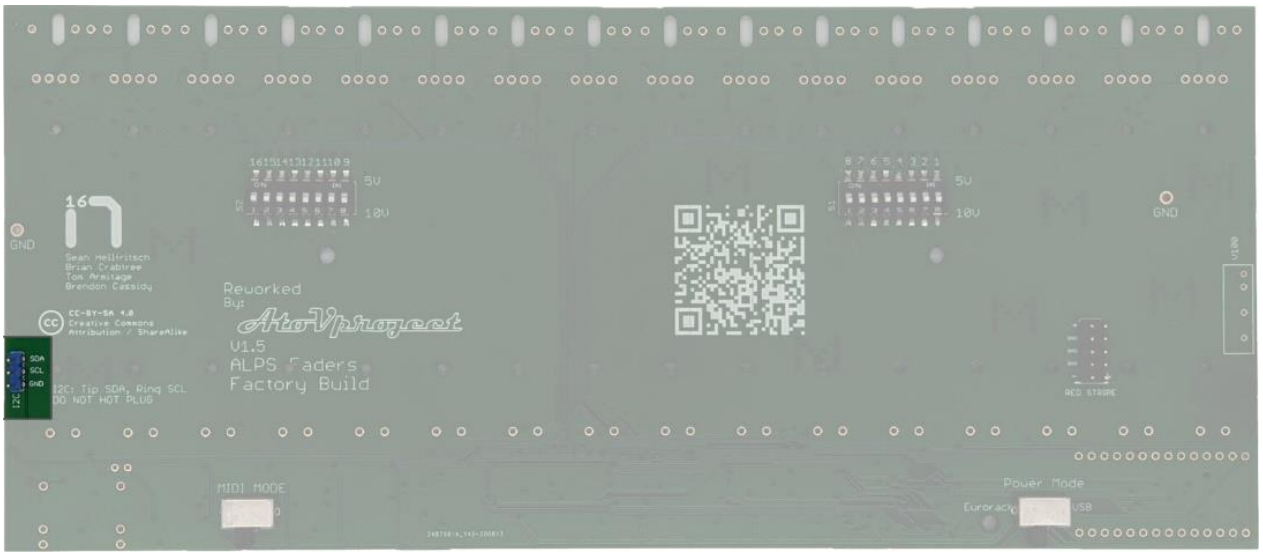


To ensure the header is soldered properly, please follow these steps:

First solder only one pin. Check whether the header is perpendicular to the PCB. If not, reheat the same pin and push the header against the PCB. Once the header is perfectly positioned, solder the remaining pins.

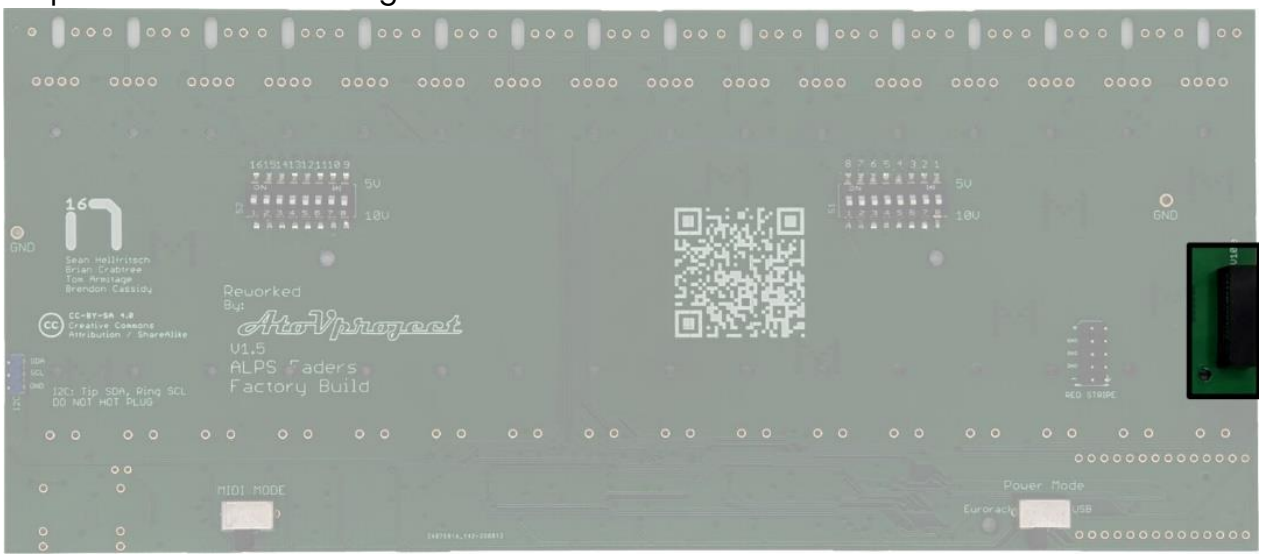
Check your work and ensure no bridges are formed between the pins. Shorts between these pins could potentially damage your PSU. Use your multimeter in continuity mode, you should **not** have continuity between the +12V GND and -12V.

Step 4 – i2c header



Cut a 3*pin out of the 40 pin header. Then use the same procedure as last step. Solder one pin, ensure the header is positioned properly before soldering the rest.

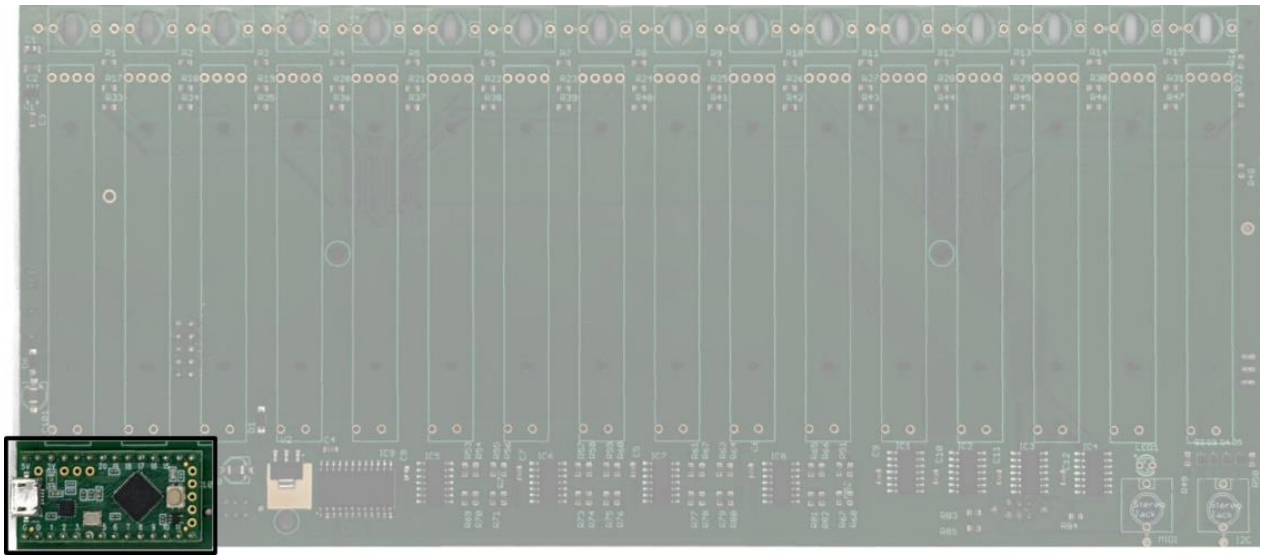
Step 5 - Isolated Power regulator

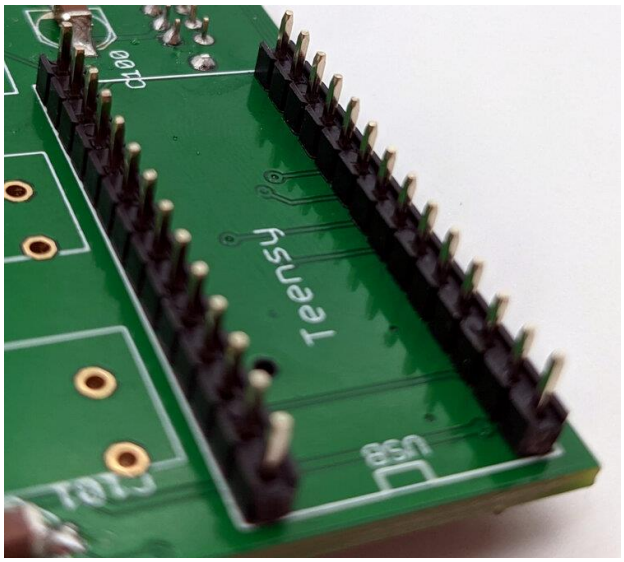


Again, solder one pin, check your work and then solder the remaining pins.

Part 2 - Front side

Step 1 - Teensy





Make sure you have now flipped the PCB! All of the following parts will now be soldered on the front side of the PCB.

Cut the remainder of the 40 pin in two 14*pin headers.

It is critical here that the headers are perpendicular to the PCB, otherwise you could have troubles placing the Teensy on the other side of the pins. See picture for how it should look.

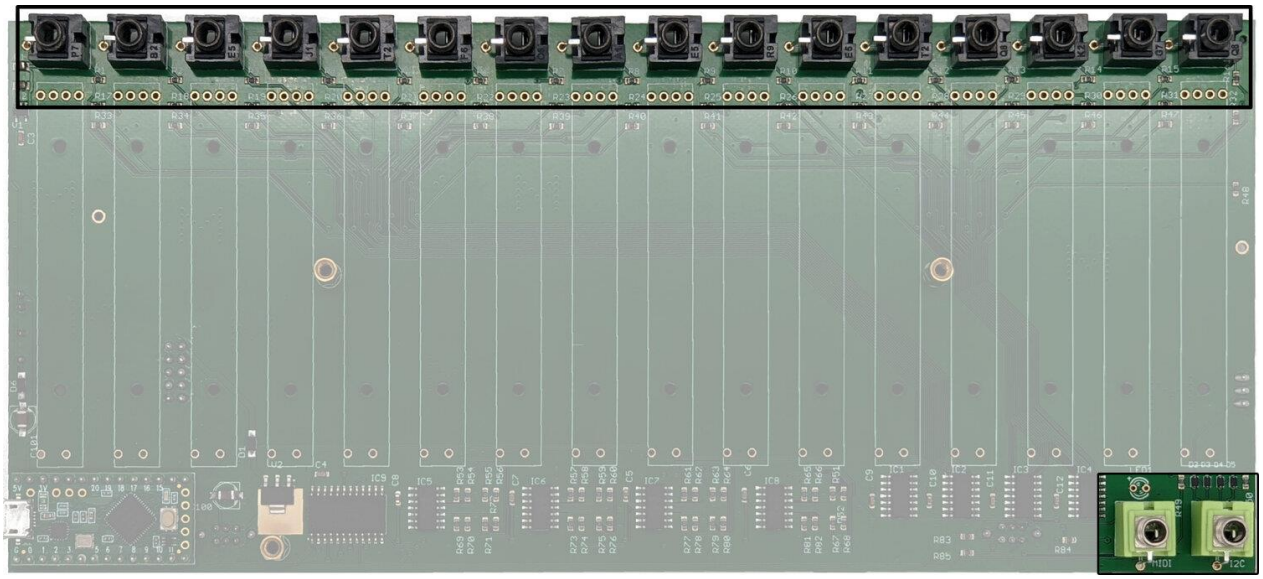
As usual, start by soldering one pin then check if the pins are perpendicular to the board. Reheat the solder join if necessary.

Put the Teensy on the pins to ensure it fits properly.

If everything is alright, then solder the rest of the pins and finally **solder the Teensy in place.**

NB : On early PCBs the silkscreen calls for a Teensy 3.2, please use here the provided Teensy LC. It is fully compatible with the function used in the 16n and its future firmware updates.

Step 2 - Jacks

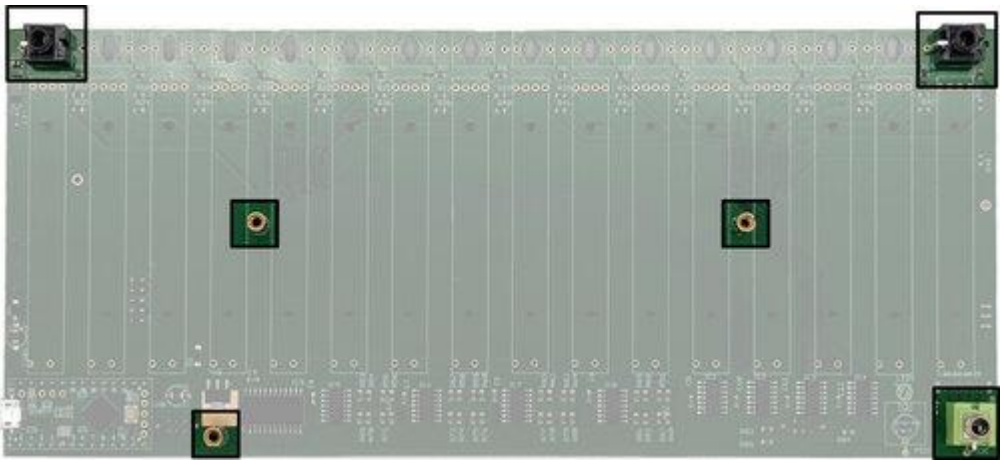


Open Bag 2. Make sure this bag contain all the parts.

This bag should contain :

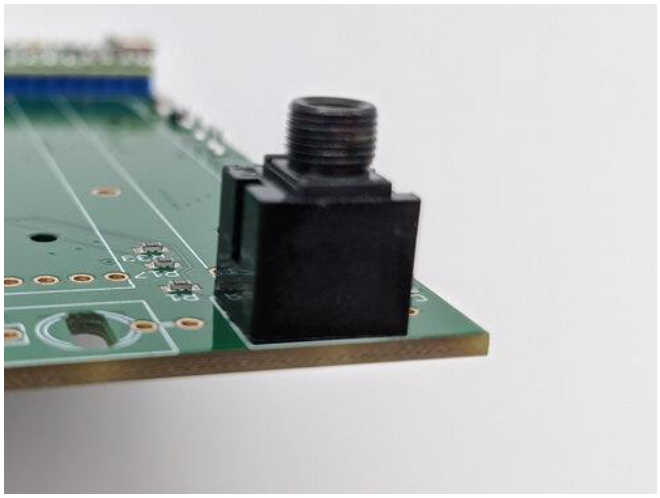
- 16 Black Mono Thonkiconn Jack
- 2 Green Stereo Thonkiconn Jack
- 18 Black Knurled nuts

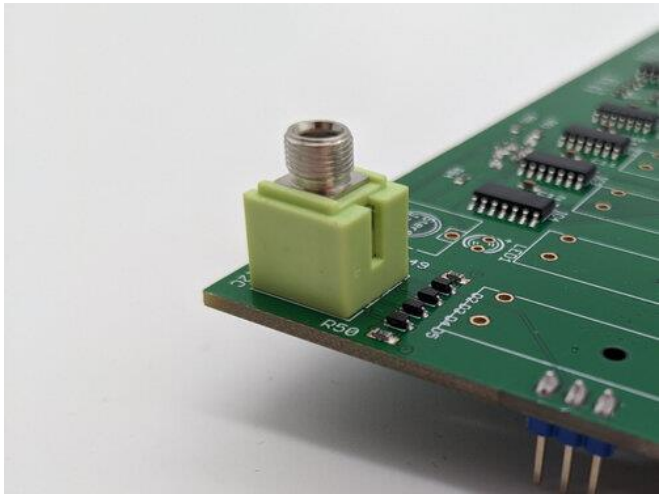
Be careful as there are 2 types of jacks; the black mono jacks and the green stereo jacks. Ensure they are placed in the right position.



Solder one jack in each corner and place the standoffs (secure them with Black M3 screws). Ensure the jacks are flush against the PCB as shown in the following pictures.

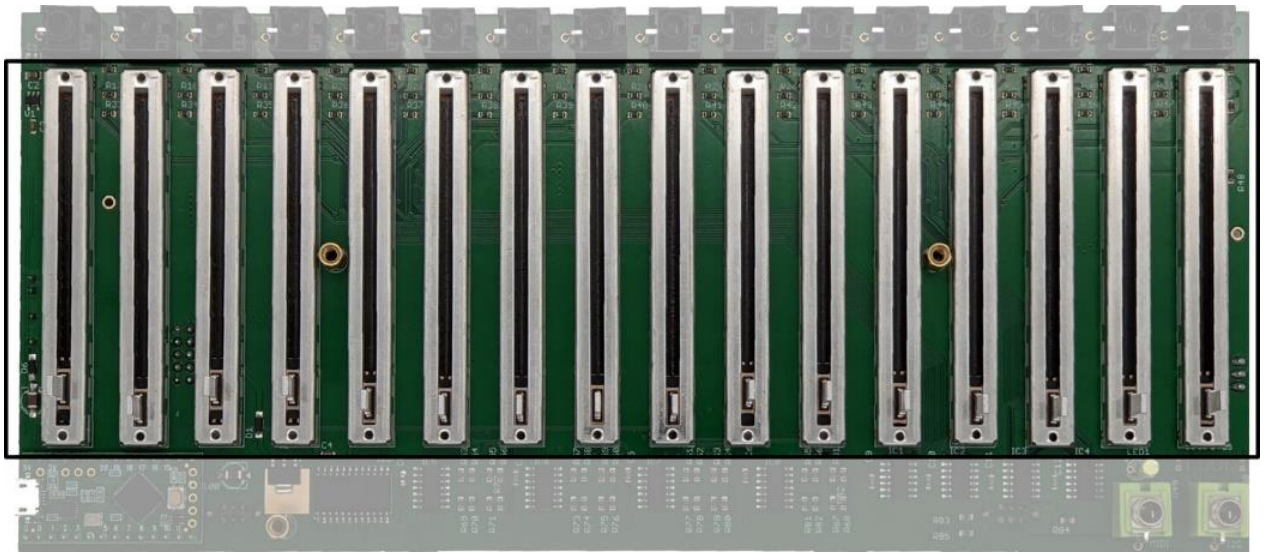
When this performed, you can add the rest of the jacks.





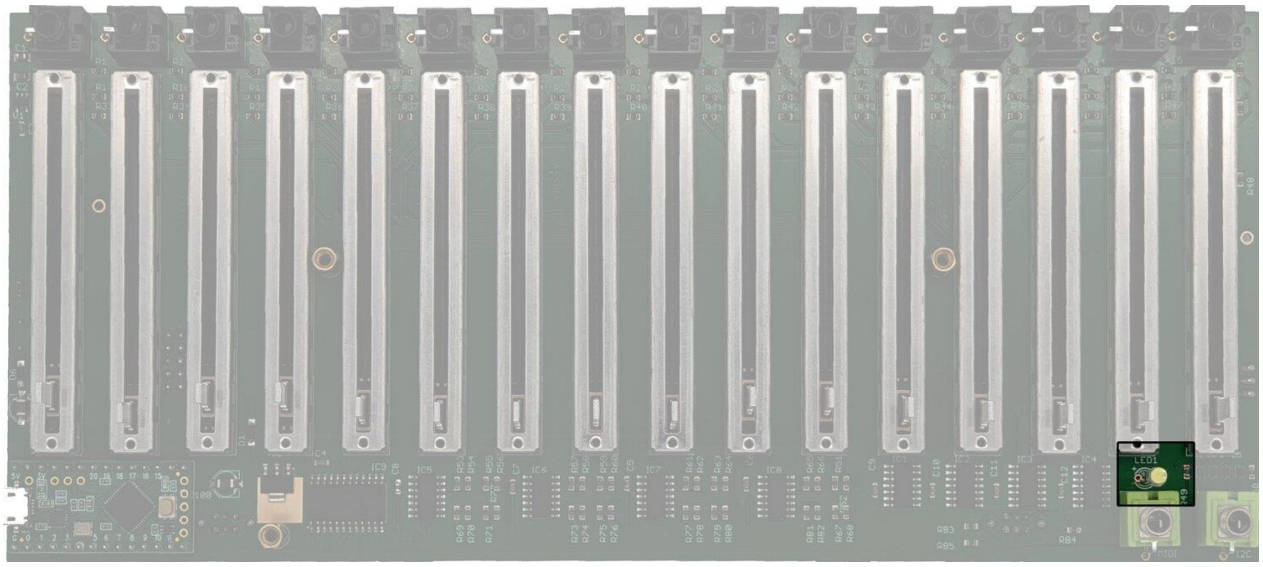
Then mount the panel. Use nuts on the 3 jacks you just soldered and use M3 screws to secure the panel in place. You can then solder all the remaining jacks. Use the provided 3d printed tool to tighten the nuts, don't overtighten them, you will have to remove them soon.

Step 3 - Faders



Remove the panel and place each fader. The faders have tabs that should hold them in place . A tip is to move the fader levers up and down in an alternating sequence, so that the PCB lays parallel to your table when inverting the PCB. Solder one pin on top and one on the bottom of each fader. Ensure the faders are flush against the PCB. If not, reheat the pin and push the fader so that it is flush against the PCB. When all the faders are well positioned, solder the remaining pins.

Step 4 - LED



The LED is polarized! Be careful not to solder it the wrong way as it is difficult to remove! The **long leg is the positive pole** and goes where the + mark is. After inserting the LED, mount the panel and secure it using a few nuts (don't put them all on just yet). Push the LED in the hole on the panel. **Use a bit of tape so that the LED stays flush to the panel.**

Solder it and cut the rest of the legs with your side cutter.

Congratulations! You are now done with the soldering!

Part 3 - Testing

Step 1 - Check for shorts.

- Set your multimeter to continuity mode. Test the pins on the power header. You should **not** have continuity between the +12V GND and -12V. If you do, check the soldering on the power header.
- Control the soldering on the two toggle switches. Ensure there are no solder bridges between pins.
- Have a look at the pins of the Teensy, check if everything is looking good there.

Step 2 - Check digital functions

- **Set the power switch to USB.**
- Connect the 16n with the provided USB cable.
- Open the online configurator using a MIDI compatible browser (i.e. Chrome) - Link here
- The Teensy comes preloaded with the standard 16n firmware. The editor will let you know if an update is necessary. Please refer to the user manual to learn how to update the firmware.
- The online configurator opens on a monitor page that reflects the position of each fader.
    - If none of the faders are moving in the editor - Check the soldering of the Teensy.
    - If one or more of the faders is not moving in the editor then check the soldering of the corresponding fader.

- If everything is working properly in the configurator this mean that the faders are well soldered and the Teensy is receiving and sending data.
- To check the 3.5mm MIDI output connection, ensure that the MIDI switch is set to the right position.

If the device you want to control follows the **type A** mini-jack MIDI standard, set the **switch to the left**. If the device you want to control follows the **type B** mini-jack MIDI standard, set the **switch to the right**.

The provided jack to MIDI DIN adapter follows the standard described by the MIDI association and is therefore type A. The switch must be set to the left.

By default the 16n will send data on Channel 1 CC 32-47

Step 3 - Check Analog outs

- Set all the DIP switches on the back of the 16n to their 5V position.
- Move all the faders to the top.
- Take a Eurorack cable and plug into each of the analog out jacks. The output should be reading 5V.
    - If you measure 10V at the output - Check the soldering on the DIP switch as you might have a cold joint. Use some flux and reheat the pin corresponding to the faulty output.

Any issues? Contact us at Support@atovproject.de

Part 4 - Final assembly

When everything works well, then you can finally install the remaining jack nuts and screws.

If you plan on using the unit in as a Eurorack module, do remember to set the power switch to the Eurorack position. If you use it in the aluminum case with USB power, set it to USB.

Use the washers to mount the module to avoid any marks from the mounting screws.

Congratulations! Your AtoVproject 16n Rework is now complete and fully functional.