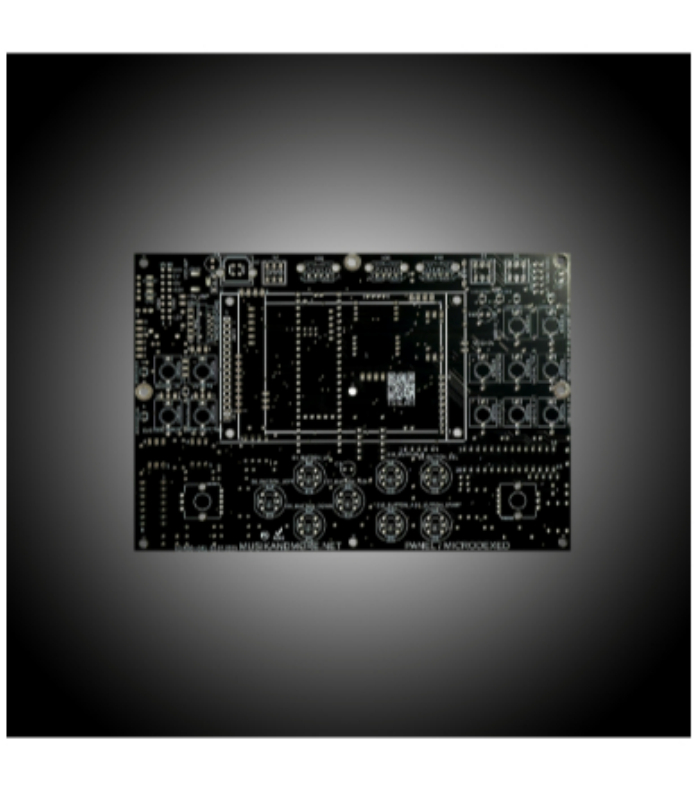
CONSTRUCTION INSTRUCTIONS NAVIPANEL-V3/ V7.0-DE

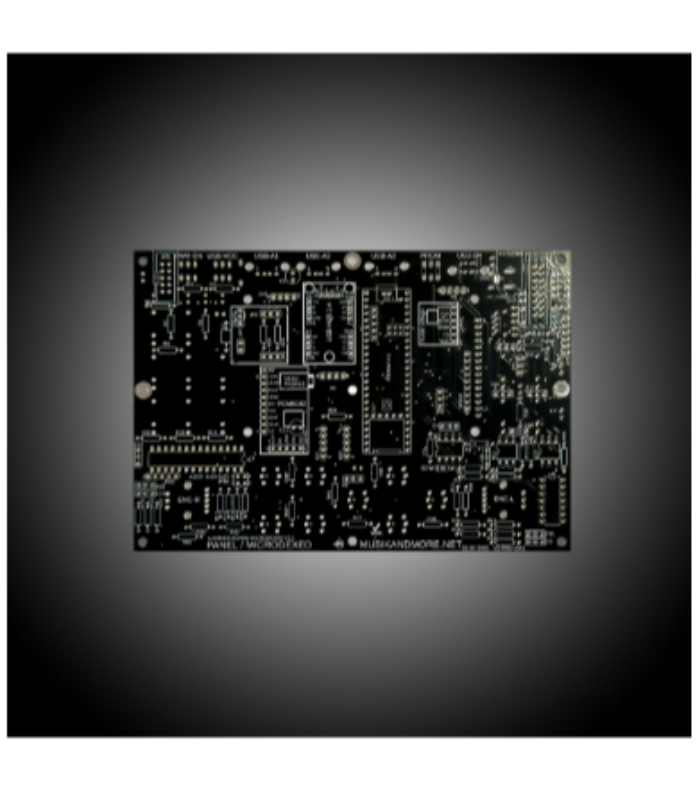
Assembly instructions / Documentation / NAVIPANEL V3

Technical Documentation V7.0 DE / Status: 23.09.2025

- for PCB version mainboard V3-R05-v526 from May 16, 2025
- for PCB version mainboard V3-R05-v541 from July 2nd, 2025
- for PCB version mainboard V3-R06-v583 from September 19, 2025
- for PCB Midi to CV-Pedal-USB-Breakout v85 from September 21, 2025
- for PCB Amphenol-TRS-6.35mm-Breakout v46 from August 20, 2025
- for PCB 8TE-Pedal-USB-Panel-V1-v7 from May 25th, 2025
- for PCB 8TE-MIDItoCV-Panel-V1-v11 from May 21, 2025
- **Technical data for NAVIPANEL-V3-R5-v541 from September 14th, 2025** (PDF)
- **BOM-Part-list-Mainboard-PCB-NAVIPANEL-V3-R5-v578-September-15-2025** (PDF)



Top PCB Mainboard V3-R05-v541



Bottom PCB mainboard V3-R05-v541

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1) Disclaimer

Before you begin with the kit and assembly, we have some legal information for you. Please read the disclaimer carefully. Thank you for your understanding. The right of withdrawal and return expires as soon as you have opened the DIY kit and you have soldered the included circuit boards or populated the front panels. The DIY kit can only be returned to us in an unused condition. The buyer is responsible for the return shipping costs. The warranty is limited to the components included in the DIY kit. Any warranty claims will be passed on to our suppliers (supply chain verification) in accordance with product liability law. The warranty is void in the event of improper use or application, such as soldering electronic components at excessively hot temperatures or for too long, which can inevitably lead to damage or total loss of the components.

Nicole Effendy (Designvorsprung) and Thomas Effendy (Musikandmore) are free from any legal claims that may result from injuries caused by the assembly, soldering and improper use of the NAVIPANEL V3 for Microdexed, as well as from health damage caused by inhaling soldering fumes.

This project requires **good soldering skills** and a certain degree of **soldering experience** , as well as **basic electronics knowledge** . Every electronics project depends on the tools and the care taken when soldering, including SMD soldering and soldering GND (ground) copper surfaces. Cold solder joints are the most common cause of failures in electronics. The same applies to unwanted solder bridges, e.g., caused by too much solder.

One important aspect of handling electronic components is the **ESD treatment** of semiconductor devices such as ICs, PSRAM, the Teensy 4.1, etc. We also know that not every electronics hobbyist or musician has an ESD (electrostatic discharge **) soldering** station **.** Unfortunately , such a discharge can cause irreversible damage to electronic components.

Tip: To avoid damage to the semiconductors, if possible, touch something metallically conductive, e.g. a radiator, before touching semiconductors in order to discharge static electricity.

This electronic circuit is designed for operation with USB 2.0, a 5V DC power supply (optionally with USB-C power), and the 16-pin Eurorack power supply (+5V and GND). Power banks and USB power supply work very well. However, the operating time depends heavily on the power bank's performance. The current consumption of the NAVIPANEL-V3 is currently approximately 250mA at 5V DC without any USB host devices connected.

A power supply with **3.7V LiPo batteries** is **not technically possible** , as the USB devices, the USB hub, and the analog components require 5V DC. Should the NaviPanel-V3 be used with LiPo batteries despite our recommendation, we are exempt from any warranty claims and are not responsible for any technical defects of the NAVIPANEL-V3 for Microdexed or other technical devices!

LiPo 3.7V batteries are not safe to **handle and should only be used by professionals with appropriate electronics knowledge.**

2) Soldering recommendations and tips

Use only **lead-free solder** with a diameter of 0.7 mm - 1.0 mm, e.g., from STANNOL KS115 Sn99.3Cu0.7 d=1.0 mm (Made in Germany). The KS115 solder wire contains a **rosin-free** flux with synthetic resins. Source / link to the product: **https://www.conrad.de/de/p/stannol-ks115-loetzinn-bleifrei-spule-sn99-3cu0-7-rom1-100-g-1-mm-588742.html**

Another point is **soldering fume extraction** .
Inhaling soldering fumes through the mouth and nose is harmful to health. Therefore, please ensure that the soldering fumes are effectively extracted from the soldering joints and that the room is well ventilated. Soldering fumes irritate the nasal mucosa—unfortunately, this isn't immediately noticeable—and anyone who assembles and solders a lot of circuit boards should, in their own interest, ensure that they have good soldering fume extraction. A highly recommended soldering fume extraction system is the ZeroSmog Shield Pro from Weller. It's not a bargain, but it's very effective.
Source / link to the product: **https://www.reichelt.de/de/de/shop/produkt/loetrauchabsaugung_zerosmog_shield_pro-371544** ,

The soldering iron should have a minimum power of 30 VA, preferably 70 VA, and, if possible, an adjustable soldering temperature setting in the range of 275°C to a maximum of 375°C. Cleaning the soldering tip with a copper mesh and a sponge (filled with water) is necessary to remove any residual scale from the soldering tip. SMD solder paste and/or flux are highly recommended for soldering the two SMD PSRAMs. The fine SMD solder pads on the back of the Teensy 4.1 don't allow for too many soldering attempts. The same applies to the 2-pin male/female cable for the rear-mounted adaptation of the Micro-USB connectors D+ and D- to the USB-B connector on the PCB mainboard.

3) Work preparation – assembly and soldering

We recommend the following **electronic tools and accessories** :

- Electronic side cutters and electronic flat-nose pliers
- Small slotted or Phillips screwdriver
- Allen key (Allen) 2mm (M3x5/6 ISK screws)
- 5.5mm (M3) socket wrench or 5.5mm open-end wrench
- 8mm (M6) socket wrench for hexagon nuts for the TRS 3.5mm jacks in the front panel
- Solder (see points 7 and 8) and SMD solder paste
- Desoldering pump or desoldering copper wire 1.5mm wide (just in case)
- A multimeter to check the supply voltages and, if necessary, to measure the metal film resistances
- a small ESD tweezers (very useful for the PSRAMs)
- A heat-resistant silicone mat (min. DIN A4 format)
- Soldering fume extraction (see **point 2**)
- A "third hand" or electronic vice (e.g. Bernstein Spannfix Vario 9-250 ESD) or similar.
- Source / Link to the product: **https://www.bernstein-werkzeuge.de/produkte/produktdetails/9-250-esd-kugelgelenk-kombination-vario-6-tlg**

4) Preparation and sorting of components

Sort components by type:

Resistors, capacitors, electrolytic capacitors, diodes, coils, micro SD card and holder, ICs, LED buttons, push buttons and switches, RGB encoders, USB sockets, other plugs and sockets, studs, screws, hex nuts, and washers. The touch display and the Teensy 4.1 have been tested. The Teensy 4.1 is flashed with our special **test software for the Navipanel V3 hardware** . The latest software at the time of delivery can be downloaded from our website under " **Downloads".**

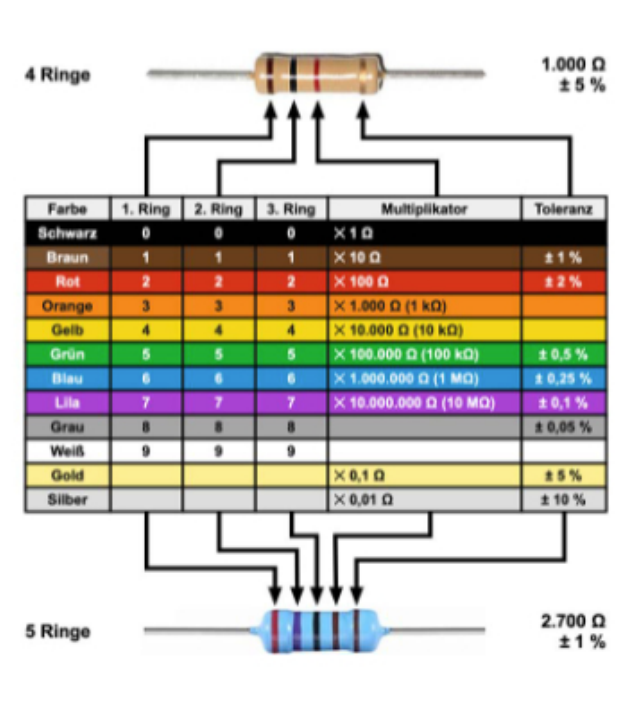
Example: the NAVIPANEL V3 DIY kit with 2 front panels

Resistance determination using the color code table

The resistors are labeled on the paper tape. We only supply metal-film resistors with 1% and 0.1% tolerances. The color coding table can be found here: Source: **https://www.elektronik-kompendium.de/sites/bau/1109051.htm**

The color code table

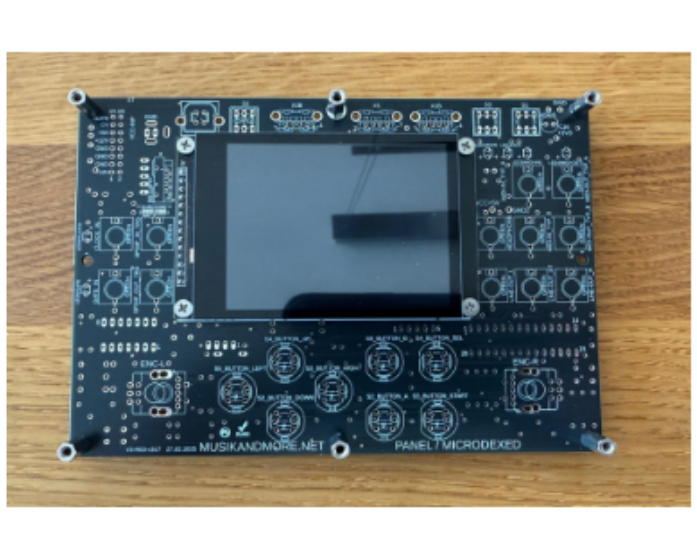
Before you start determining the resistance, you have to count how many colored rings are applied to the resistor. Carbon film resistors usually have 4 rings. **Metal film resistors have 5 rings** . For resistors with 5 rings, the resistance value is specified a little more precisely. Then you have to determine which ring is the first. Usually you try to find out which ring is the last ring. This is the tolerance ring, which indicates how high the determined resistance value can deviate from the actual resistance value. The tolerance ring is usually gold. If this color is not available, you have to pay attention to the two outer rings. Usually one is further away from the end of the body. This is the tolerance ring. Then you start putting the resistance value together from the beginning. The colors have specific values. The first and second rings determine the resistance counter (4 rings for a carbon film resistor). The third ring acts as a multiplier. It determines how high the resistance value is. The fourth ring is the tolerance ring, which determines the deviation of the resistance value (for carbon film resistors, 4 rings).



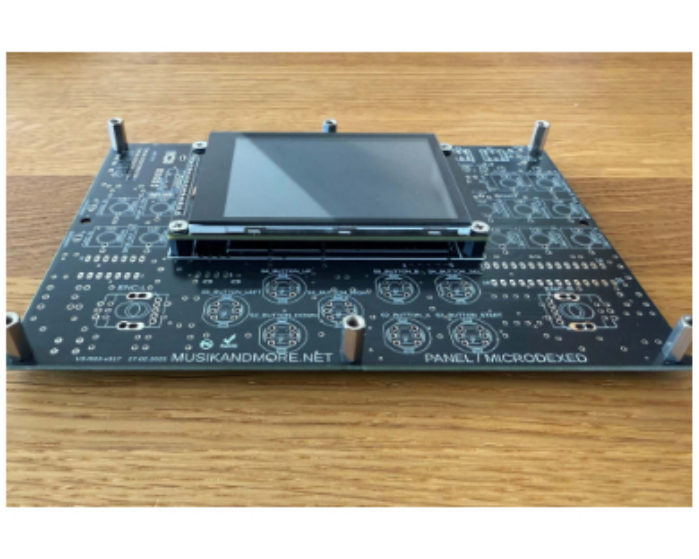
Resistance determination using the color code table

5) Installation of the 3.2" capacitive TFT touch display

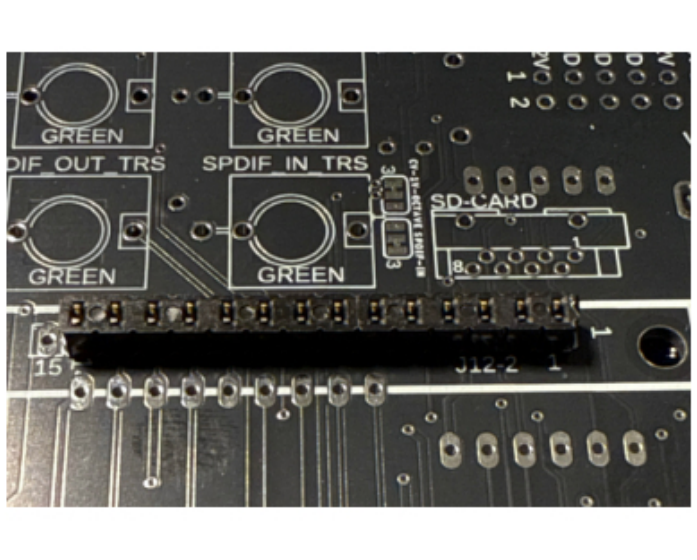
The studs for the TFT touch display and the front panel are pre-assembled and aligned. The M3x5 countersunk screws are used to secure the display and ensure precise centering.
Solder the 14-pin low-profile BKL female connector J12-2 for the display while the display is assembled. The flex cable included in the original packaging is not required but will be used for future hardware modifications; please do not discard it!
Important: Shorten all pins on the 3.2" TFT touch display to **2.9mm** ! Otherwise, the **maximum clearance of 6mm** between the board and the underside of the front panel cannot be maintained, and the TFT display will not be flush with the front panel.



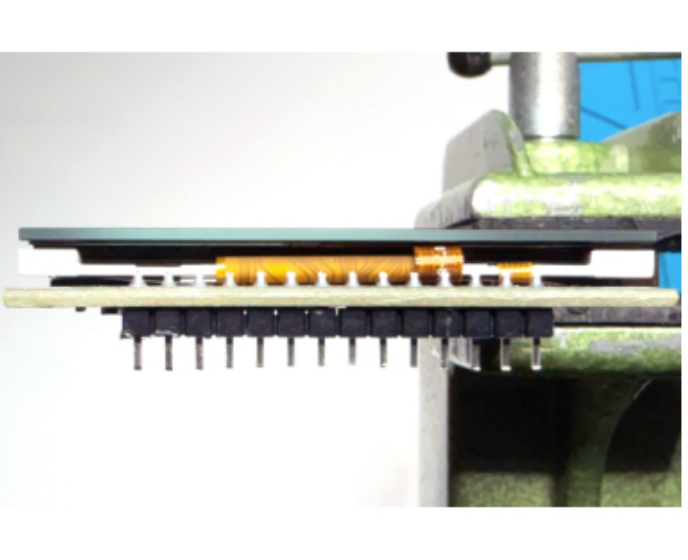
3.2" touch TFT display mounted with M3x11 studs for the front panel



3.2" touch TFT display mounted with M3x11 studs for the front panel



J12-2 Low Profile 14-pin female connector for the TFT



Shorten all pins of the TFT touch to 2.9mm length!

6) Components – Teensy 4.1 – PSRAM – Micro-USB

Next comes the most difficult part of the project. Soldering the 2x8MB SMD PSRAMs to the back of the Teensy 4.1. These are easier to solder as long as the Teensy 4.1 does not have any headers soldered in. To do this, clamp the Teensy 4.1 in an electronics vice.
Use a thin soldering tip for soldering. SMD solder paste and/or flux is very effective. Tin all gold-plated SMD soldering pads beforehand with SMD solder paste. Please align the SMD PSRAMs (using ESD tweezers) as shown in photos **3a 3b** , paying particular attention to PIN1. Tin the pads beforehand with solder paste and first fix and align the 1st PSRAM with just one pin. Then solder all pins (reduce the soldering temperature to approx. 280-290°C).
Repeat the same soldering process for the 2nd PSRAM. Here, too, be careful not to create any unwanted solder bridges! Ideally, the solder joints should look like in photos **3a** and **3b**

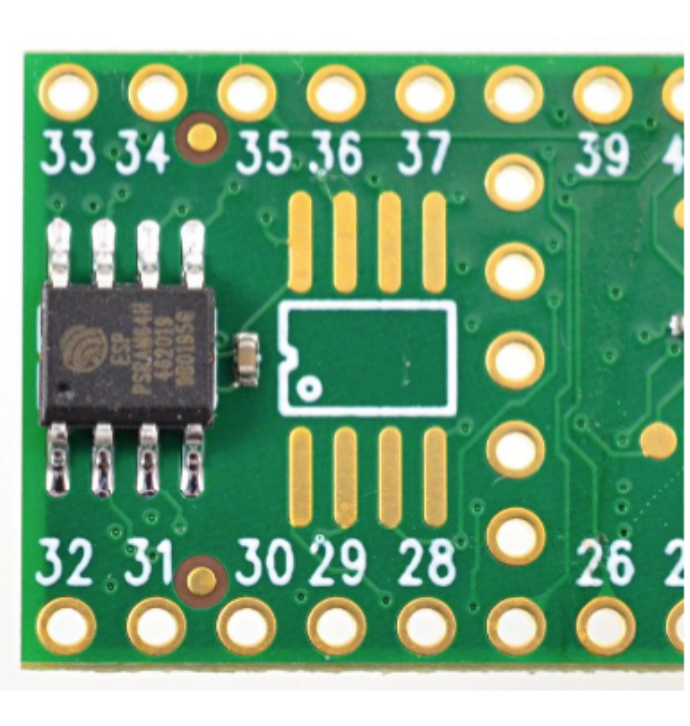


Photo 3a: PSRAM 8MB soldered

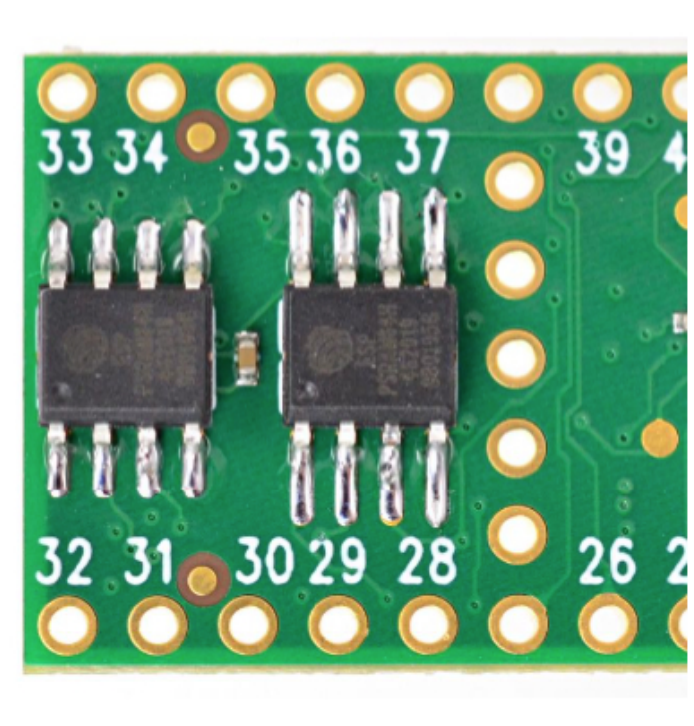
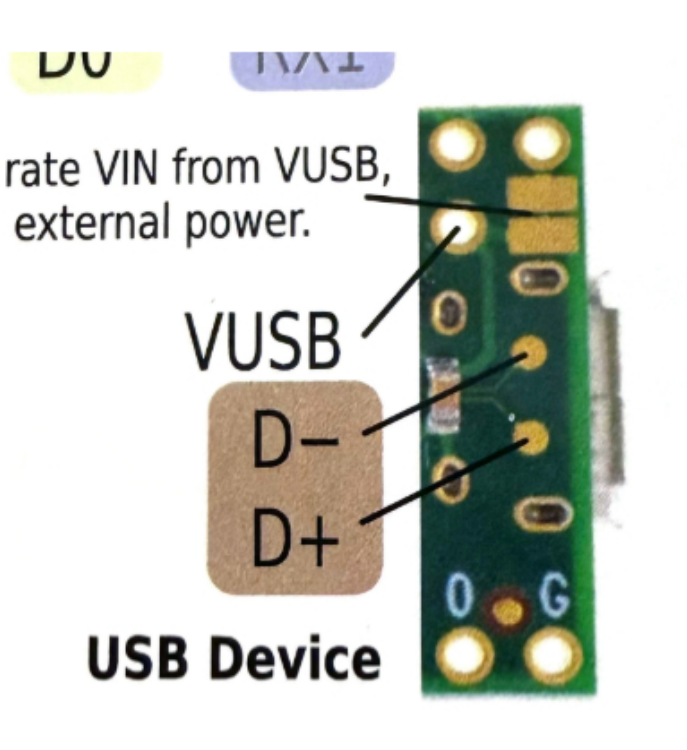


Photo 3b: PSRAM 2x 8MB (16MB) soldered

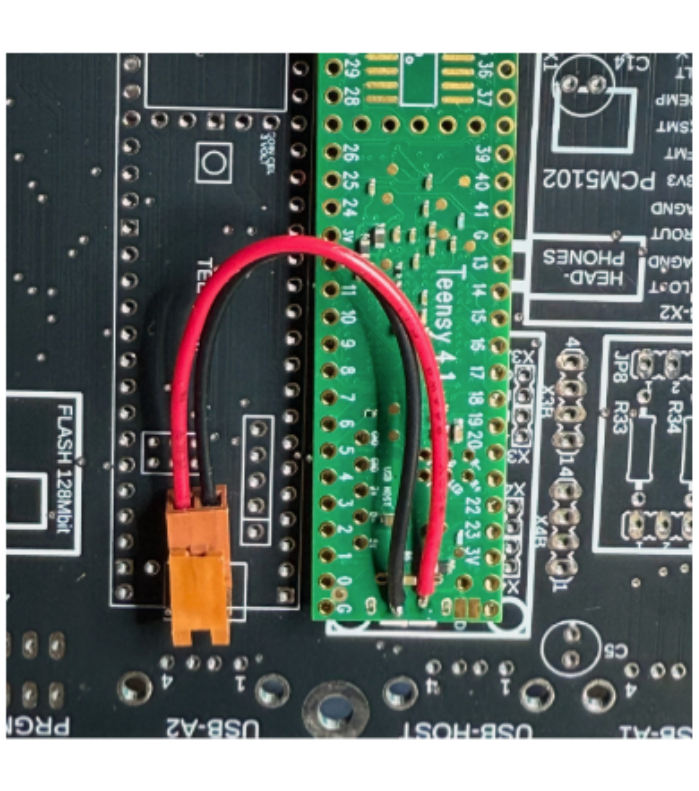
2x APS6404L-3SQR (8MB)

6.1) Components – Teensy 4.1 Micro-USB

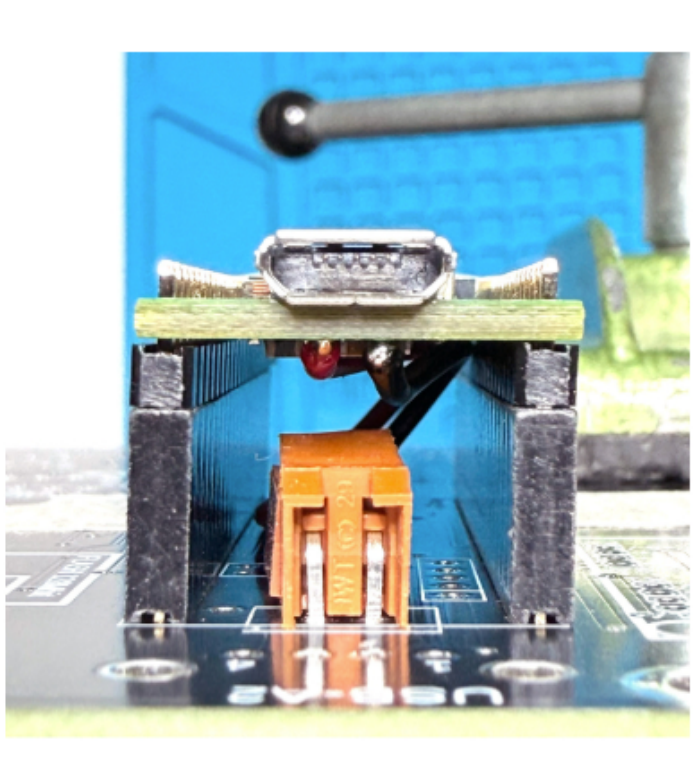
Then, solder the 2-pin cable to the USB PC connectors D+ and D-. On the back of the Teensy, below the USB micro connector, there are two labeled solder pads. Solder the cable to the two pads D- and D+ (tin them first!). Please be careful not to create a solder bridge between D+ and D- when soldering the cable.



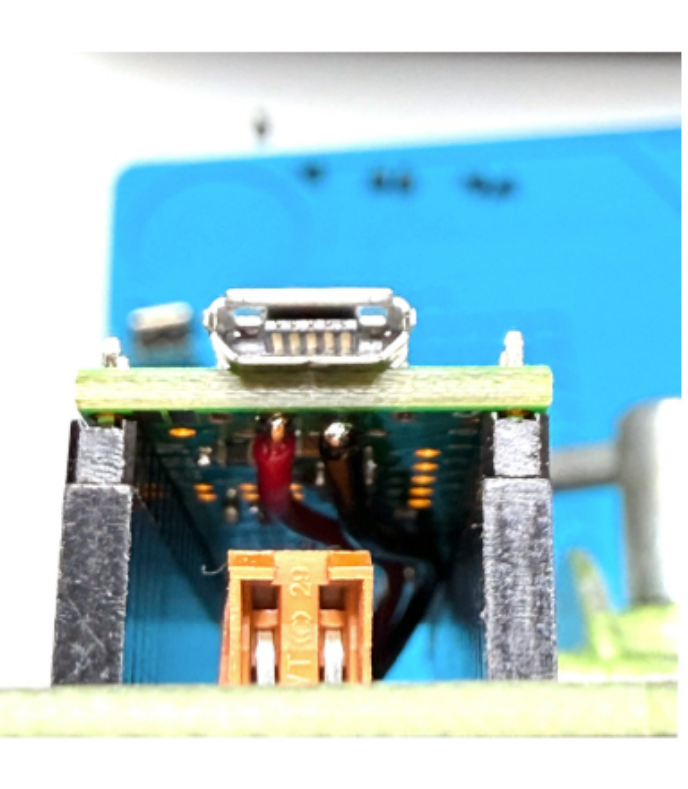
Teensy 4.1 back USB D- D+



2-pin cable with plug and angled socket



USB Micro to USB-B X7

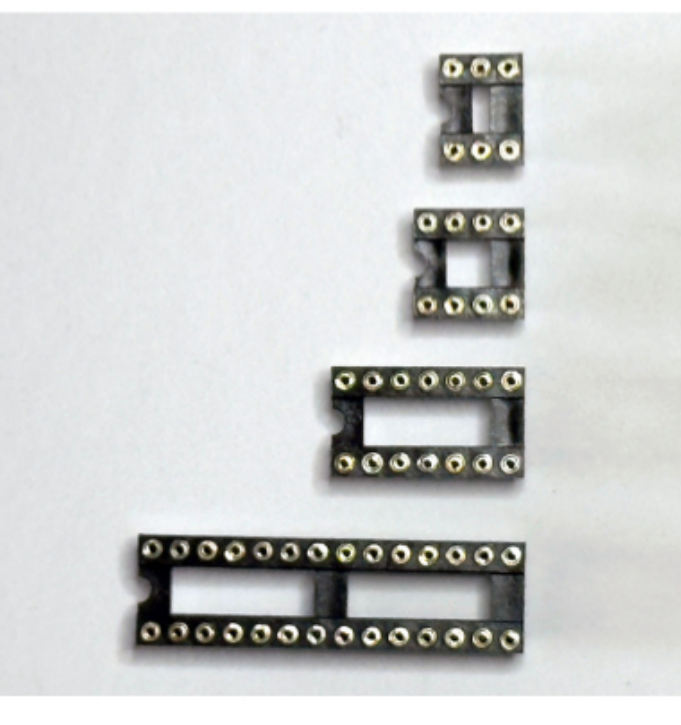


USB Micro to USB-B X7

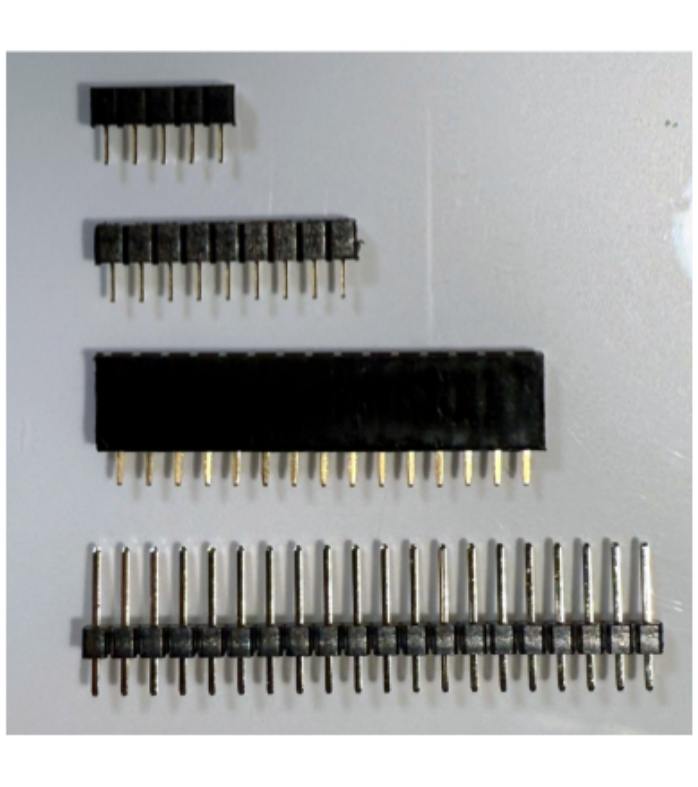
At the end of the cable is a 2-pin female connector with an angled plug (polarity protected). Disconnect the female connector and cable from the angled plug and then solder the angled plug into the designated location on the motherboard. This connection establishes communication between the Teensy and the PC or Mac via the USB-B socket X7 on the front panel and is essential for the USB PWR ON/OFF switch (white cap) to function. The micro-USB socket on the motherboard can, of course, be used to test the Teensy 4.1!

7) Further assembly of the mainboard

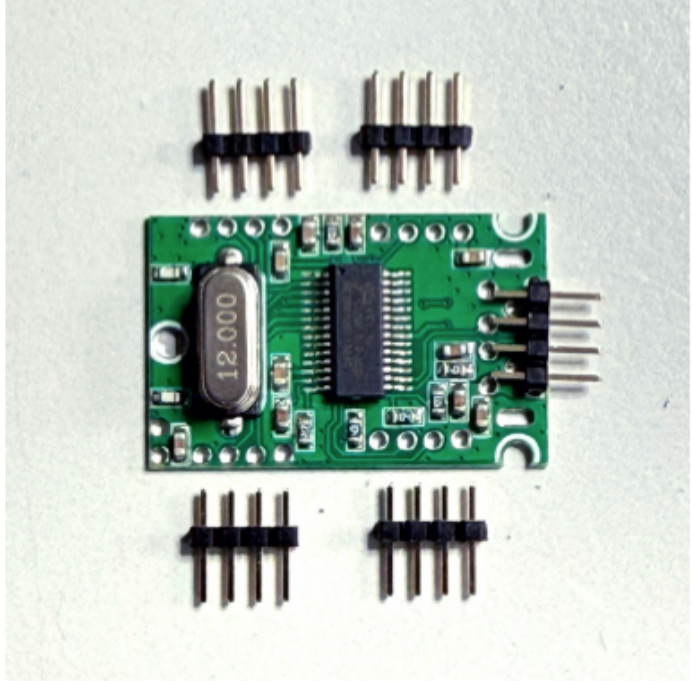
All ICs are socketed with high-quality machined sockets. All other components (breakouts), such as the PCM5102, Teensy 4.1, etc., are plugged into standard or low-profile 2.54 pitch female headers and are assembled with 2.54 pitch headers. The only exception is the USB hub 1-4, which uses 2.0 pitch female and male headers, which are also included in the scope of delivery. (See also **section 20.**)



IC sockets 6/8/14/28 pin



Male (low-profile) socket strips RM2.54



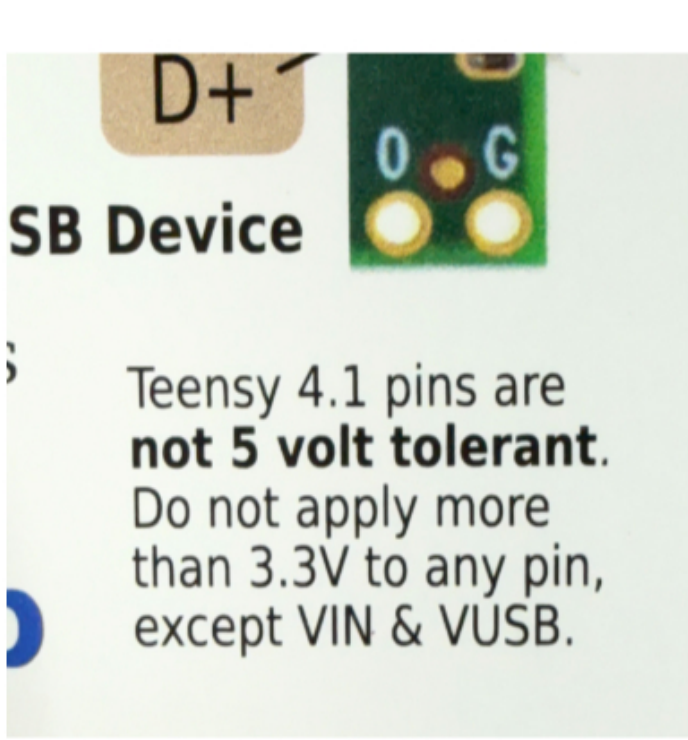
USB hub power strips RM2.0

8) Assembly of components on the solder side

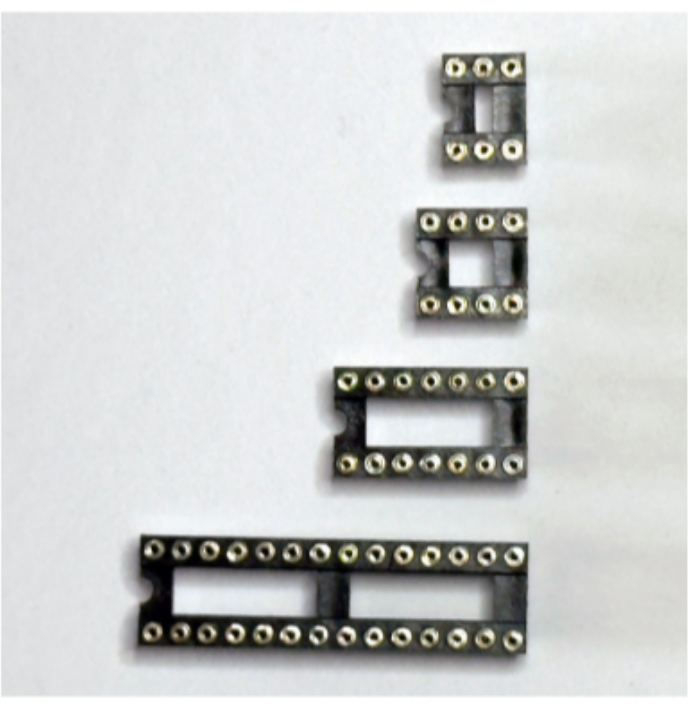
Due to its design, the motherboard is populated with components on both sides (the component side and the solder side). The procedure for populating the board on the "solder side" is as follows: Fix and solder all components according to the component height:

- first the diode D2 1N4148 and D8 Zener diode 5.1V
- then the metal film resistors (all labeled on the paper tape)
- first the R40 and R49 the marked metal film resistors with 0.1% tolerance
- then the metal film resistors 1% R17, R18, R19 and R30, R31, R32 for the RGB encoder LEDs (special values to adjust the RGB color ratio)
- then all remaining metal film resistors with 1% tolerance
- then the two inductors L1 100µH (color code table as for the resistors)
- Now install the two suppressor diodes D6-D7, paying attention to the "silver-white" marking. This marking must match the marking on the component assembly label.

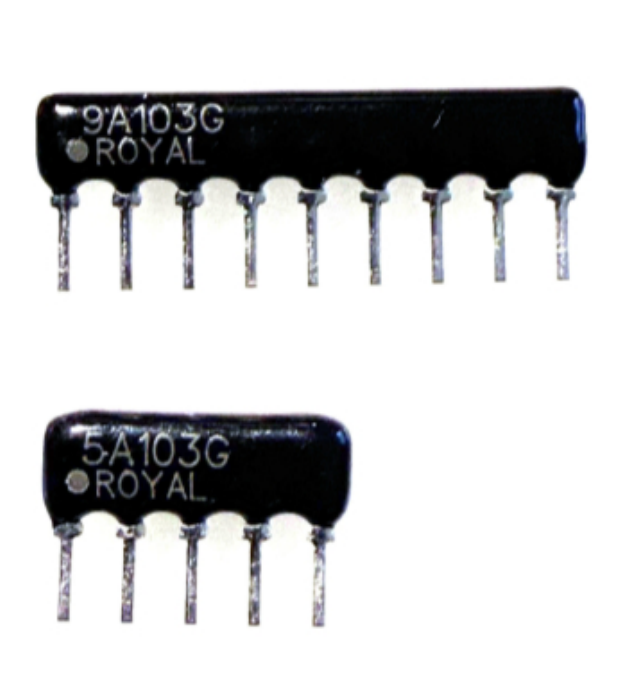
Note: These diodes (1N5817) limit the input voltage to 3.3V from the VOL pedal input and also protect against reverse polarity (negative input voltage). Since voltages between **5V and 10V may be present** at the SUSTAIN pedal (GATE IN) and CLOCK IN jacks , the diodes limit the input voltage **behind the voltage divider** to 3.3V (this is purely a **protective circuit). No voltage greater than 3.3V** may be present at the Teensy 4.1 inputs !



no voltage greater than 3.3V!



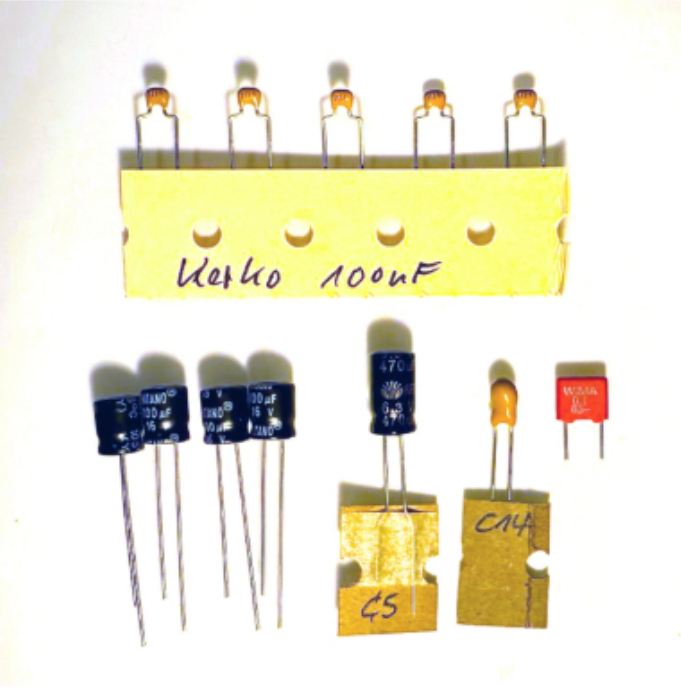
IC sockets 6/8/14/28 pin



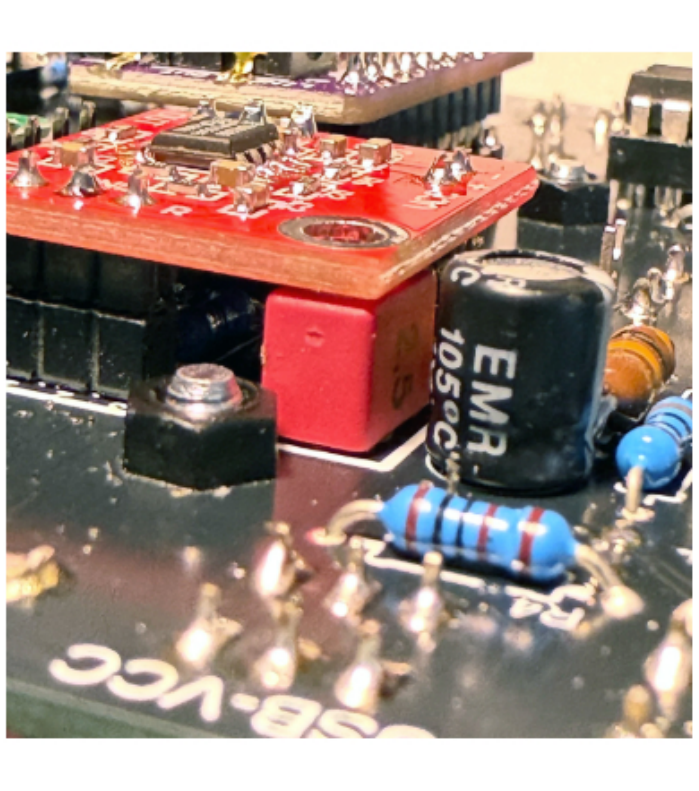
Dot = PIN1 – RN1/10K 5-pins RSIL8/10K 9-pins

8.1) Assembly of components on the solder side (continued)

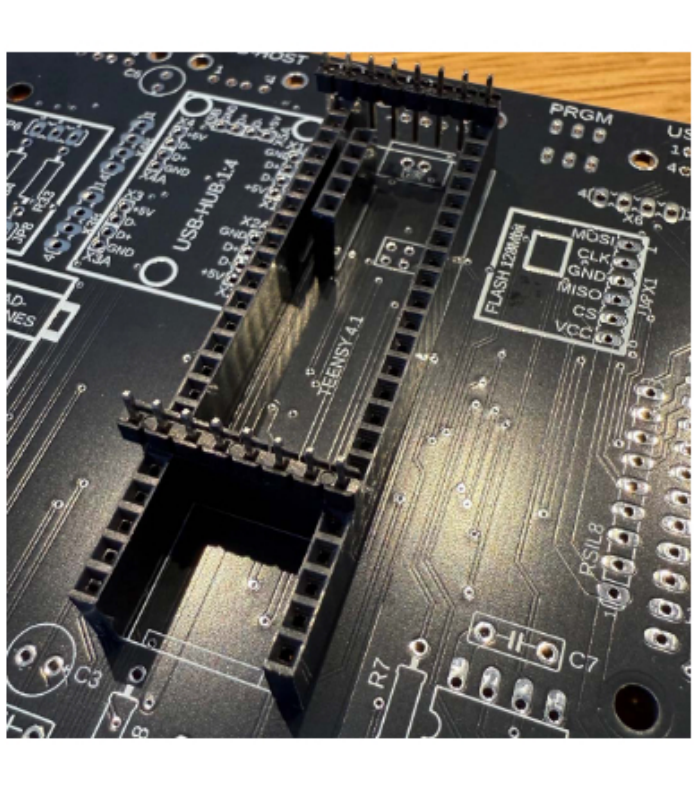
- then all IC sockets 6/8/14/28pol.
- then the SIL resistor networks RN1/RN2/10K with 5-pins and RSIL8/10K with 9-pins (the dot/marker is PIN 1)
- then all ceramic capacitors 10nF (code 103k) and 100nF (code 104k)
- Then all 100µF/16V electrolytic capacitors C3, C4, C5, C10, C16, C19, and the 10µF tantalum capacitor C14. (Please observe the polarity; the long leg is **+** .)
- Now solder in the MKS/MKT 0.1µF capacitor C8. Test it first – it will sit under the plugged-in headphone amp. If C8 is too high, solder it at a slight angle; the pins are long enough.
- Then solder all female and male headers except for the 6-pin U4-X1 (**not required – do not solder!)** . Secure the headers **with 1-2 solder points and align them straight.**
- Please note **point 8.2** !!!



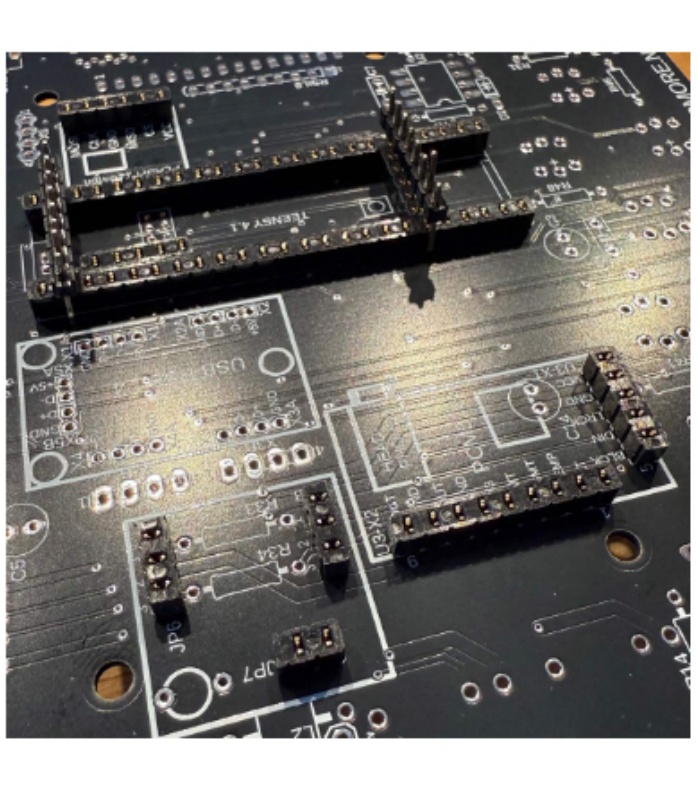
Example: Kerkos/Elkos



MKS film capacitor C8



Example: Female headers, vertical, for the Teensy 4.1. The pin connectors are for precise alignment only!



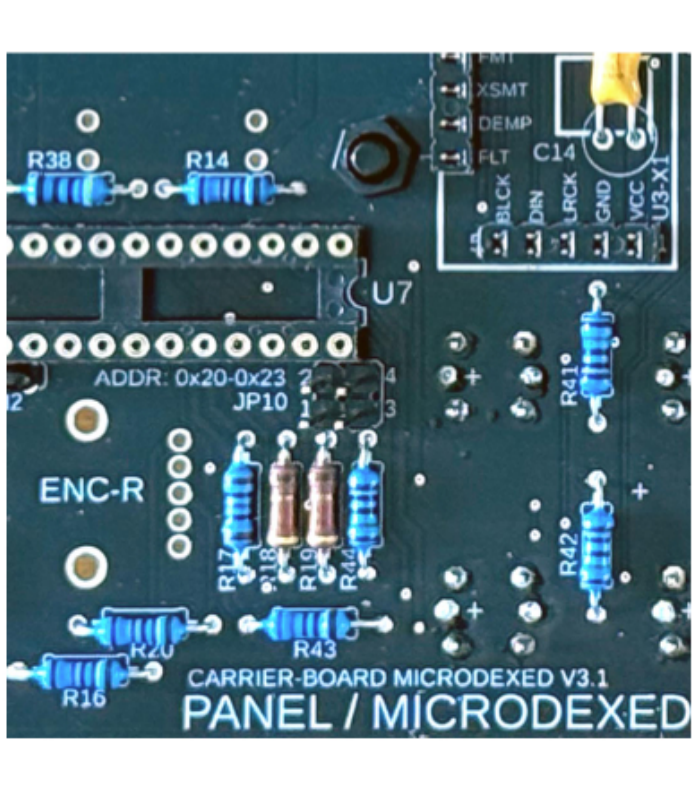
Example: Low Profile Socket Headers for Teensy 4.1

Here, too, it's important to solder in with a small amount of solder first , and be sure to prevent any solder from bleeding through! **Inserting header pins** is a good way to prevent solder from bleeding through and to align the female headers parallel.

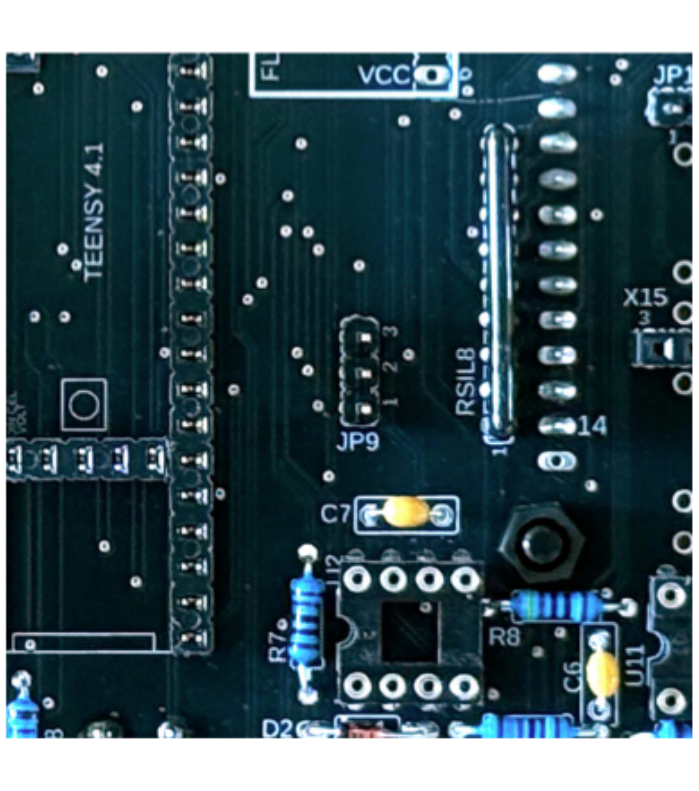
8.2) Assembly of components on the solder side – connectors for MIDI-to-CV and PEDAL-USB options

- Normal Profile sockets and connector strips for Midi-to-CV and Pedal-USB Breakout
- Jumper JP9 long (14mm) connector strip 1x3-pin. 1-2 = CLOCK OUT / 2-3 = SPDIF OUT
- Jumper JP10 long (14mm) connector strip 2x2-pin for MCP23017 (1-2 = 0x20 address 0 / 3-4 = 0x20 address 1)
- complete jumper, plug and socket strip assembly

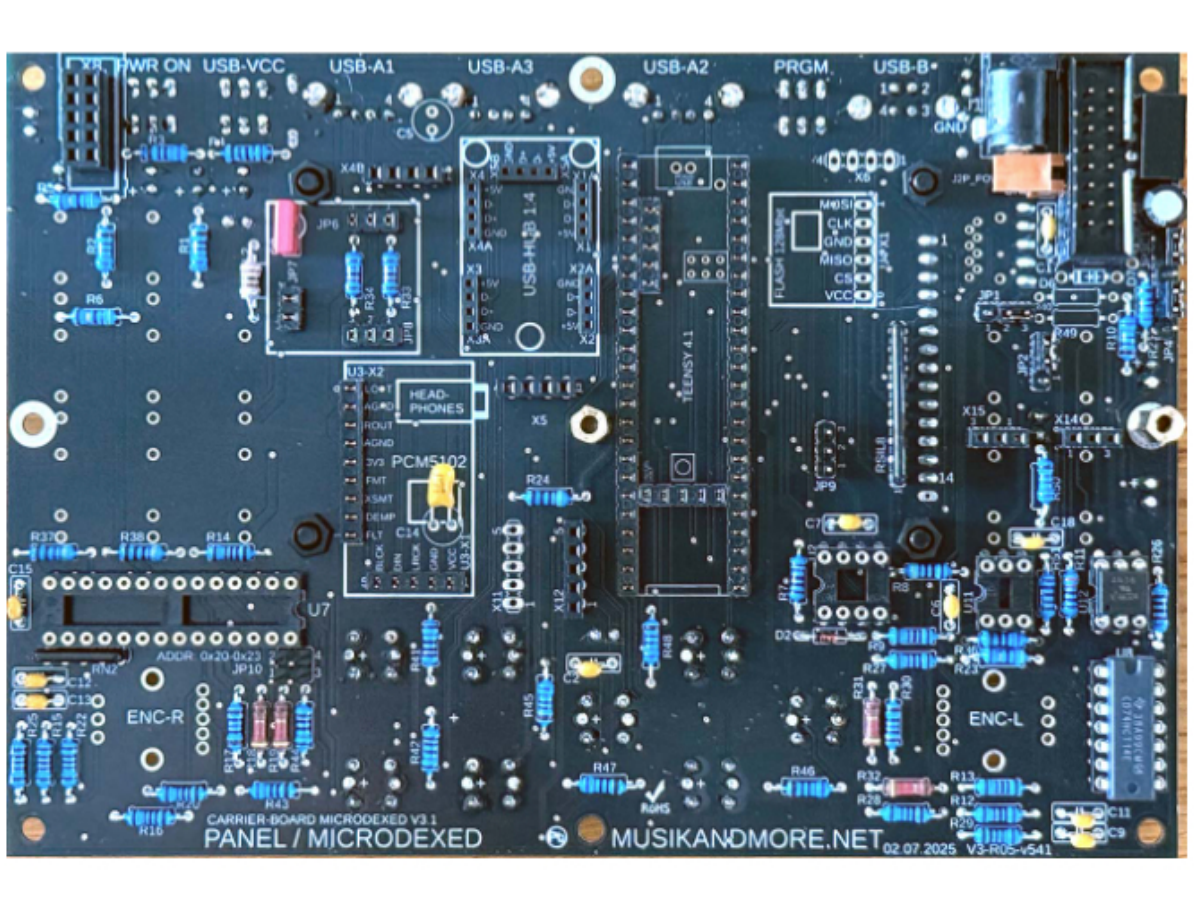
IMPORTANT: When using the **pedal USB option, JP10** ADDR 0x20 must be jumpered on the **NAVIPANEL mainboard** . If this is not done, the MCP23017 I2C chip will not initialize, and the **RGB and button LEDs will not** light up .



JP10 long (14.6mm) 2x2-pin connector strip.
1-2 = 0x20 address 0 (MCP23017)
3-4 = 0x20 address 1 (MCP23017)



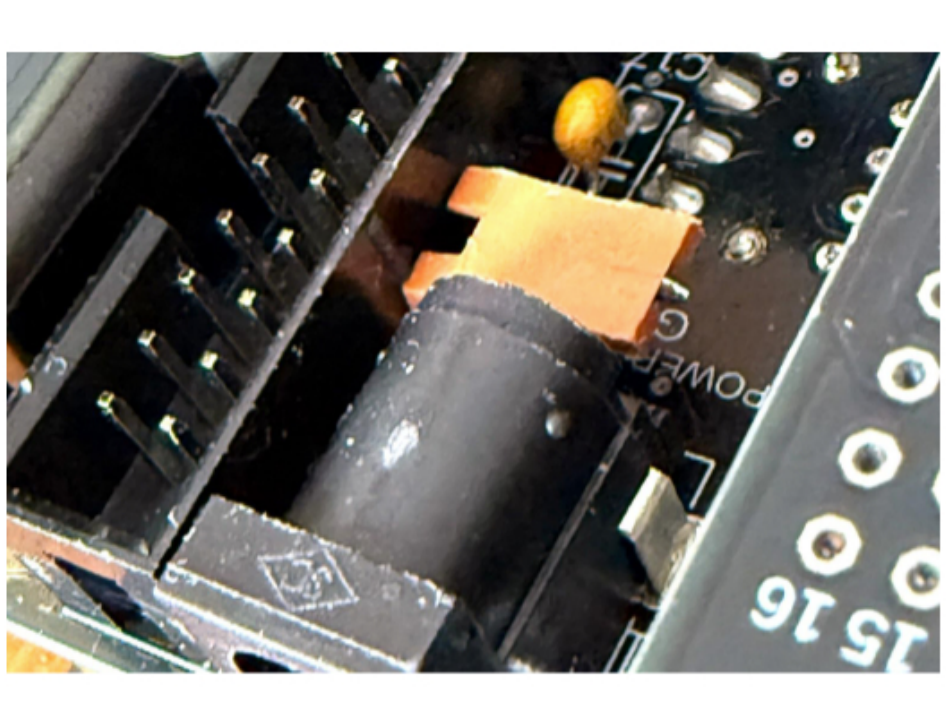
JP9 long (14.6mm) connector strip 1x3-pin.
1-2 = CLOCK OUT
2-3 = SPDIF OUT



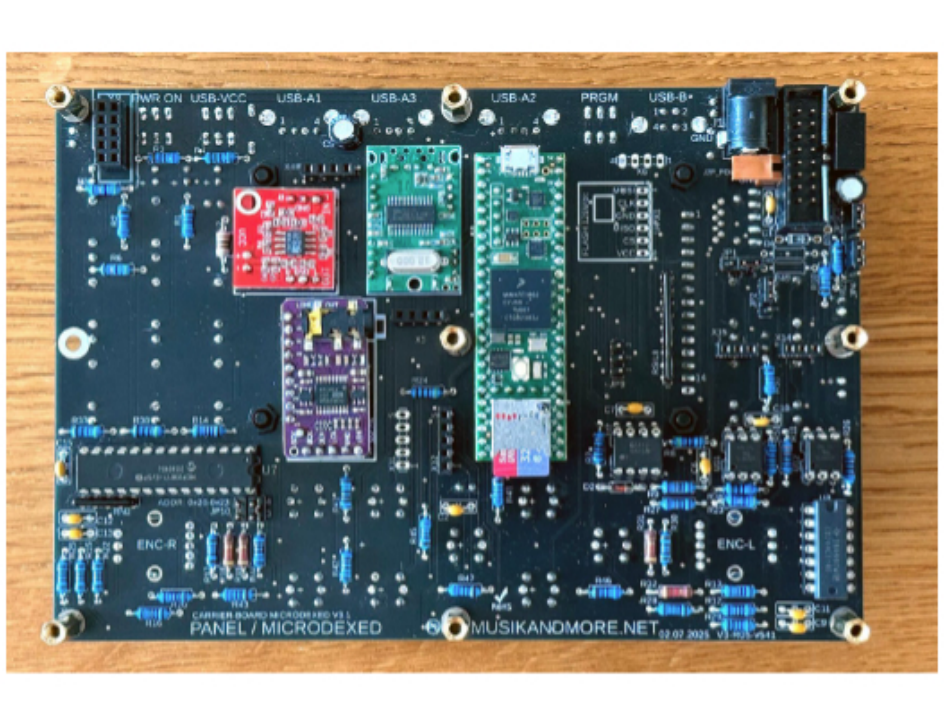
complete jumper, plug and socket strip assembly

9) Component assembly Eurorack 16-pin / DC socket / USB-C

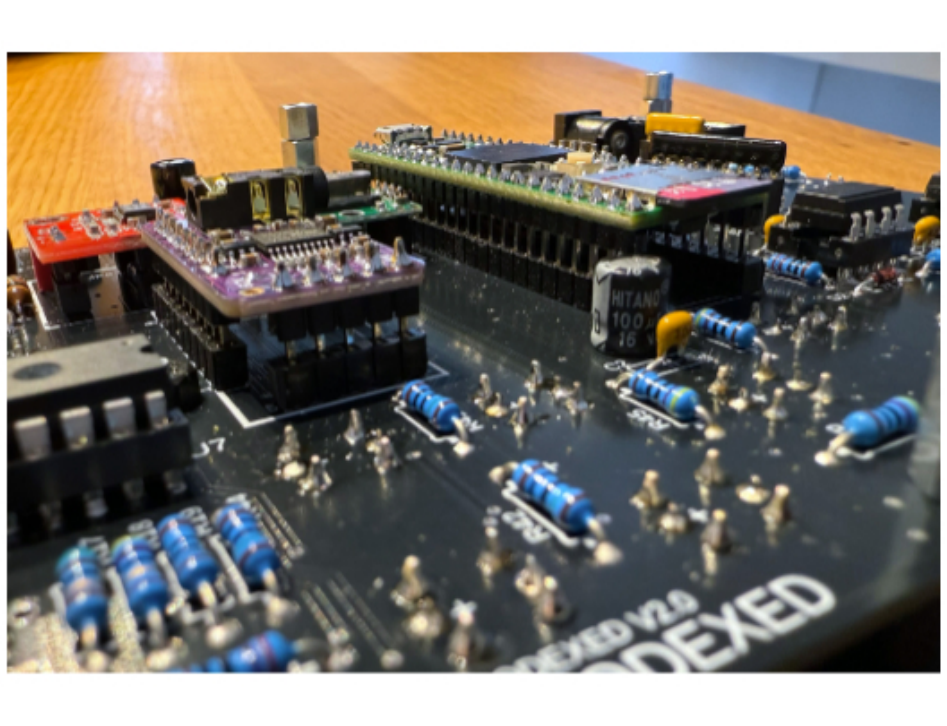
- Now the high 16-pin header for Eurorack power supply (only +5V and GND are required).
- Solder in the +5V DC socket J1=5.5×2.1mm and the J2P_POWER-IN right-angle connector (for the USB-C power supply), and then the "soldering side" is almost finished…



Eurorack box connector and DC socket J1 and J2P for the USB-C PD charger



Eurorack header, DC jack J1 and J2P_POWER-IN for USB-C power module. Solder side populated and with all ICs, Teensy 4.1, and modules (excluding FLASH128Mbit U4, no longer supported!)



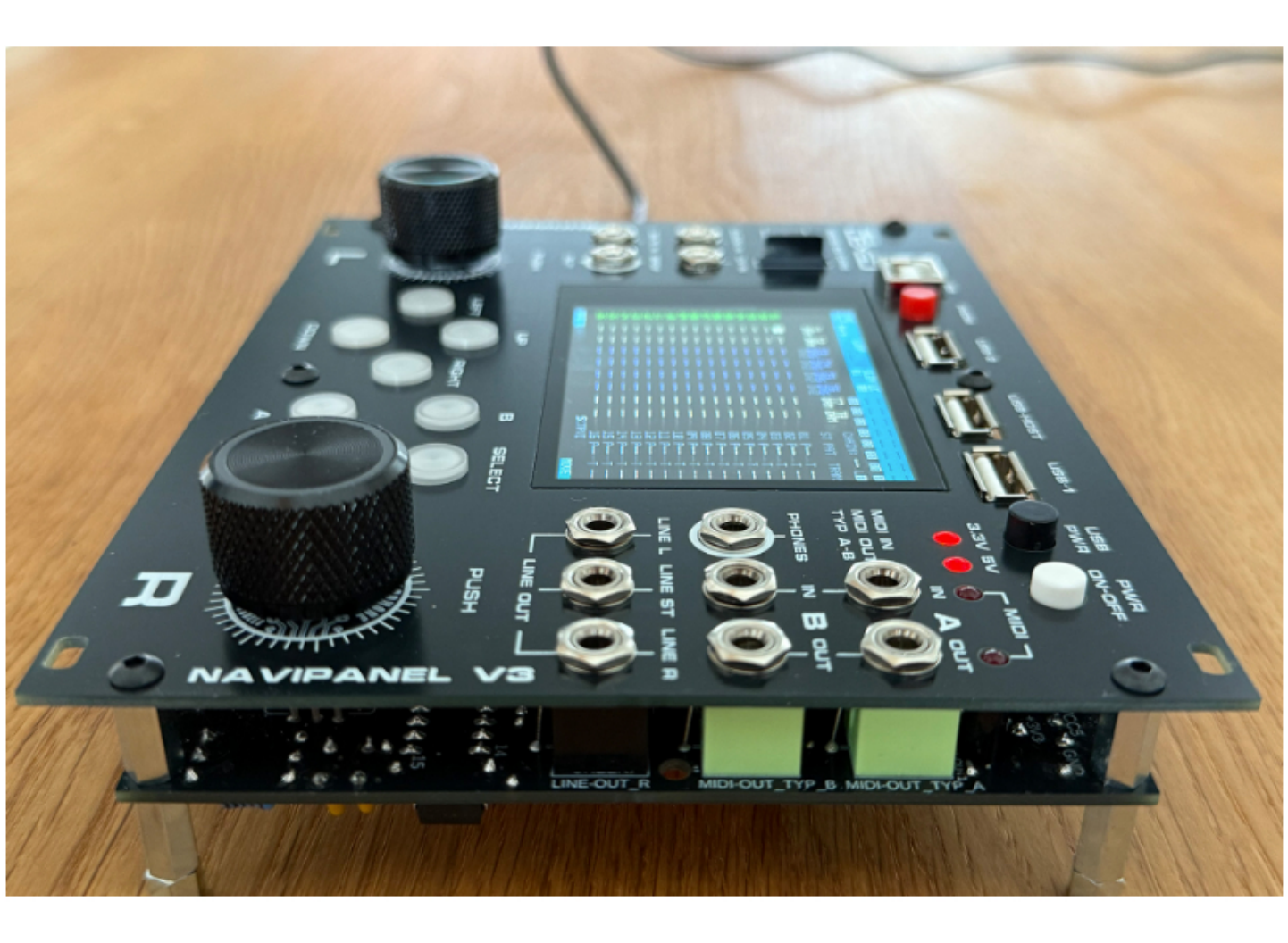
Solder side assembled and with all ICs, Teensy 4.1 and modules

10) Front panel controls and sockets

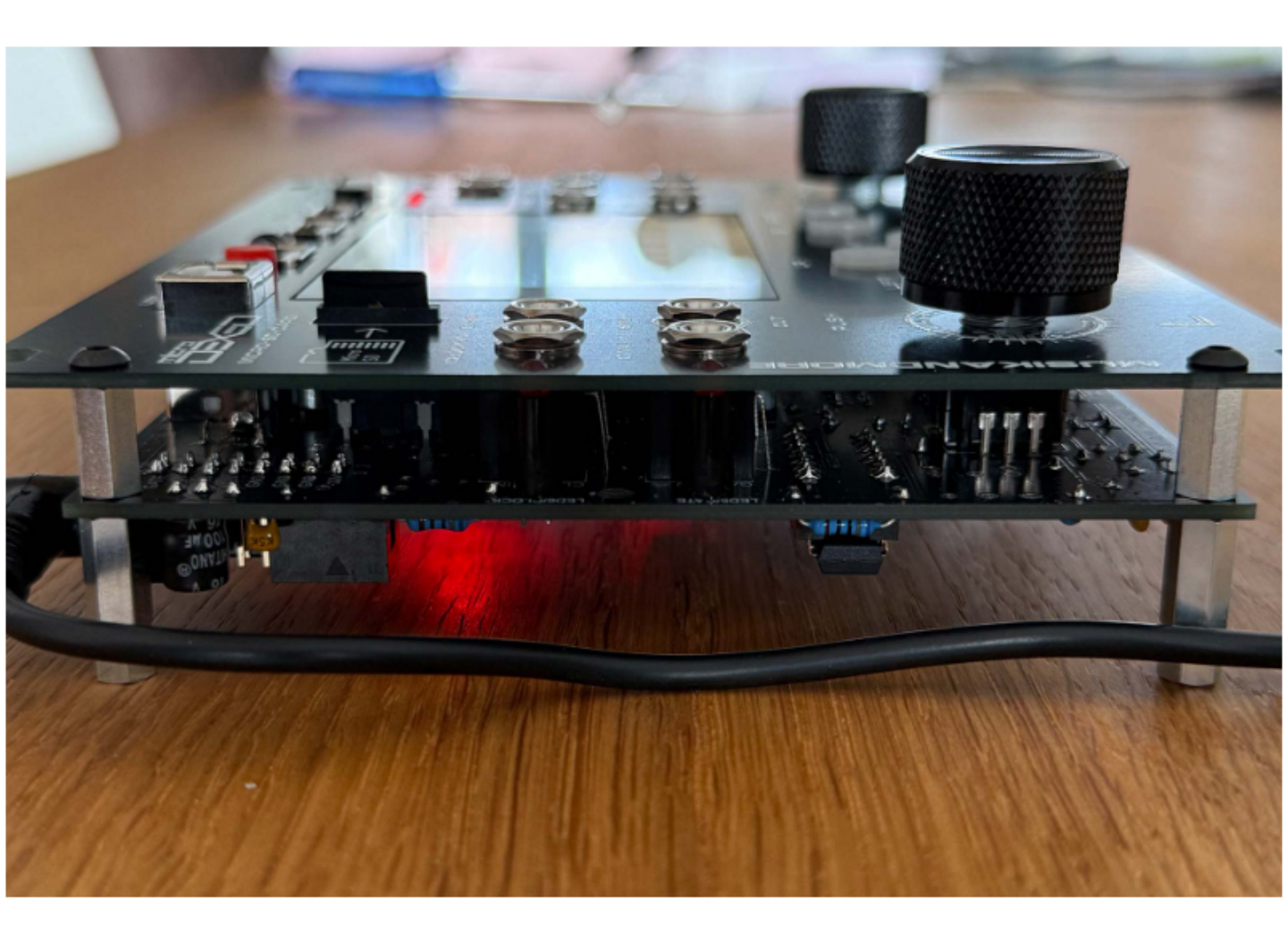
Next comes the "component side" with the 3.2" capacitive TFT touch display, the TRS 3.5mm jacks, 8 LED buttons, 2 switches, 1 button, 3 USB-A jacks, 1 USB-B jack, 2 RGB encoders, 6 red LEDs with spacers, and the Micro SD card slot. (Please be careful when soldering the Micro SD card slot! It's best to solder it with the Micro SD card inserted, to prevent any solder from running through!)

The mainboard PCB is pre-assembled with M3x11 hex bolts (female/female) for mounting the front panel and M3x6 male/female bolts (female) with nuts for the TFT display. This shows exactly how the entire product looks fully assembled. The mounting screws on the component and soldering sides are secured with M3x6mm ISK type ISO 7380-1 (2mm hex key).

The low-profile 14-pin socket strip for the TFT must be aligned horizontally with the front panel. The TFT connectors are shortened to 2.9 mm (**section 5**) to maintain the maximum clearance of 6 mm from the front panel. This is the only way to ensure the **TFT display is flush with the front panel** . The M3x5 countersunk screws are used to precisely secure the TFT display.

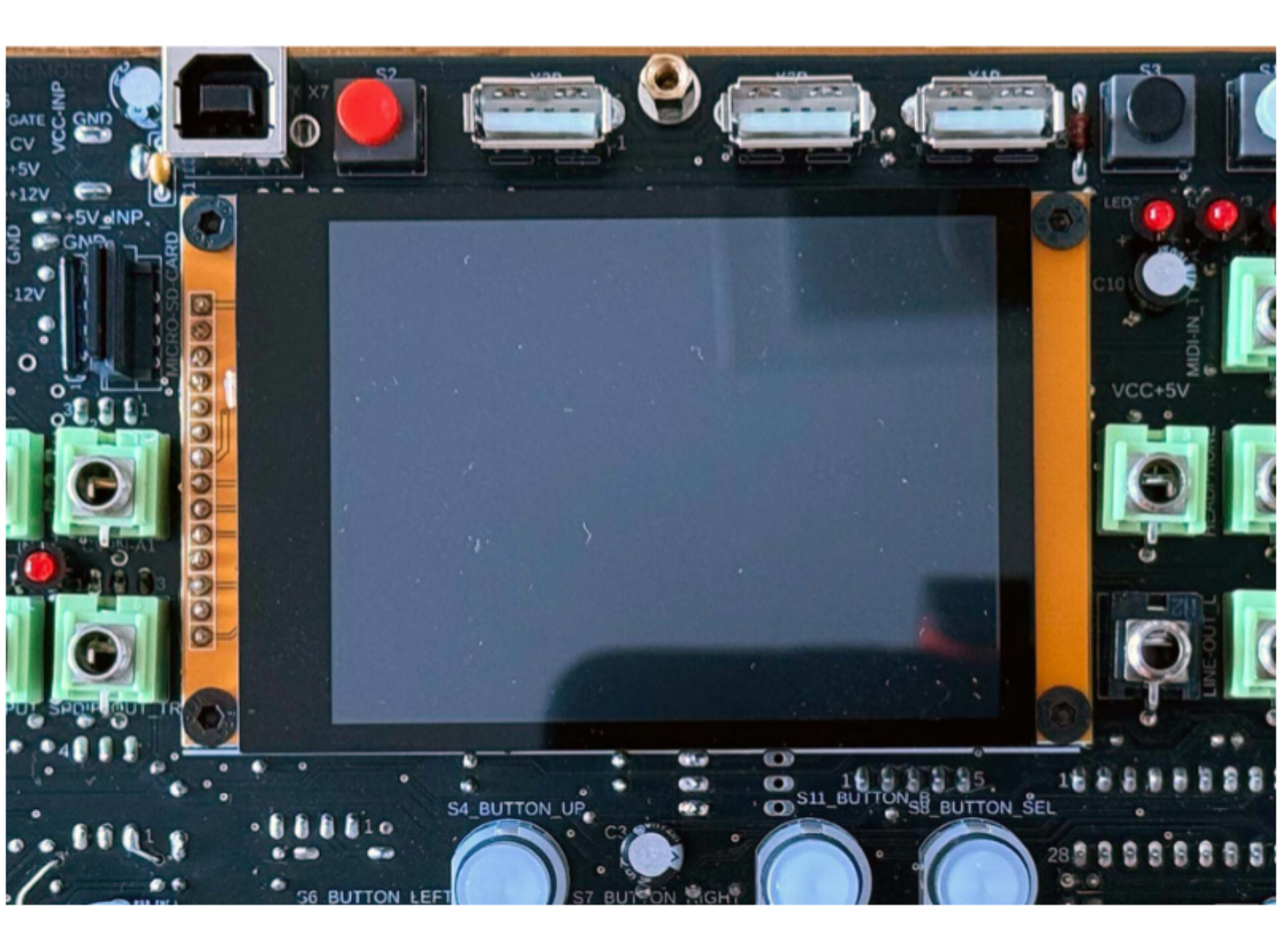


Example: Finished device the TFT display must be flush with the front panel (side view right)

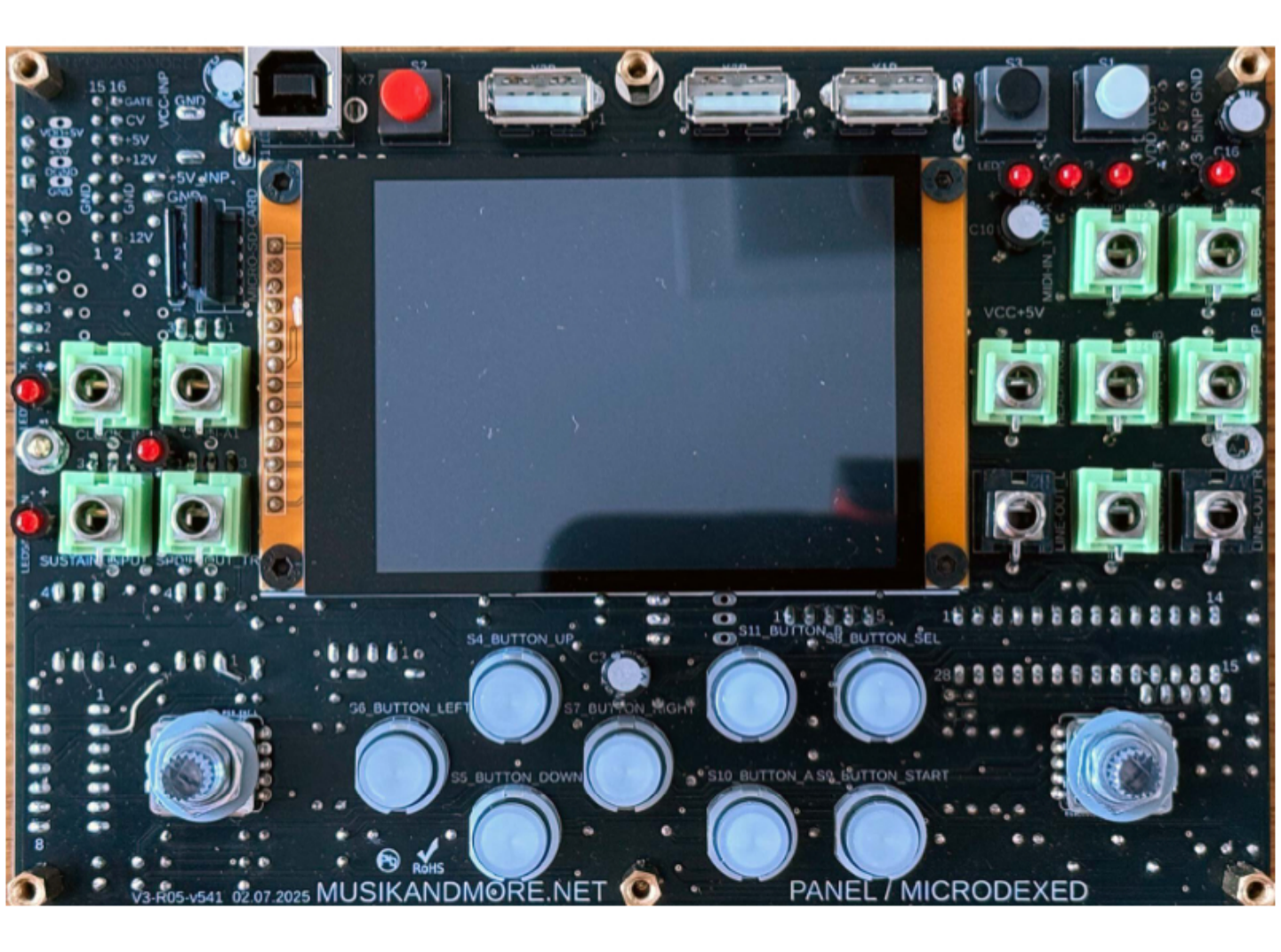


Example: Finished device the TFT display must be flush with the front panel (side view left)

The order for assembling the front elements is as follows:
Generally, all front elements are initially secured with a single soldering point. It's **important not to solder all** the soldering points immediately. It's almost impossible to subsequently align or unsolder completely soldered components. To do this, we recommend plugging the TFT display into the mainboard and securing it with the M3x5mm countersunk head screws.



Insert the TFT and fix it with SK M3x4 (ISK or TX)

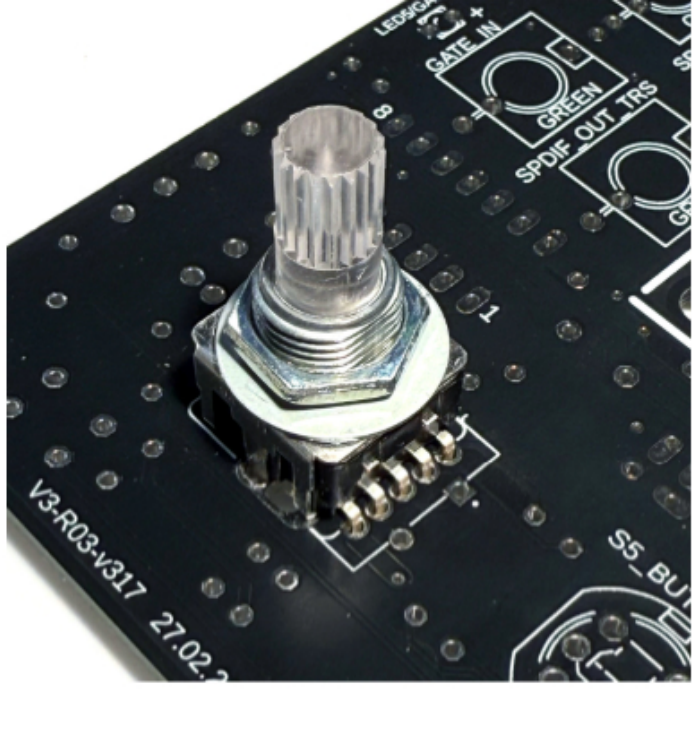


Top view of NaviPanel V3 without front panel

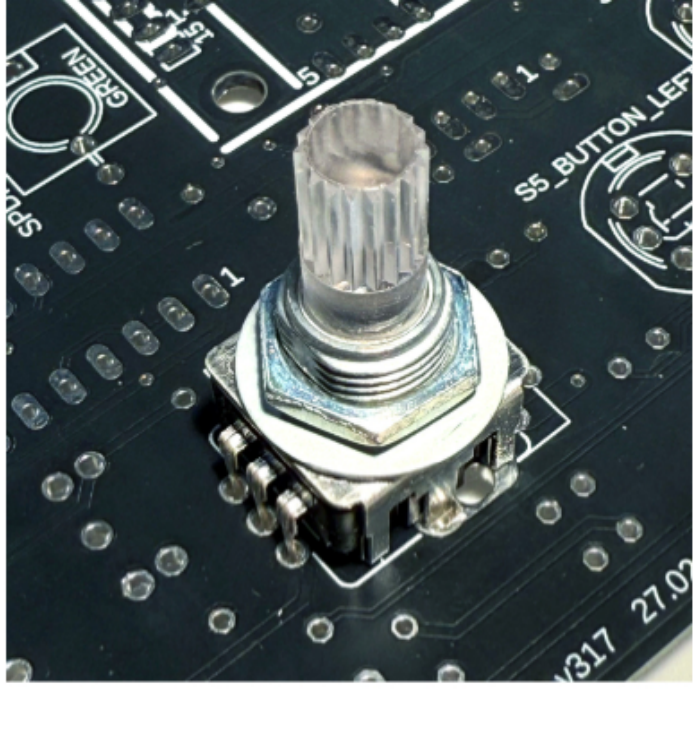
11) Equipping the RGB encoders

Now insert the two RGB R/L encoders (3/5 pins) and secure them with one soldering point. The metal tabs on the RGB encoders ensure they fit **tightly** into the mounting holes. Please install carefully! Before installing the panel, adjust the mounting nut so that it only supports the front panel. The encoders are **NOT** screwed onto the front panel from above!

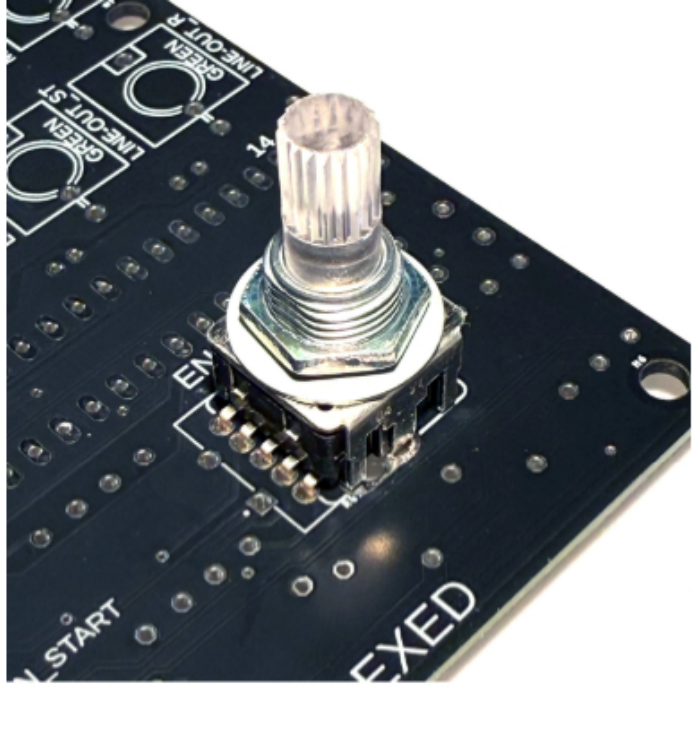
Note: Please pay careful attention to the insertion position of the two encoders!



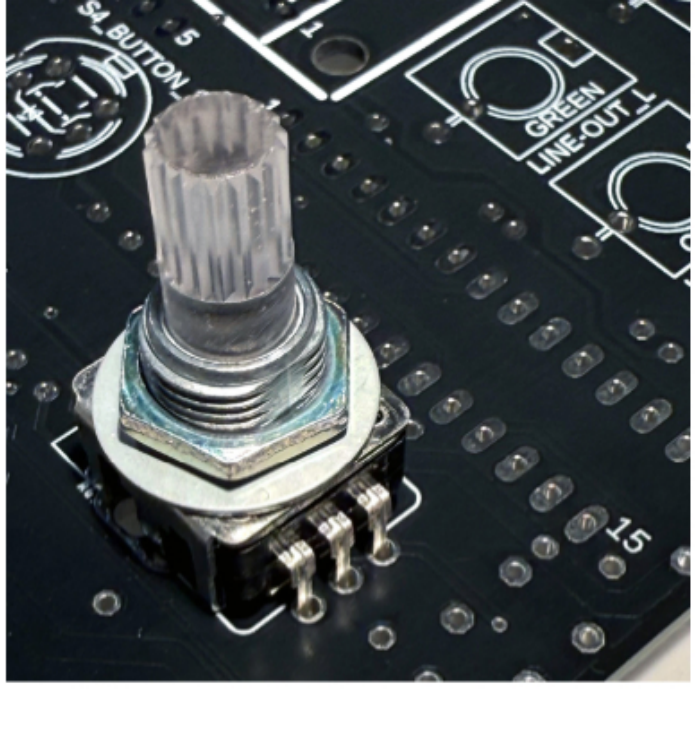
RGB Encoder L 5 Pins



RGB Encoder L 3Pins



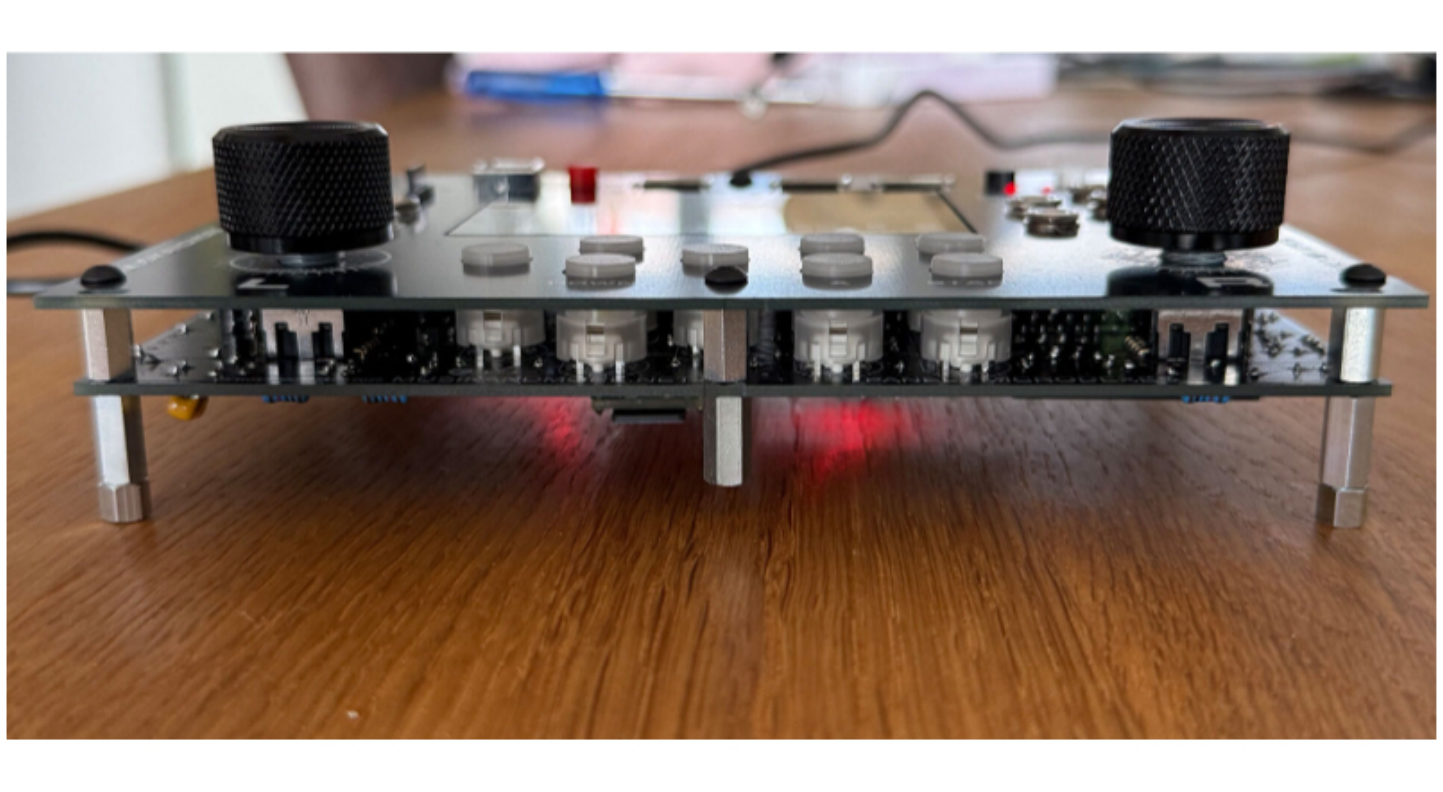
RGB Encoder R 5 Pins



RGB Encoder R 3 Pins

For info: The motherboard is now only designed for RGB encoders (3/5 pins). The software for this DIY kit only supports RGB encoders.

RGB rotary knobs for encoders:



RGB rotary knobs 22mm installed in the front panel

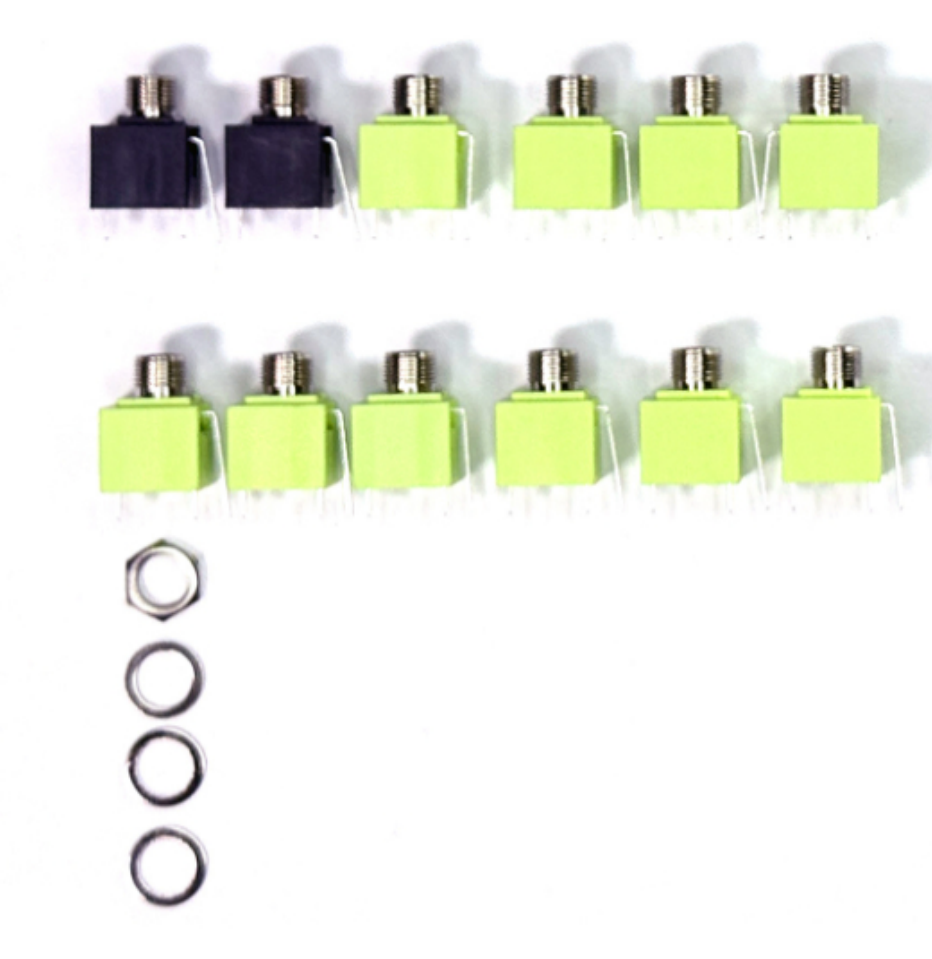
with RGB encoder

Left: Encoder without thread

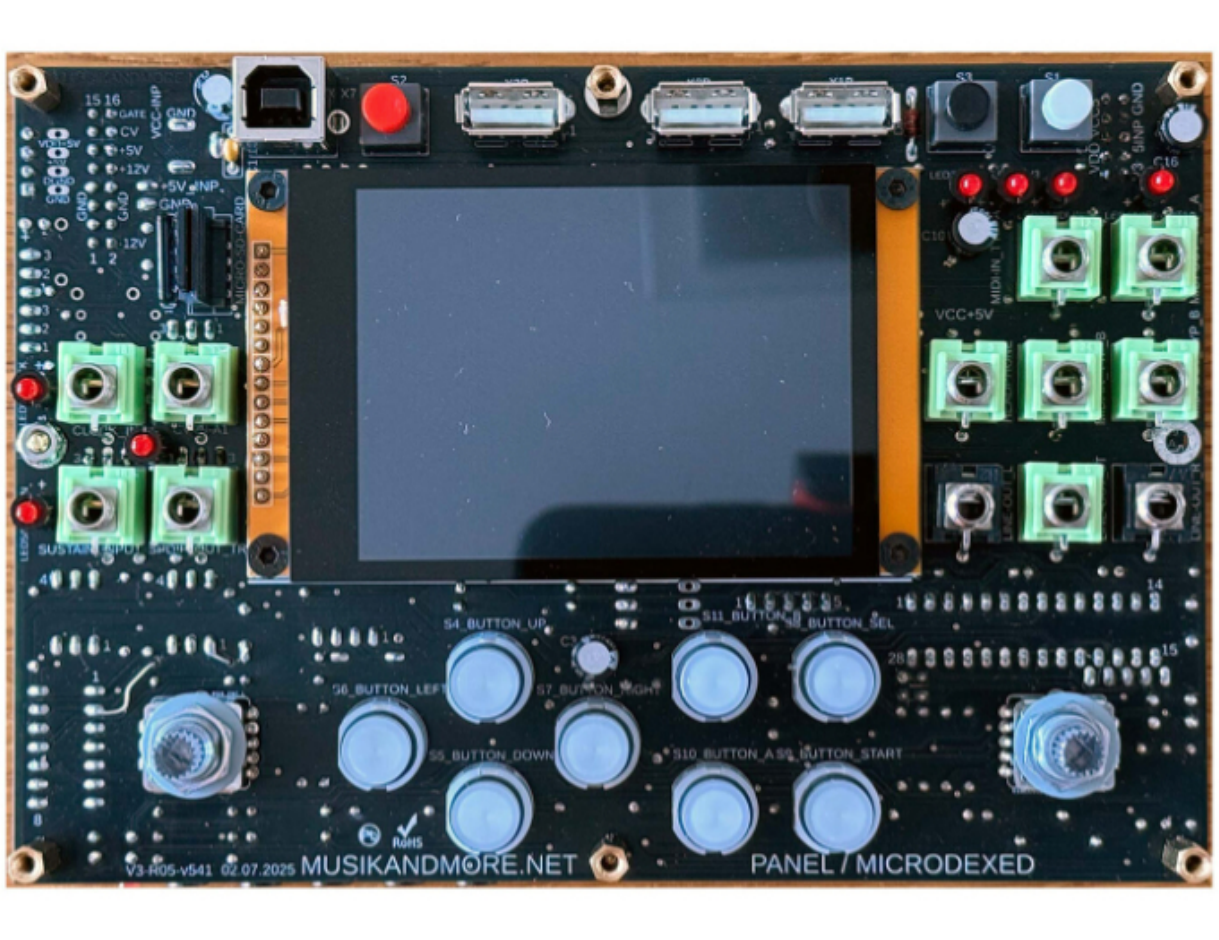
12) Equipping the TS/TRS jacks

Now the TS/TRS jacks are inserted.

- 2x TS (black) mono and 10x TRS (green) stereo jacks
- Then put on 2 pieces of 6mm washers per TS/TRS sockets (24 pieces in total).
- The washers serve to adjust the height of the front panel. (Reserve 2x washers and 1x nut)

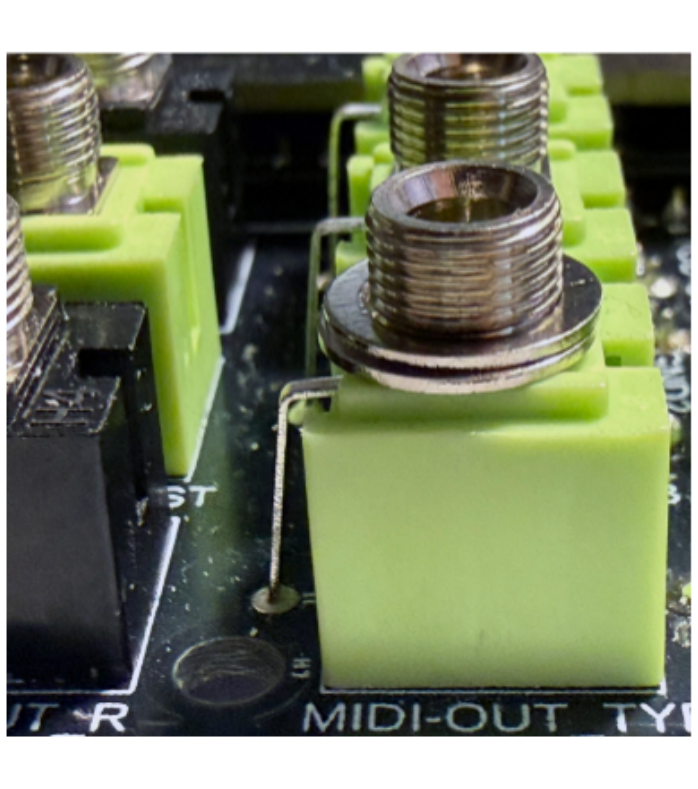


2x TS sockets (black) and 10x TRS sockets (green) with M6 hexagon nut and 3 6mm washers

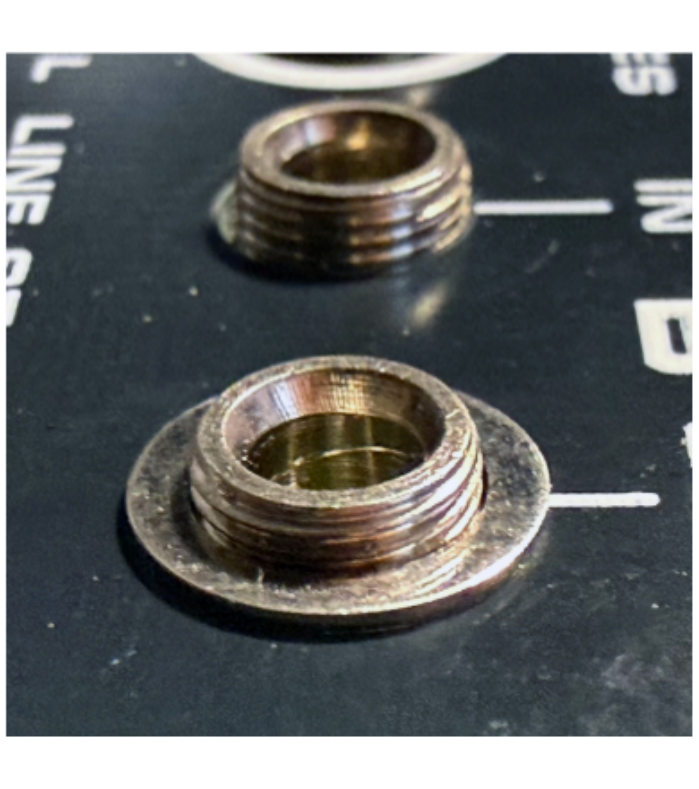


Green = TRS jacks (stereo) | Black = TS jacks (mono)

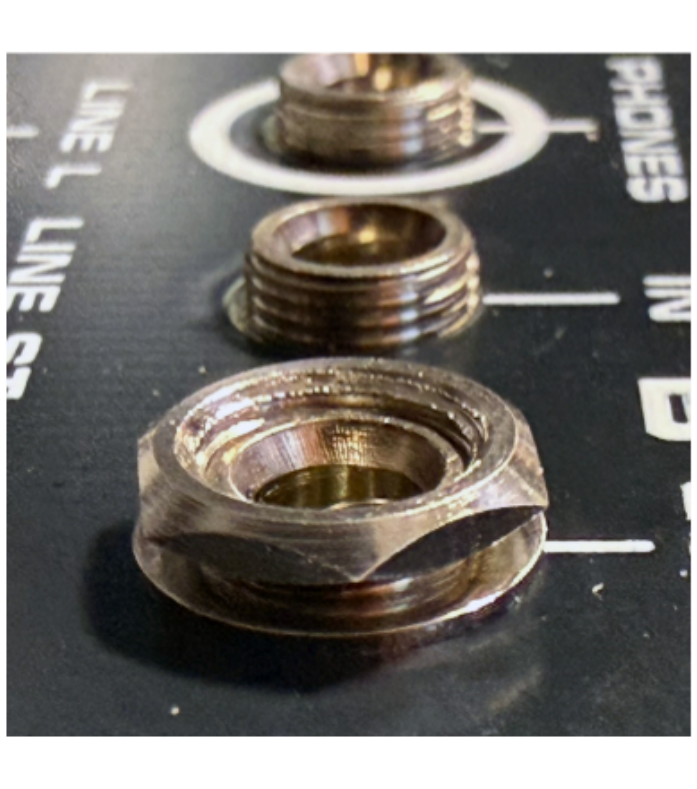
For your information: When attaching the TS/TRS sockets to the front panel using the washer and hexagon nut, the front panel will be bent downwards without the 2 washers, so place 2 washers underneath each socket. Then you can carefully tighten the sockets later using the M6 hexagon nut (SW 8mm) and washer.



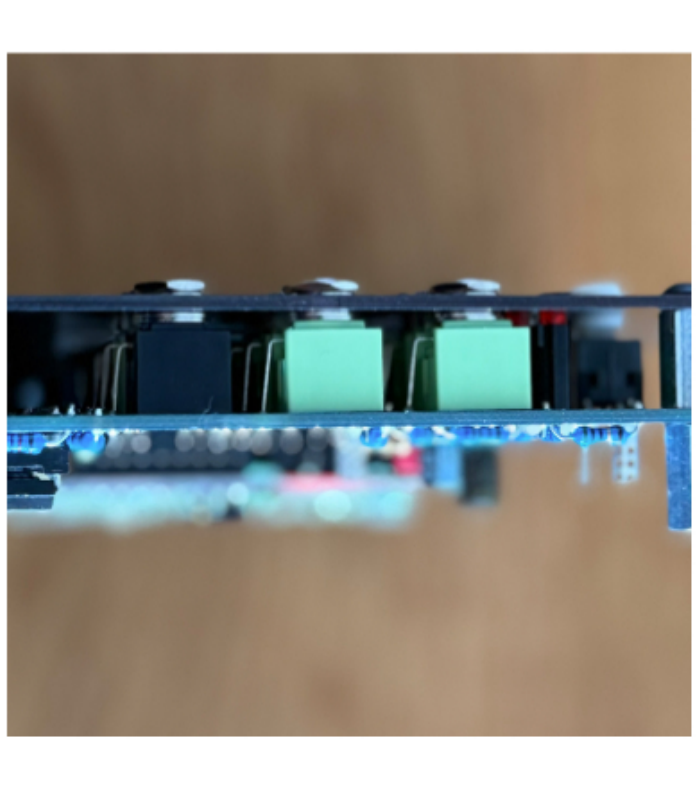
1. 2x U-washer



2. 1x U-washer



1x M6 hexagon nut

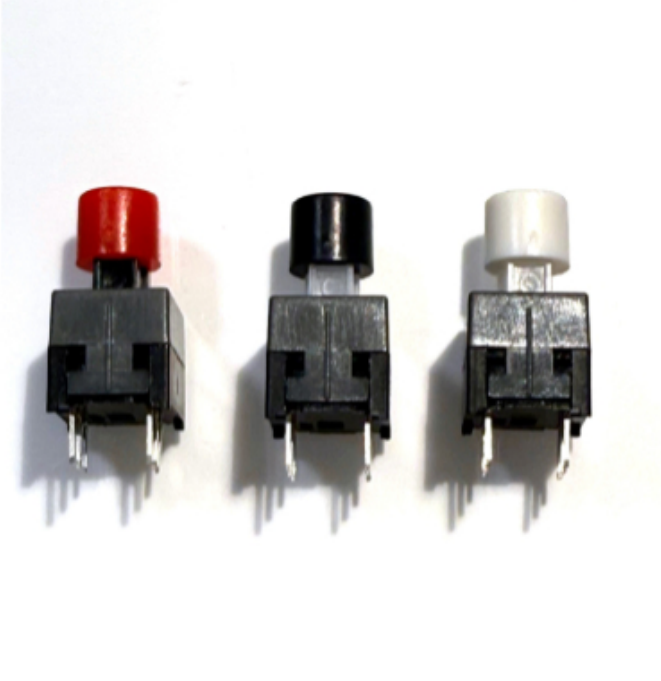


for all 12 TS/TRS jacks

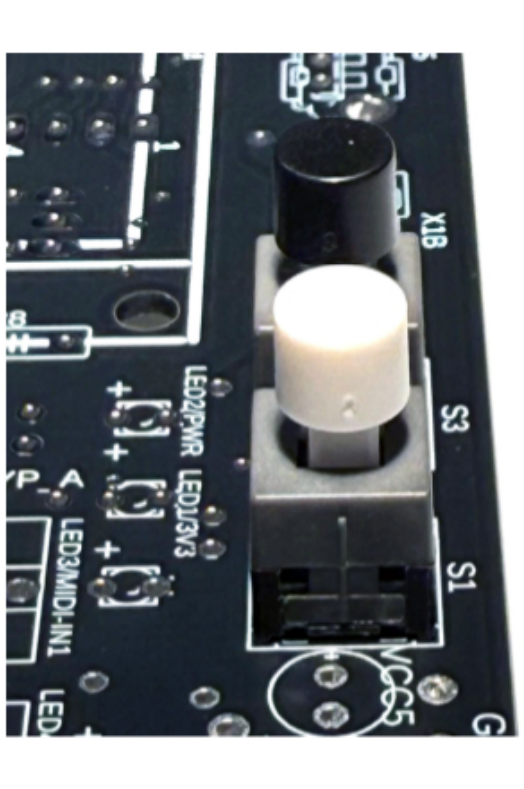
13) Equipping the USB switches and PRGM buttons

Next, install the two 2-pin switches (2 changeover contacts) **S1 PWR** (white button) and **S3 USB-PWR** (black button), as well as the **S2 PRGM** button (red button). Both switches and the button have a vertical marking on the right side.

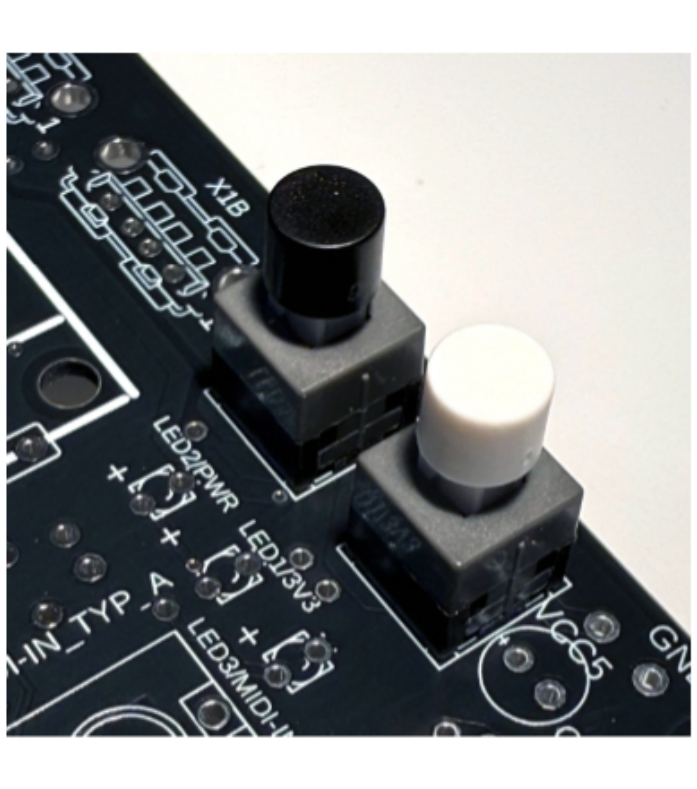
IMPORTANT: This must point to the right for both switches and the button ! If not, the switching function is reversed: OFF/ON (incorrect), but **the correct function is ON/OFF** . Also, initially fix the switches/buttons with just one soldering point.



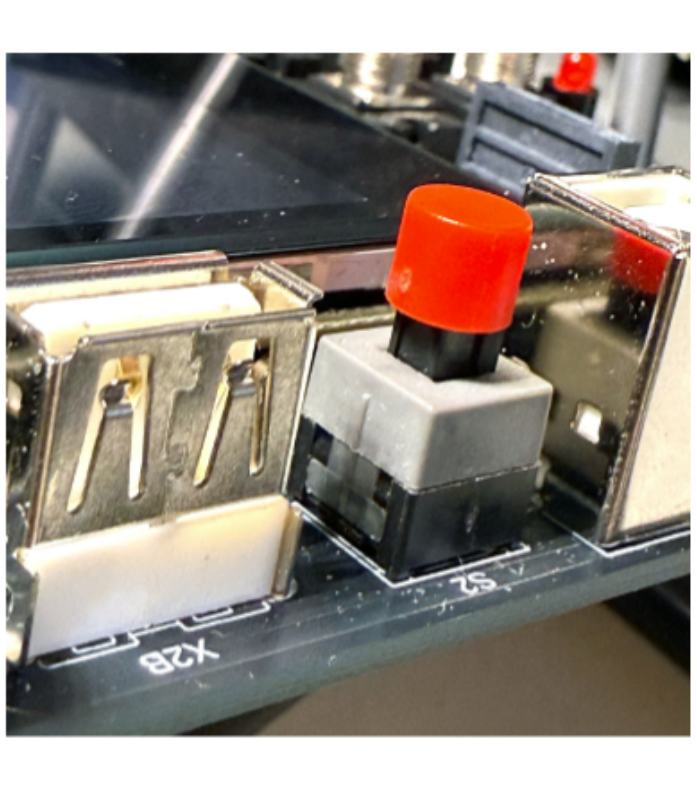
1. Pay attention to the vertical marking on button S2 when installing!



2. Pay attention to the vertical marking on switches S3 and S1 when installing!



2. Pay attention to the vertical marking on switches S3 and S1 when installing!

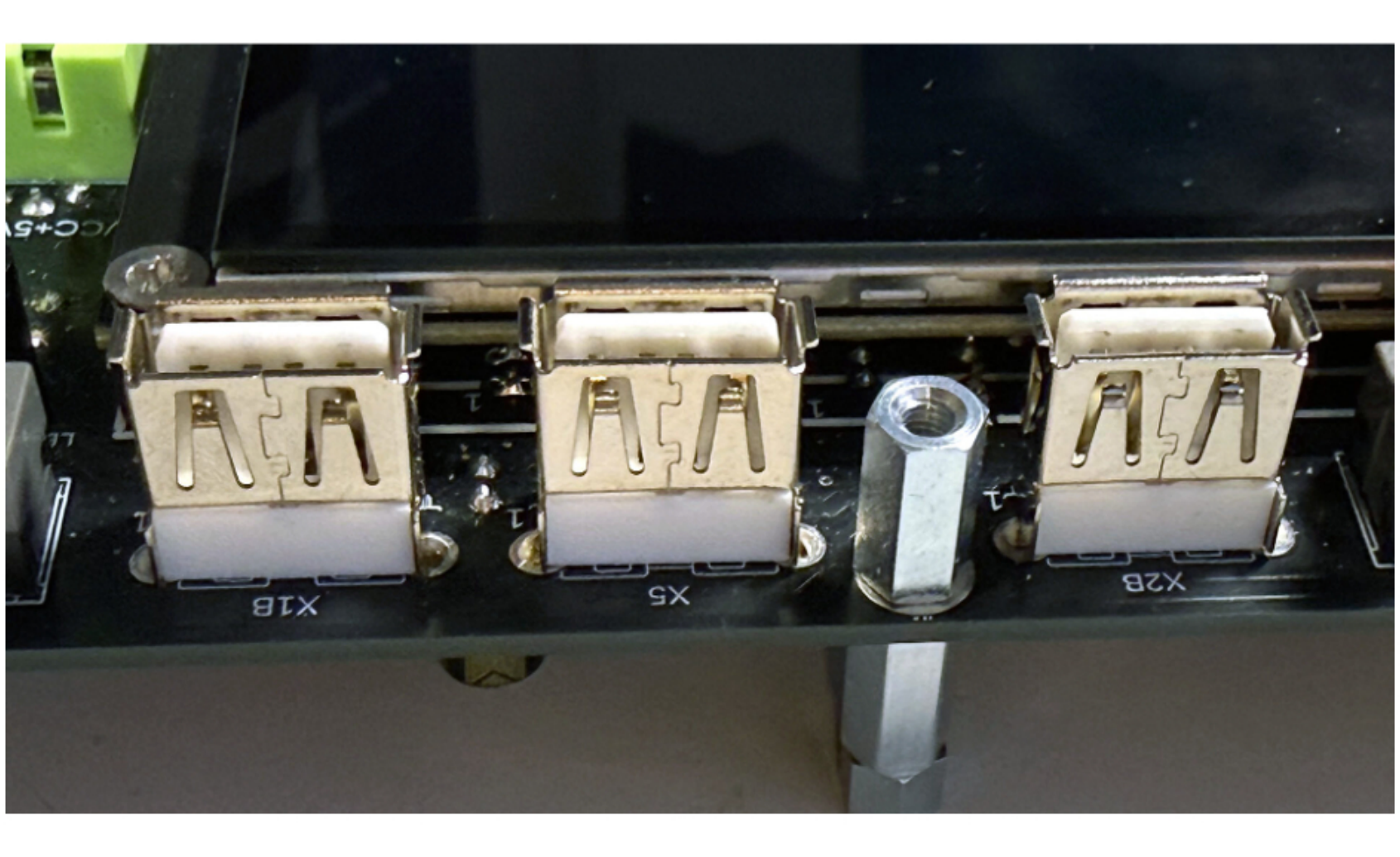


1. Pay attention to the vertical marking on button S2 when installing!

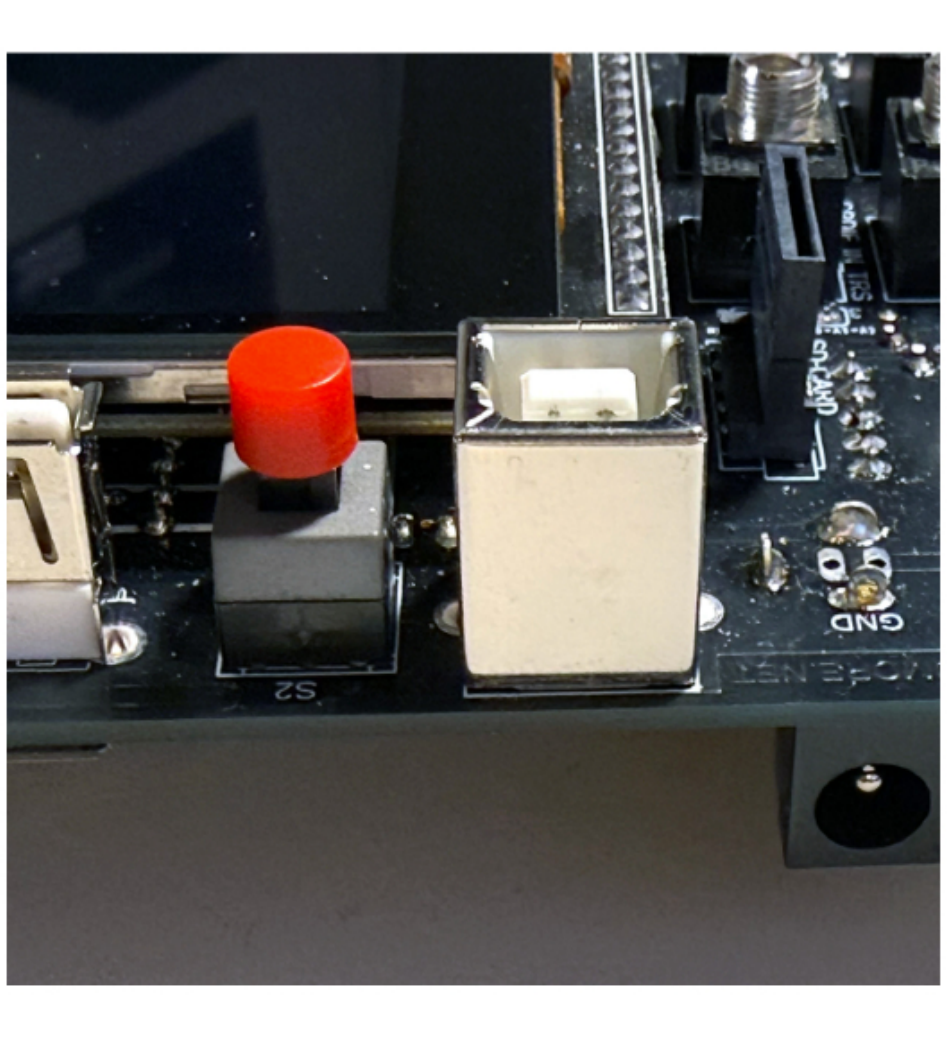
14) Equipping the USB host and USB-B sockets

The next step is to install the USB-A sockets (USB-1, USB-2, USB-3) and the USB-B socket. The procedure is the same as for the TRS sockets. Plug in and align. Here, too, only solder one pin first.

The side housing pins on the USB ports clamp them securely, making them easier to solder later. Only solder the housing pins after all four other connections per USB port have been soldered. The USB ports are very difficult to align afterward.

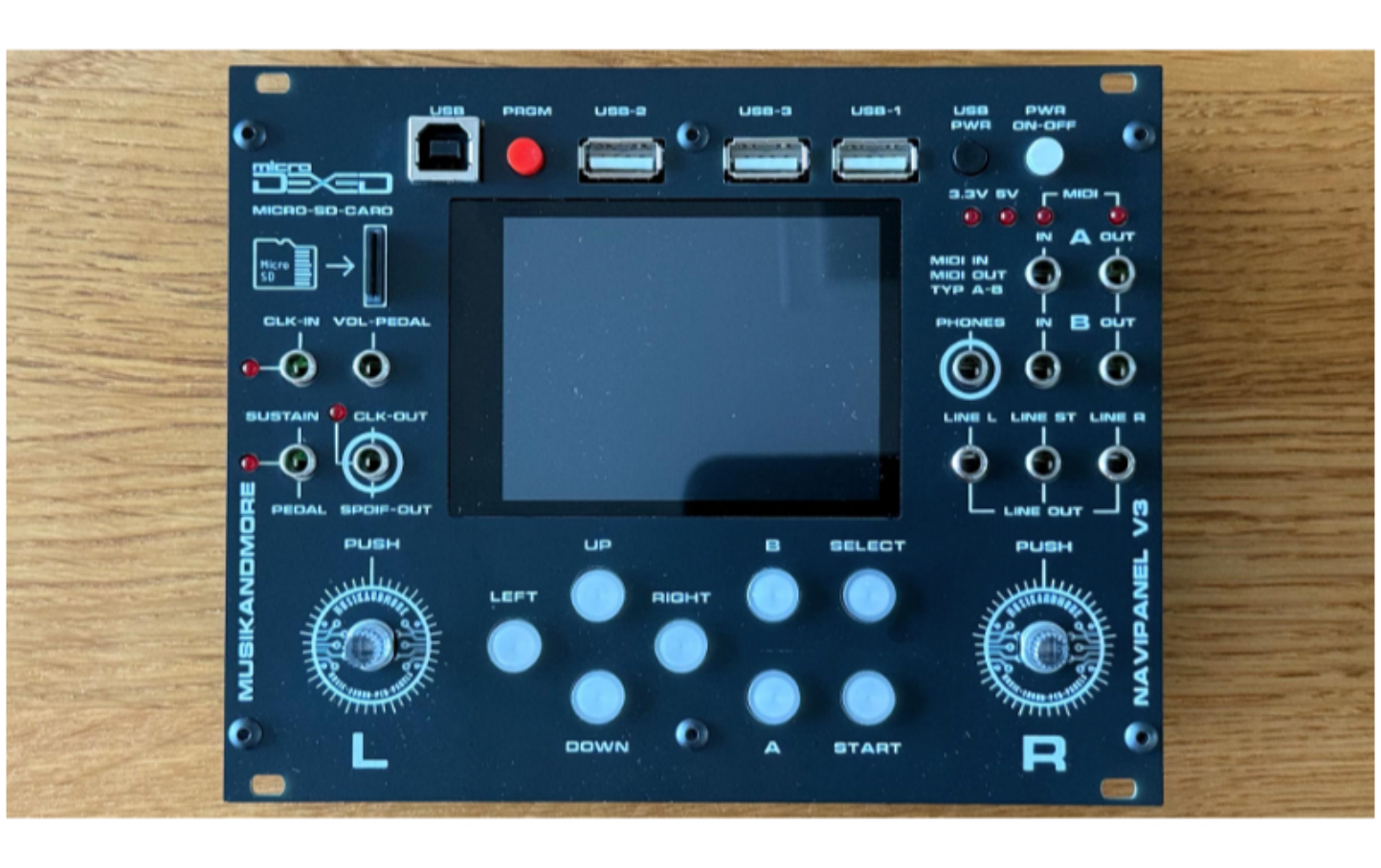


USB A Host Port 1 | USB A Host 3 | USB A host port 2

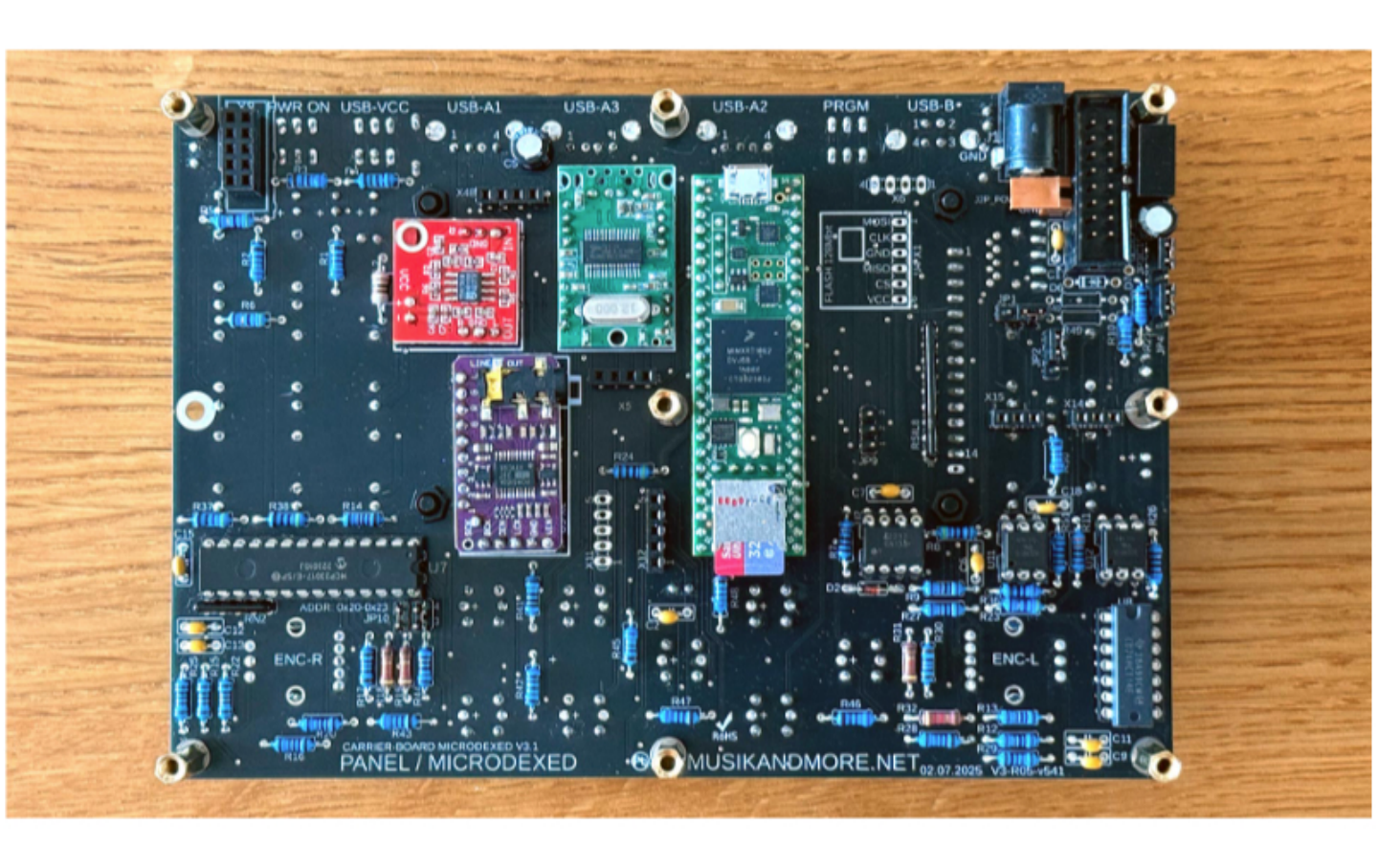


USB-B 2.0 PC/MAC from Teensy 4.1

Before soldering/fixing can begin, the front panel is mounted with the six M3x6 hex screws. The screws are tightened hand-tight with a 2mm hexagon socket. All populated sockets and switches should then be pushed through the panel. Now turn the panel over and solder the components in place with **a soldering point** . When soldering, always check that the sockets are firmly seated on the board before soldering.
If there is no wobble and all components are seated tightly and straight on the circuit board, the remaining component pins can be soldered.



NAVIPANEL V3 (v541 02.07.2025) with front panel fully assembled



NAVIPANEL V3 (v541 02.07.2025) – back / fully equipped

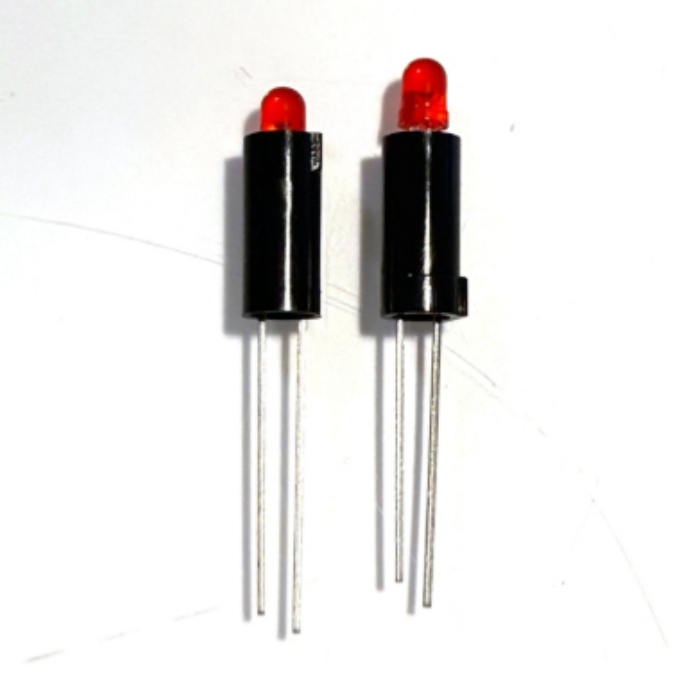
15) GND – Soldering of GND pads and areas

The **GND pins** require very good heat distribution for a clean soldering joint, so if possible, heat the soldering pad and the component pin at the same time and add a very small amount of solder. The soldering is "good" when the solder flows "voluntarily" into the via.

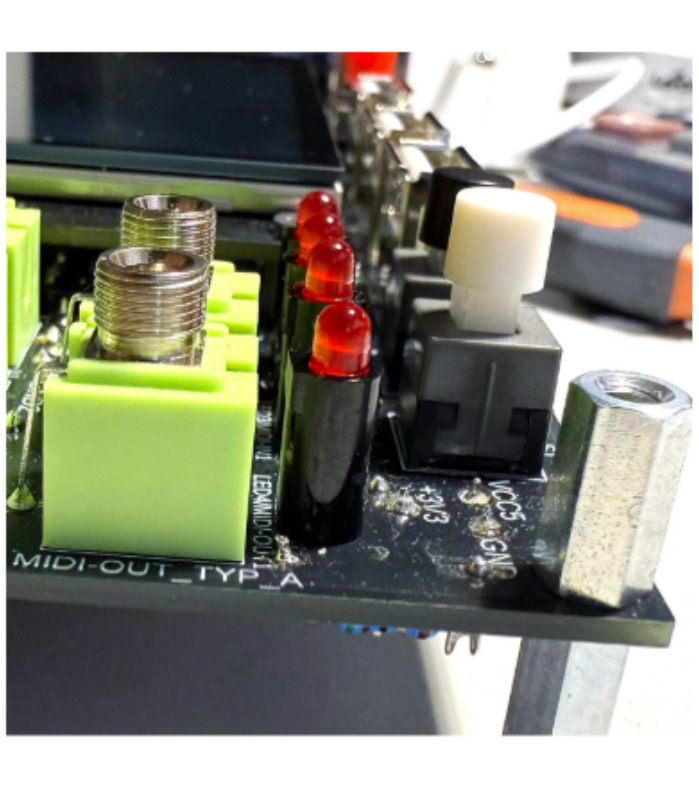
A quick tip: In general, less (solder) is more. The larger the solder ball, the more likely it is to have a cold solder joint! The fact that the GND pins are harder to solder than the other pins is due to the copper surfaces on both sides of the GND and their high heat dissipation on the circuit board. However, the electrical advantage of good mass distribution on the soldering and component sides outweighs this.

16) Fitting the red 3mm LEDs with spacers

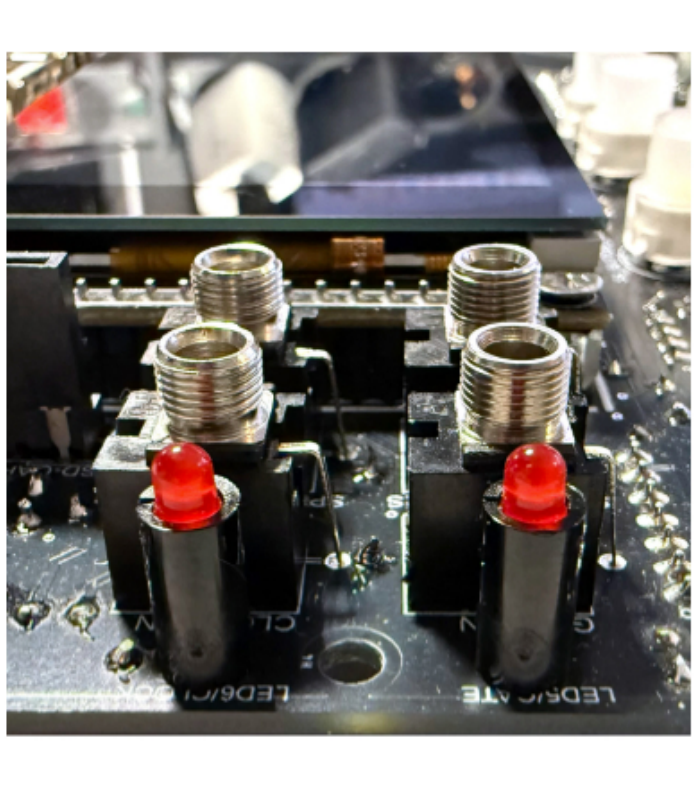
The next step is to disassemble the front panel and install the seven 3mm red LEDs. These are placed on the black standoffs. The **long leg is the anode** . The anode **+ pole of the LED** is marked on the circuit board. The standoffs have different ends: one with a recess and the other without. The direction determines how far the LEDs protrude through the front panel. Please use **the deep end !**



the LED on the left is correct!



4 LEDs on the right side of the panel



3 LEDs on the left side of the panel

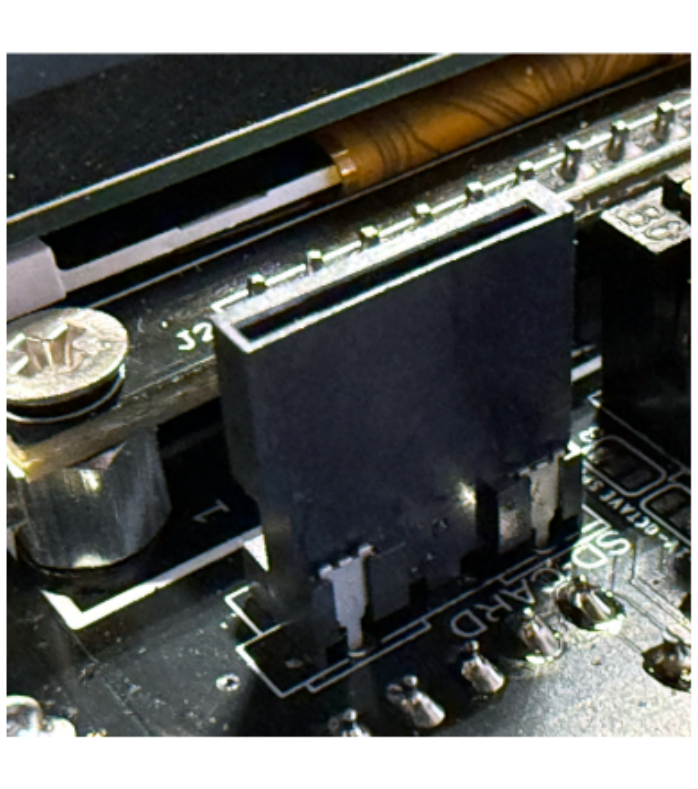
The LEDs must shine evenly through the front panel.

An example:
Correct = recess at the top = LED protrudes approximately 0.7mm through the front panel.
Incorrect = recess at the bottom = LED protrudes approximately 1.5mm through the front panel and no longer fits between the panel and the PCB... a maximum gap of 11mm. Then remount the front panel using the M3 hex screws.

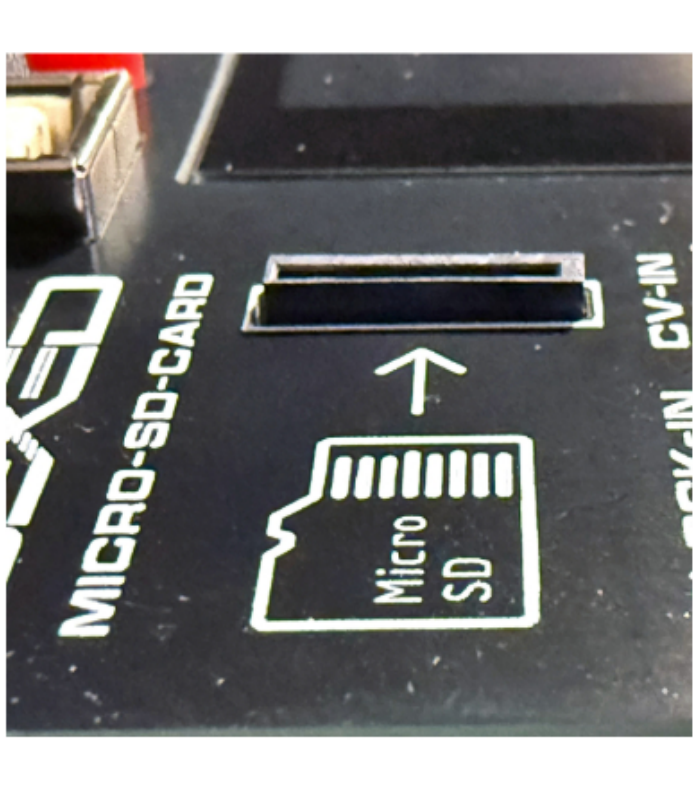
- Turn the panel over and check the long legs of the LEDs again (+)
- Then solder the long legs, the other leg is the cathode and is connected to GND for all LEDs.
- (See also **point 15 Soldering GND pins**)

17) Equipping the Micro SD card slot

Now it's the turn of the micro SD card slot. The micro SD card slot only fits one way on the board. The solder pins are very close together, so first fix them with a single soldering point. Please be careful when soldering the micro SD card slot! It's best to solder it with the micro SD card inserted, as this prevents solder from running through and potentially damaging the SD card slot! It's also important to use a small amount of solder here.



Micro-SD card slot assembly side

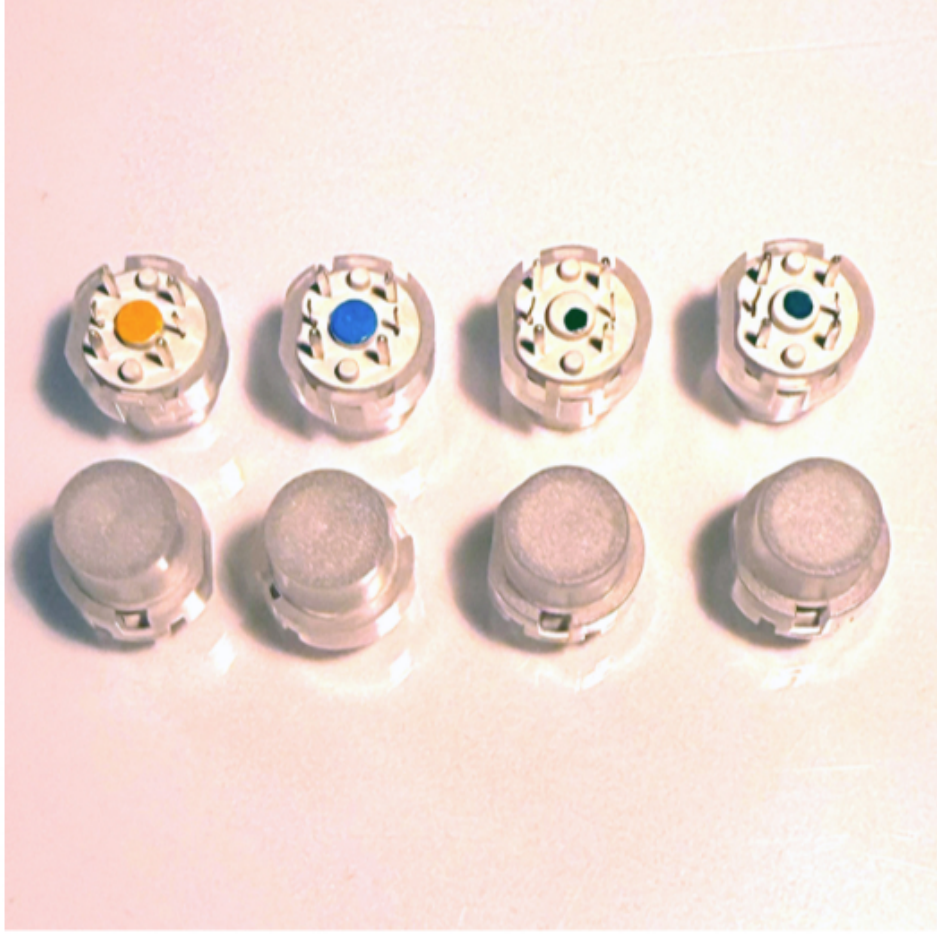


Micro SD card slot in the front panel

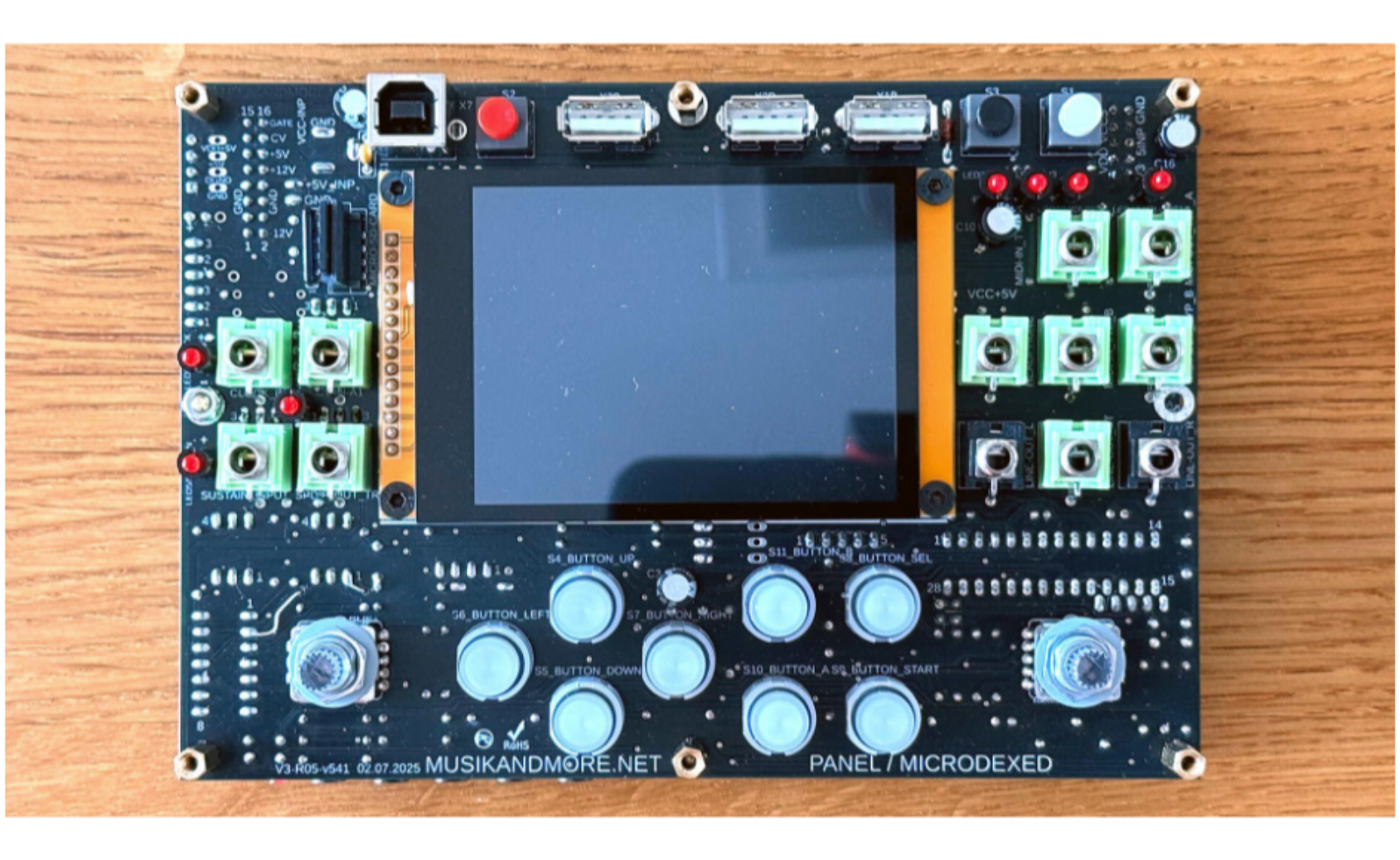
The next step is to reassemble the front panel and align the LEDs and the SD card slot and solder them completely.

18) Assembly of the LED buttons

The final part of assembling the motherboard is the LED buttons. The buttons naturally differ in their actual function and LED color. The left group (UP, DOWN, LEFT, and RIGHT) has RED LEDs. The color coding for the LED color is located on the underside of the buttons. So be sure to check before soldering!



LED buttons: YELLOW, BLUE, RED GREEN



LED buttons on the left 4x WHITE, on the right RED, BLUE, GREEN YELLOW

(**A notice** : the LED color WHITE is marked with the color marking "black".)

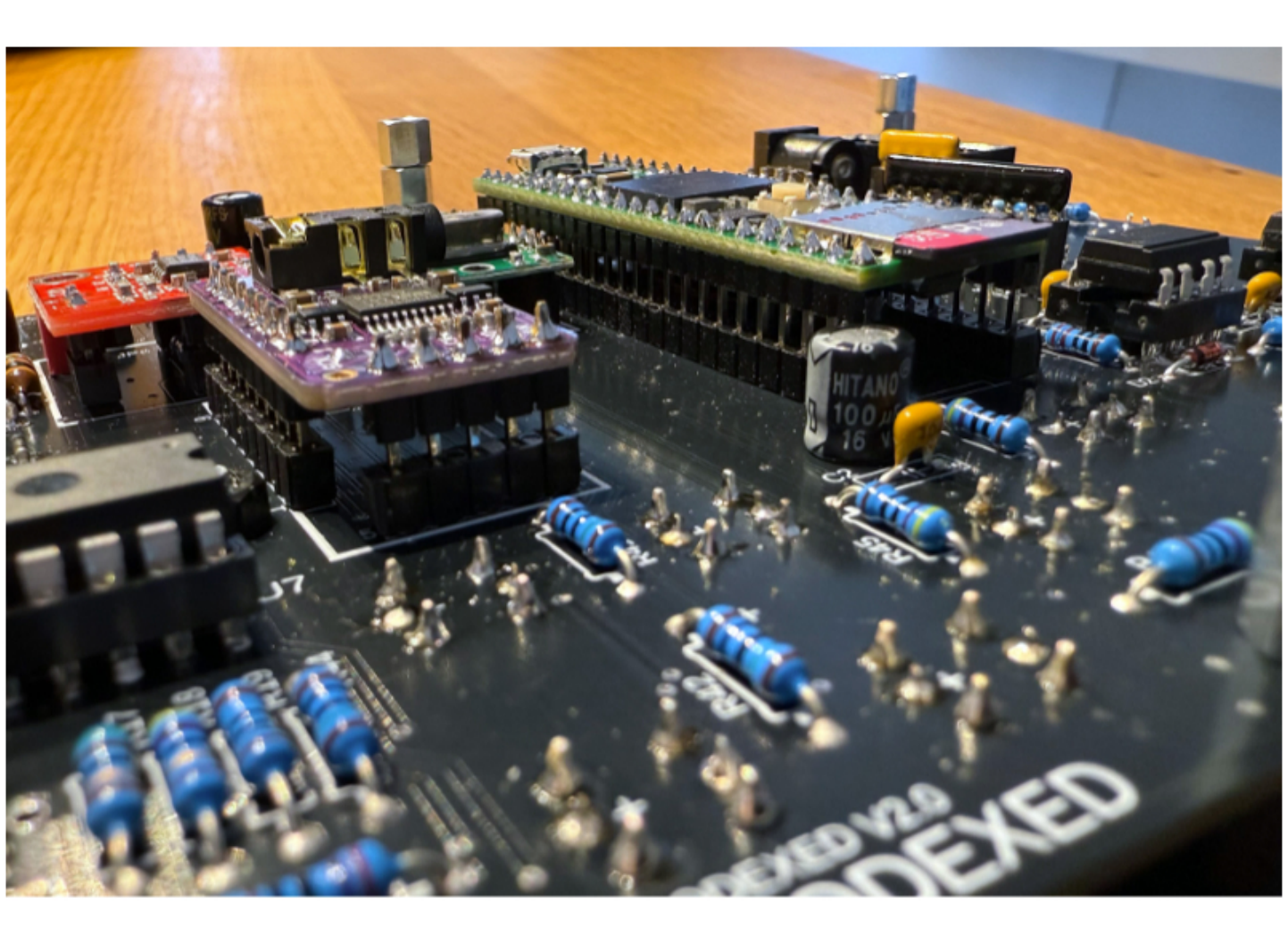
The UP, DOWN, LEFT, and RIGHT buttons are white. Button A is red, Button B has a green LED, the SEL button has a yellow LED, and the START button has a blue LED. All buttons have a straight edge, which must strictly comply with the component markings when assembling the buttons. Incorrect assembly will result in a non-functioning LED and no button function. Please check carefully before soldering! Then reinstall the front panel and screw it tight.
Caution: The buttons will fall out when the front panel is turned over. This means that all 8 buttons must be temporarily secured to the front panel with light adhesive tape. The buttons must be easy to operate once the front panel is installed.

Note: All buttons are fitted with a 2-3 mm diameter (13 mm) heat shrink tubing over the cylindrical push button and are shrunk using a heat gun. The white and blue buttons are very bright and show through the surrounding buttons when pressed. The heat shrink tubing reduces this effect.

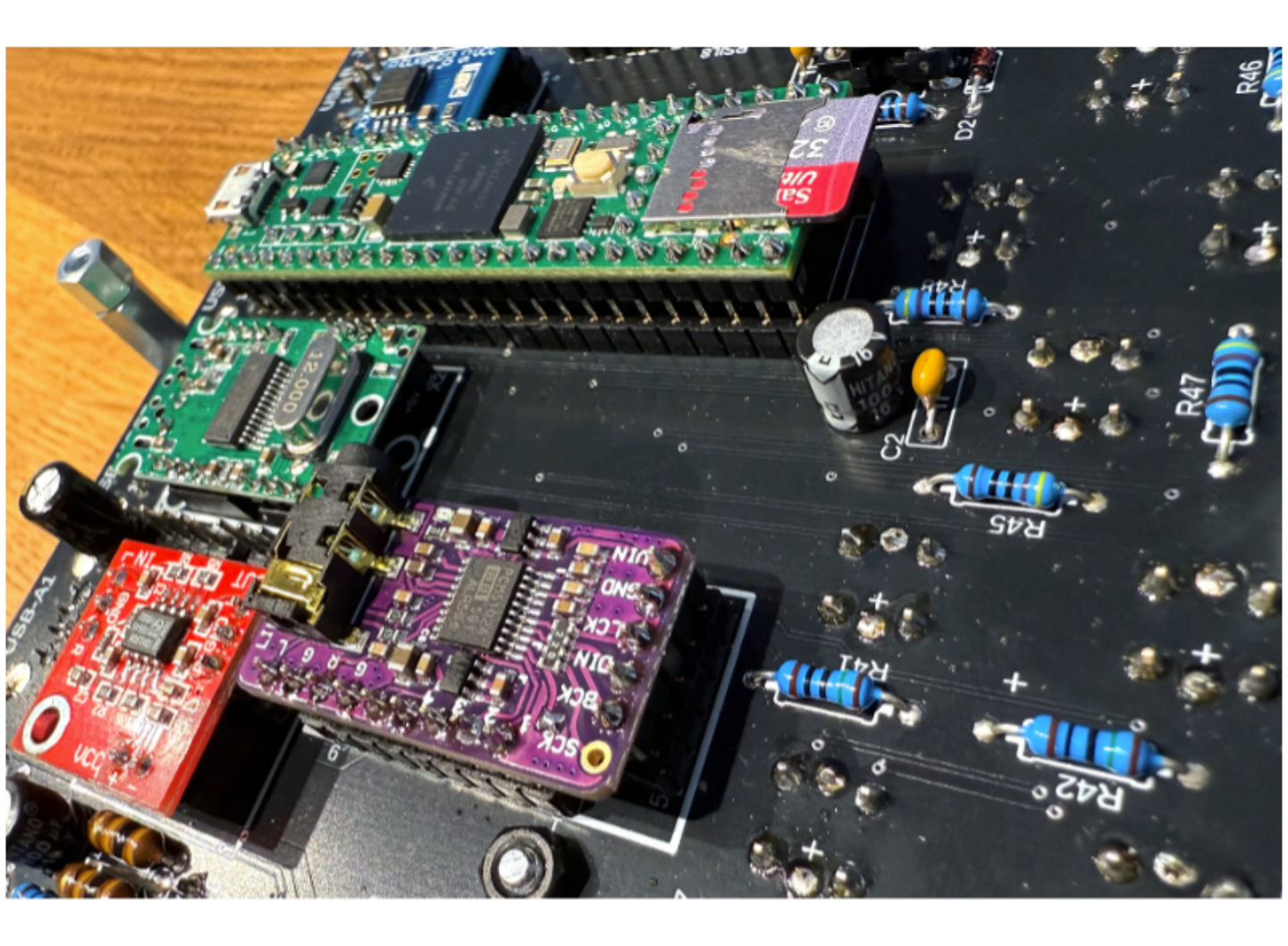
The buttons and LEDs are also connected to GND via three pins. Here, too, the following applies: good heat distribution during soldering, minimal soldering, and only soldering one pin per button at a time, as well as not letting the buttons overheat. Make sure the buttons move smoothly after soldering and still have a noticeable pressure point.

19) Equipping the socket strips for the modules

Now we come to equipping the Teensy 4.1, the PCM5102, and the headphone amp with the header pins. To ensure the pins are aligned straight into the modules, plug the header pins into the existing sockets and then solder the module or the Teensy onto the header pins. On the Teensy, first secure/solder the header pins to various solder pads. Please solder the Teensy 4.1 with extreme care and ensure that no unwanted solder bridges are created. Here, too, use a small amount of solder. It's better to re-solder carefully than to remove solder balls.



Equipping with low-profile socket strips for the Teensy 4.1



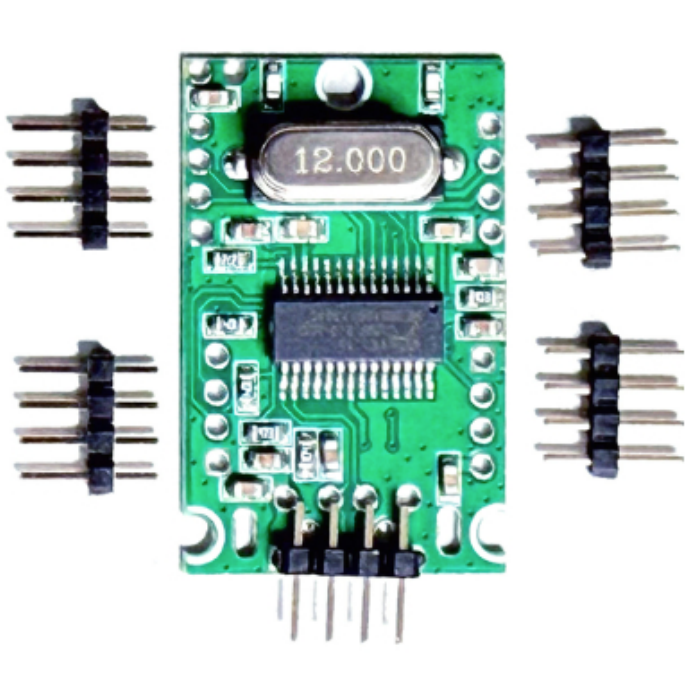
DAC PCM5102, Headphone-Amp TDA1508 and the USB-HOST 4 Port Hub

20) Equipping the USB A hub 1 host to 4 USB A clients

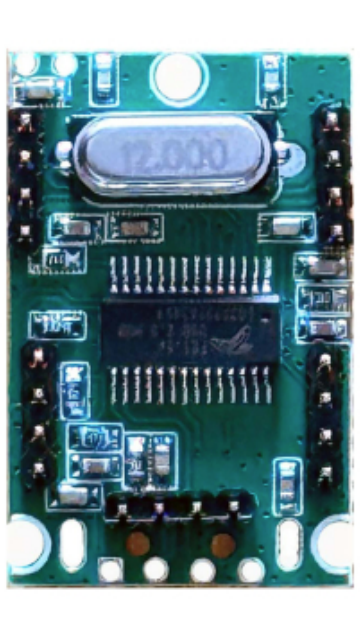
USB 1-4 Hub for the Teensy USB Host

The USB Hub 1 to 4 controls the front USB-A socket X1B, X2B, X3B and X4B from the solder side for the expansion for the **MIDI-to-CV** and **Pedal-USB** breakouts

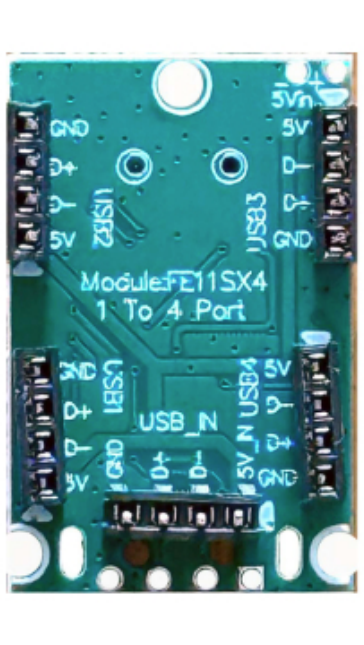
Attention: the USB hub has **RM2.0mm** plugs and sockets).



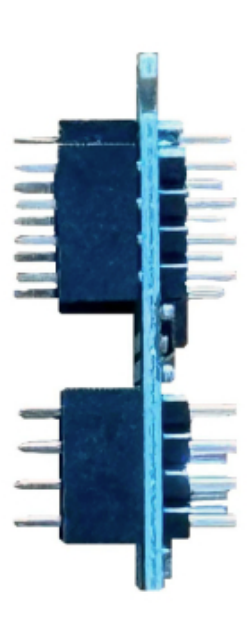
4-pin connector with 2.0mm pitch



USB HUB 1-4 for Teensy USB Host



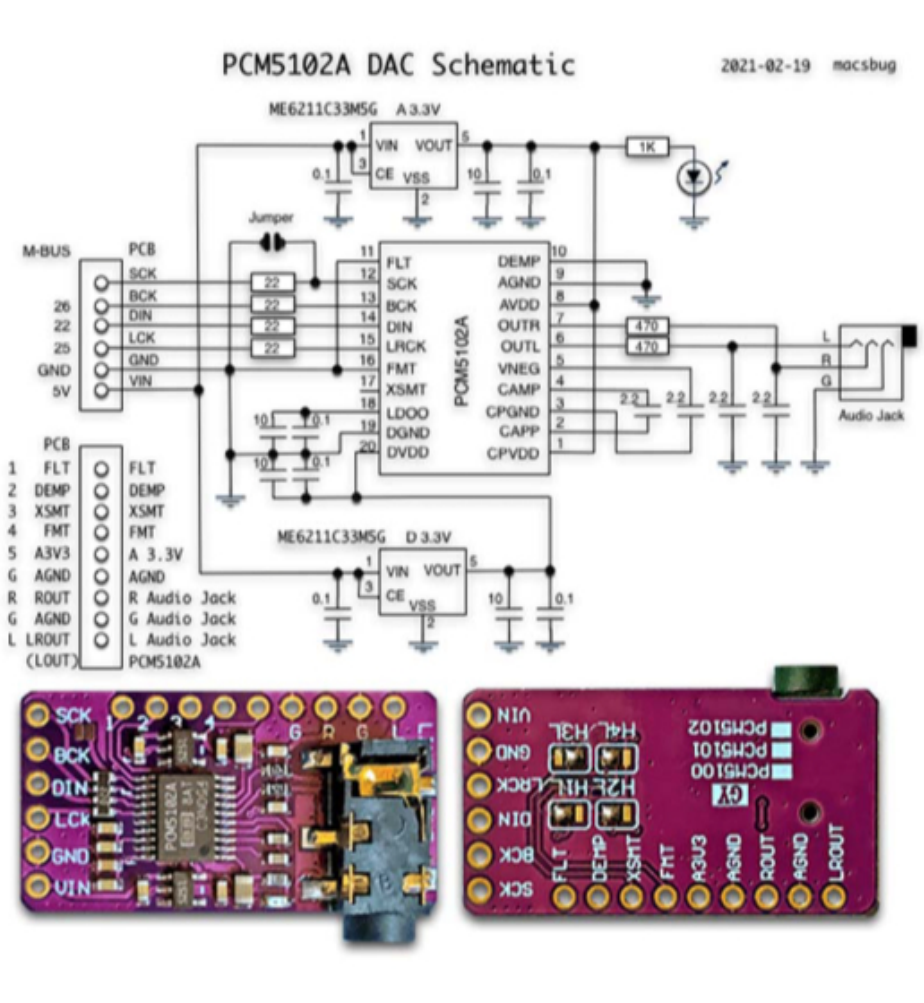
4-pin connector with 2.0mm pitch



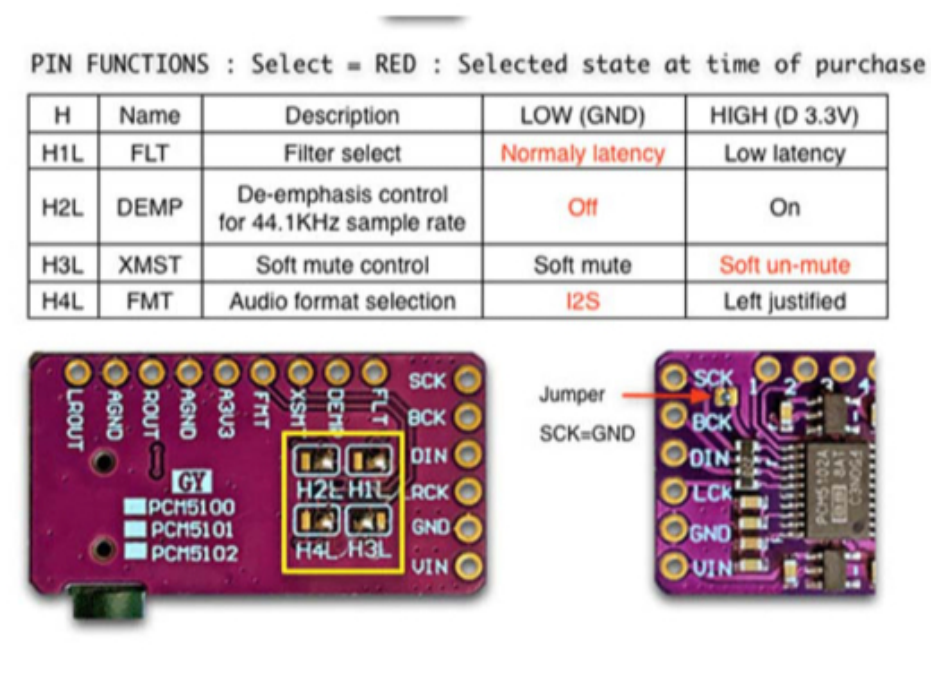
Pins Side View Left/Right

21) Configuration of the audio DAC PCM5102

A few minor modifications need to be made to the **PCM5102A DAC . Remove the H3L** solder jumper on the back and connect the **SCK** solder jumper on the component side with solder.



Schematic PCM5102 | Completely remove solder pad H3L



PIN FUNCTIONS : Select = RED : Selected state at time of purchase

H	Name	Description	LOW (GND)	HIGH (D 3.3V)
H1L	FLT	Filter select	Normaly latency	Low latency
H2L	DEMP	De-emphasis control for 44.1KHz sample rate	Off	On
H3L	XMST	Soft mute control	Soft mute	Soft un-mute
H4L	FMT	Audio format selection	I2S	Left justified

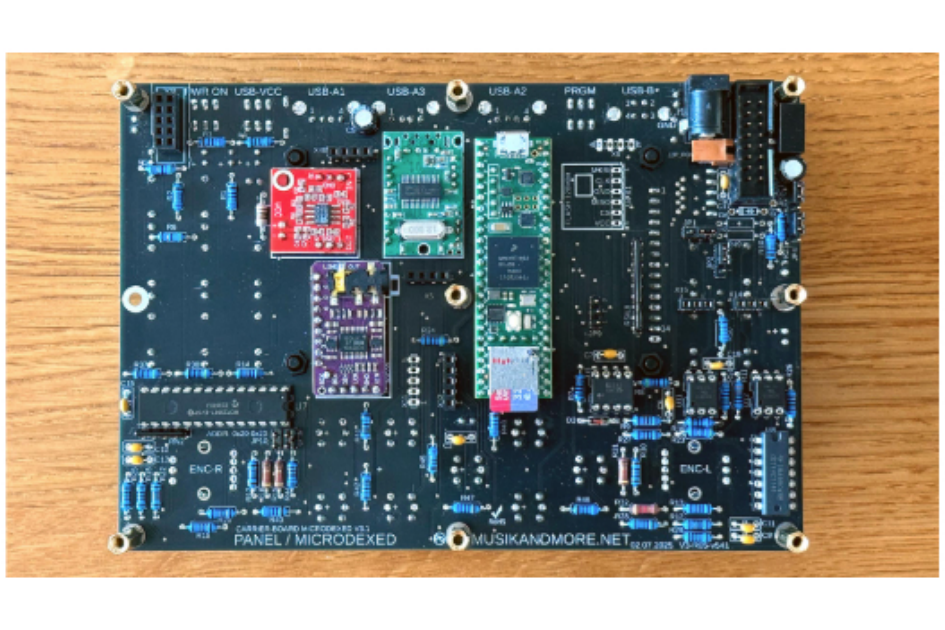
Set soldering point "Jumper SCK"

22) Checking the components and mainboard

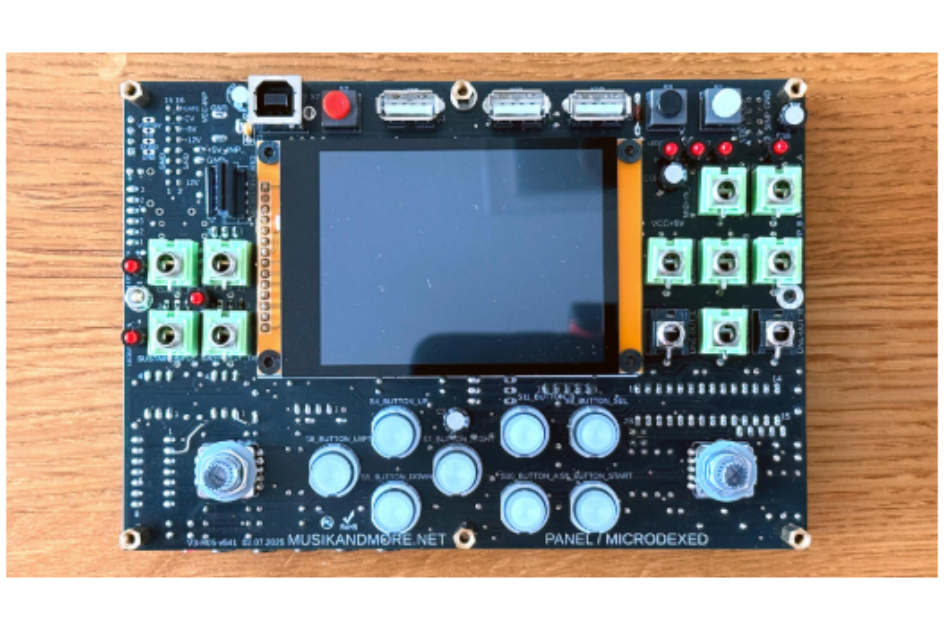
We're nearing the end of the assembly. There shouldn't be any components left, except for two 6mm washers and one M6 nut for the TRS jacks (included as a spare). Experience has shown that the small parts are the first to go missing, and unfortunately, they're not readily available. Now we'll check all the solder joints again and re-solder if necessary.

- Check components for correct position…
- Diodes, electrolytic capacitors, the tantalum capacitor…

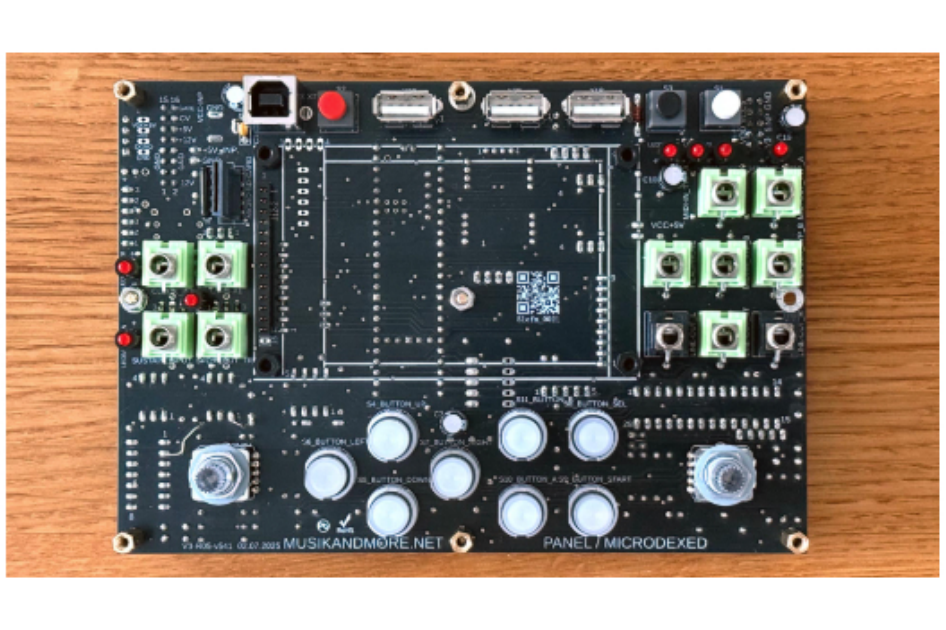
The mainboard should now look something like this (without any plugged-in modules and ICs):



Mainboard soldering side / back



Mainboard component side without front panel



Mainboard assembly side without front panel (sample view only)

23) Commissioning / Functional test

Next comes a short functional test:

- USB B connector and supply power to the mainboard
- Press **S1 PWR " ON"** = LED 5V lights up
- Press **S1 PWR " OFF"** = LED 5V does **NOT light up**

If this is successful, check the voltage (**S1 ON**) with a multimeter at the +5V VCC5 and GND test points. The voltage level depends on the USB interface of the PC, MAC, or USB hub. However, the voltage should be between 4.8V and 5.2V.

Now connect the Teensy 4.1 (U1) to the motherboard using the 2-pin USB cable and carefully insert it into the socket headers.

- Then repeat **step 23** and additionally the 3.3V LED must now also light up.
- Use a multimeter to check the voltage +3.3V at the measuring points +3.3V and GND.
- The +3.3V from the Teensy 4.1 is not always exactly 3.3V, but should be between 3.25V and 3.35V.

We've already flashed our test program onto the Teensy at the time of delivery. (This only applies to customers who purchased the complete DIY kit!)

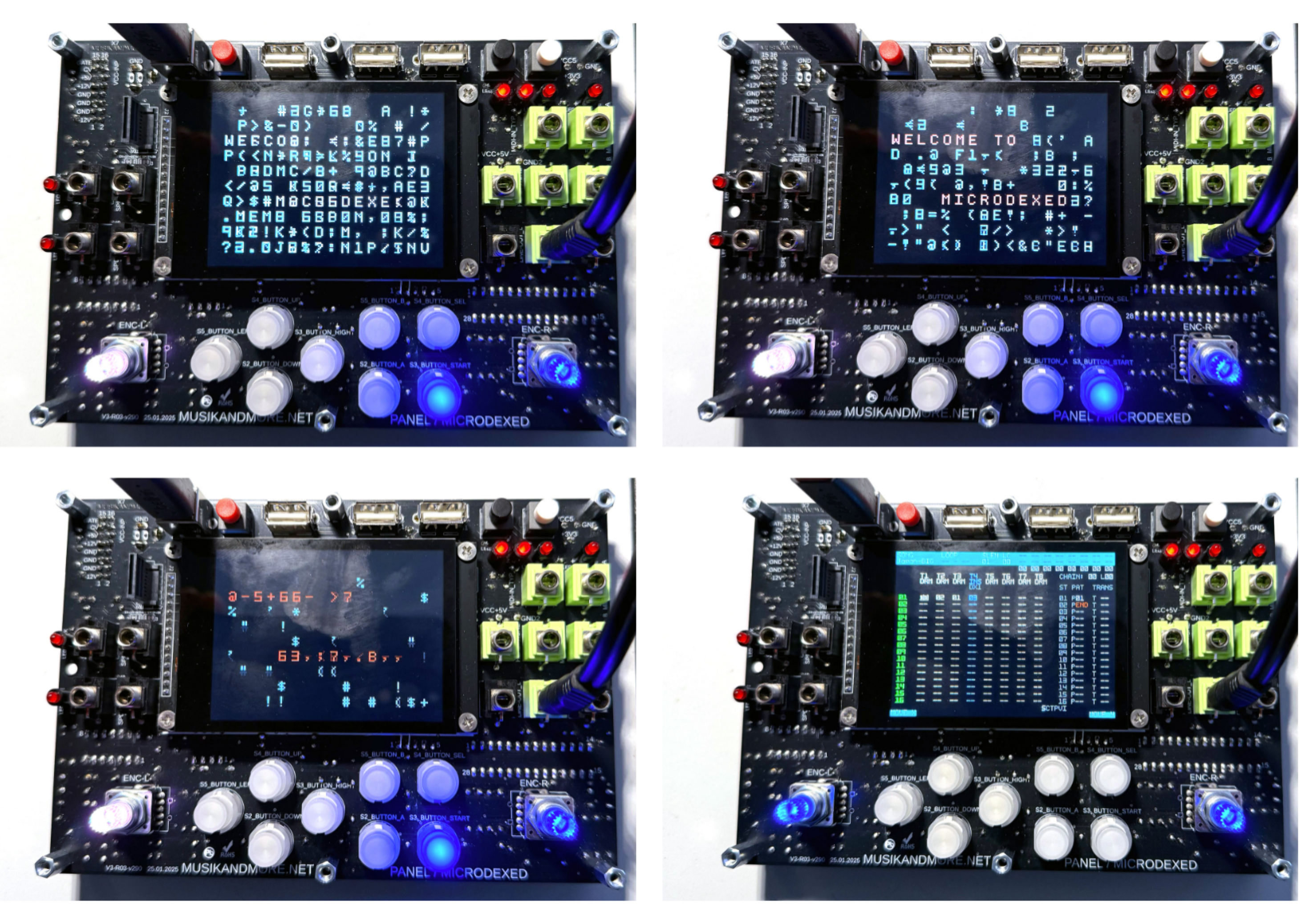
If the USB port is connected to a PC or MAC, the "Microdexed" should be automatically detected and installed. This is also a good sign that the 2-pin USB cable connection (**section 6**) is working on the Teensy 4.1.

Now switch the white switch back to **S1 PWR "OFF" .**

- Insert the ICs U11, U12 (4N36M), U2 (6N138), U7 (MCP23017) and U8 (CD74HCT14E) into the IC sockets.
- Press the pins of the 5 ICs together a little beforehand, then they will fit more easily into the turned sockets!
- Now insert the capacitive 3.2" TFT touch display on the front carefully but with pressure into the 14-pin connector strip J12-2 and screw it tight using the countersunk screws M3x5.
- From the unpacked software version 1.9.9x, copy all files and directories from /addon/SD/ to the root directory of your SD card (**FAT32**) and insert the card into the Teensy 4.1's SD slot. If you have one or two PSRAM chips, copy your custom samples to the /CUSTOM folder on the SD card, or copy the demo contents from **/addon/SD/CUSTOM to the /CUSTOM** folder on the micro SD card.
- Now set the white switch back to **S1-PWR "ON** ." If everything **is correct,** the NAVIPANEL-V3 with the Microdexed should now boot, and the LED test should light up the 8 LED buttons, both RGB encoders, and the MIDI IN/OUT LEDs one after the other, greeting you with the start screen. Connect a MIDI keyboard to MIDI IN Type A or B (or use the virtual touch keyboard and the encoders for navigation).

Note: Audio line-out and headphones will only work after the next step.

First steps during the boot process after S1-PWR "ON"



Mainboard boot process with LED test and my start screen (assembly shows demo device!)

It's almost done!

- the white switch back to **S1-PWR "OFF"**
- Simply plug the DAC U3 (PCM5102A), the headphones amp U5 (TDA1308) and the USB hub 1-4 U6 into the designated socket strips.

Note on the U4 128Mbit flash memory module:
The flash memory module is currently no longer required and is no longer supported in the current software. The U4-X1 socket header is included and should **only** be soldered if **no MIDI-to-CV or PEDAL-USB breakboard option is to be installed** .
This allows for future software upgrades at any time by simply plugging in a flash memory module, even without soldering any socket headers.

- Now set the white switch to **S1-PWR "ON"** and the black switch **S3 USB PWR "ON"** .
- With the S3, the USB host is separated from the "USB host 5V from the Teensy." (The 5V of the Teensy USB host can only supply a maximum of 250mA, which is certainly sufficient for many applications, but the USB hub 1-4 allows the use of two front panel USB-A ports and two USB-A ports on the back of the mainboard with 4-pin USB4-HOST connectors (for a **MIDI-to-CV or PEDAL-USB breakboard option,** the 4-pin connection cable for a USB-A port is included. An elegant alternative is the USB adapter from prjc.com; see **Appendix A.**)
- By switching the **S3 USB PWR "ON"** the max. current of 500mA is made available to a standard USB PC interface or a USB hub and the 5V is disconnected from the Teensy 4.1 USB host port (max. 250mA).

24) Test environment with 4 Microdexed / USB devices / Midi CC-Fader V3

We tested the following configuration:

Test environment: AKAI MPC mini (MIDI via USB), ARTURIA MiniLab3, 1x Microdexed NAVIPANEL V2 4MS, 3x Microdexed NAVIPANEL V3, and **MIDI FADER V3** . For testing CLOCK IN/OUT or the CV outputs and GATE OUT, we also have analog modular devices in Eurorack format, such as VCO, ADSR, VCF, and VCA, as well as the necessary mono and stereo mixers in the test setup.

Test environment: AKAI MPCmini, ARTURIA MiniLab3 and 1x Microdexed NAVIPANEL V2 4MS - 3x Microdexed NAVIPANEL V3 and **MIDI FADER V3** .

The entire setup is powered by the **Behringer Eurorack Go** with an external 95VA power supply and USB plug-in power supplies.

AKAI MPCmini via USB host on the Microdexed **NAVIPANEL V2 4MS**

Test environment : We tested the following configuration with the USB hub 1-4 on 3 of 4 possible USB-A ports

- AKAI MPC mini (Midi via USB)
- AKAI MPD 218 (Midi via USB)
- ARTURIA MiniLab3 (Midi via TRS MIDI IN)

The total current consumption was in the range of 390mA – 410mA, so still well under 500mA.

A notice:

If the black push button **S3 USB PWR is not set to " ON** ," USB ports 1-4 of the U6 USB hub cannot be used, e.g., for USB MIDI data transfer. In general, using USB for audio and MIDI is a tricky issue. Many ports don't even have 4.4V when loaded (instead of the required 5V USB). Another problem is possible noise on the audio outputs when using USB audio and/or audio line outputs. In the studio, galvanic USB isolation is very helpful for eliminating ground loops and USB "interference." We use several of these USB isolation modules in our studio.

Link to product: ARCELI USB Isolator Module, Industrial Isolator Protection against Audio Noise, 1500V

Digital module: **https://www.amazon.de/dp/B07SJD86TD?ref=ppx_yo2ov_dt_b_fed_asin_title**

25) External power supply and Eurorack NAVIPANEL and options

An external 5V power supply (J1), either via the 5V/1A DC connector or via an external (USB) 5V power adapter, is also helpful to prevent any noise or hum. The new version, released in April 2025, now also includes a USB-C power connector (J2P_POWER-IN).

IMPORTANT: The X19 16-pin angled header on the **Midi-to-CV breakout board** and **Pedal-USB breakout board** is not equipped (the power supply is via the mainboard of the NAVIPANEL V3, only +5V and GND are used). However, the external power supply only makes sense if the USB PC or MAC connection is not used for data transfer. So decentralized without a notebook or similar, e.g., during live performances. But both external +5V and USB on PC or MAC also work.

IMPORTANT: The power switch on the NAVIPANEL V3, **S1 PWR** (white cap) must then be set to " **OFF" when using external power supply .**

26) Commissioning and final assembly of front panel

The final:

Front panel on the mainboard and **2nd functional test**

- Equip all TS/TRS sockets with the 2x 6mm washers (24 pieces in total).
- Now align the front panel of your choice on the mainboard and secure it with 6x M3x6mm ISK.
- Make sure that all buttons and switches sit smoothly in the front panel.
- Then fasten the bushings with 12x 6mm washers and 12x M6 hexagon nuts (SW8).
- Now screw the two hex nuts of the RGB encoders up from below onto the front panel. The nuts only serve to support the front panel.
- The RGB encoders are **NOT** screwed from above.
- Now insert the two RGB encoder knobs onto the encoders with light pressure
- The NAVIPANEL V3 can now be turned on again with the **S1-PWR "ON** ." (See also **sections 23** and **24.**)
- If everything works, the hardware is ready for use!

27) The setup for the Microdexed

Now it's time to set up the Microdexed. Please read the very detailed user manual from **@positionhigh** at the following link: **https://codeberg.org/positionhigh/MicroDexed-touch/raw/branch/main/doc/MicroDexed-touch-manual.pdf**

28) Additional hardware functions and sockets

TS- /TRS 3.5mm jack sockets and Micro-SD card slot in the front panel

- In addition to the stereo audio LINE OUT (TRS), the NAVIPANEL-V3 also features LINE OUT L (TS) and LINE OUT R (TS). This is because in the modular world, it's common for audio outputs not to be used in stereo, but rather split into R and L for routing to different modular modules.
- The Headphone Amp U5 (TDA1308) is a small stereo headphone amplifier (PHONES) with 40-50mW output power (at 16-32 ohms with a 5VDC supply voltage). The input from the Headphone Amp is routed directly from the Line Out R/L of the PCM5102 U3 DAC.
- MIDI communication can then be carried out in the traditional way via TRS 3.5mm MIDI IN and MIDI OUT. The MIDI IN and MIDI OUT are dual-ported, 1 Type A and 2 Type B, to allow for the correct cable connection of various synthesizers and MIDI devices.
- A good cable recommendation for MIDI-DIN5 to TRS-Midi is the BEFACO MIDI adapter cable with a length of 1.5m in a pack of 3.

Midi cable red pack of 3 classification TYPE A

- 3.5 mm TRS jack to 5-pin DIN plug
- Compatible with devices from Akai, Korg, Make Noise, ADDAC, Critter & Guitari, Dreadbox, Intellijel, Teenage Engineering, Twisted Electrons, Elektron, among others.
- Link to the product: **https://www.thomann.de/de/befaco_trs_midi_cable_a.htm**

Midi cable grey 3-pack classification TYPE B

- 3.5 mm stereo jack to 5-pin DIN plug
- Compatible with devices from 1010Music, Arturia, Elektron, Erica Synths, Faderfox, Malekko, Polyend, Darkglass, among others
- Link to the product: **https://www.thomann.de/de/befaco_trs_midi_cable_b.htm**

The **SPDIF OUT output** is fully functional and integrated into the Microdexed software. It delivers a 44 kHz/16-bit digital signal to the TS 3.5 mm jack (SPDIF OUT). Connecting to a standard SPDIF input requires a cable adapter from a TS mono 3.5 mm jack to an RCA plug.

The CLOCK OUT output (same jack as SPDIF OUT) is fully integrated into the current software. Two software versions are available for operation with **SPDIF** or **CLOCK OUT** (current version under " **Downloads** ").

The **TRS jacks VOLUME PEDAL/CV-IN, CLOCK-IN and SUSTAIN PEDAL/GATE-IN** are functional in both hardware and software.

Technical information on voltage levels can be found under " **Technical Data** ".

Micro **SD card slot 2** is designed for expansion with an additional micro SD card. Possible applications include providing a simple way to access sounds, sound banks, MIDI files, etc. without removing the Teensy 4.1's micro SD card or using the **Web Remote Console** . The necessary software for the second micro SD card has been fully implemented.
The link to the **Web Remote Console** is: **https://positionhigh.codeberg.page/**

The functionality and use of the USB HOST, USB-1, USB-2, USB-3, and the USB4 ports located on the rear panel are described in **section 14.** The Teensy 4.1 micro-USB port can be switched **ON/OFF using S1 PWR** and is no longer accessible from the front panel.

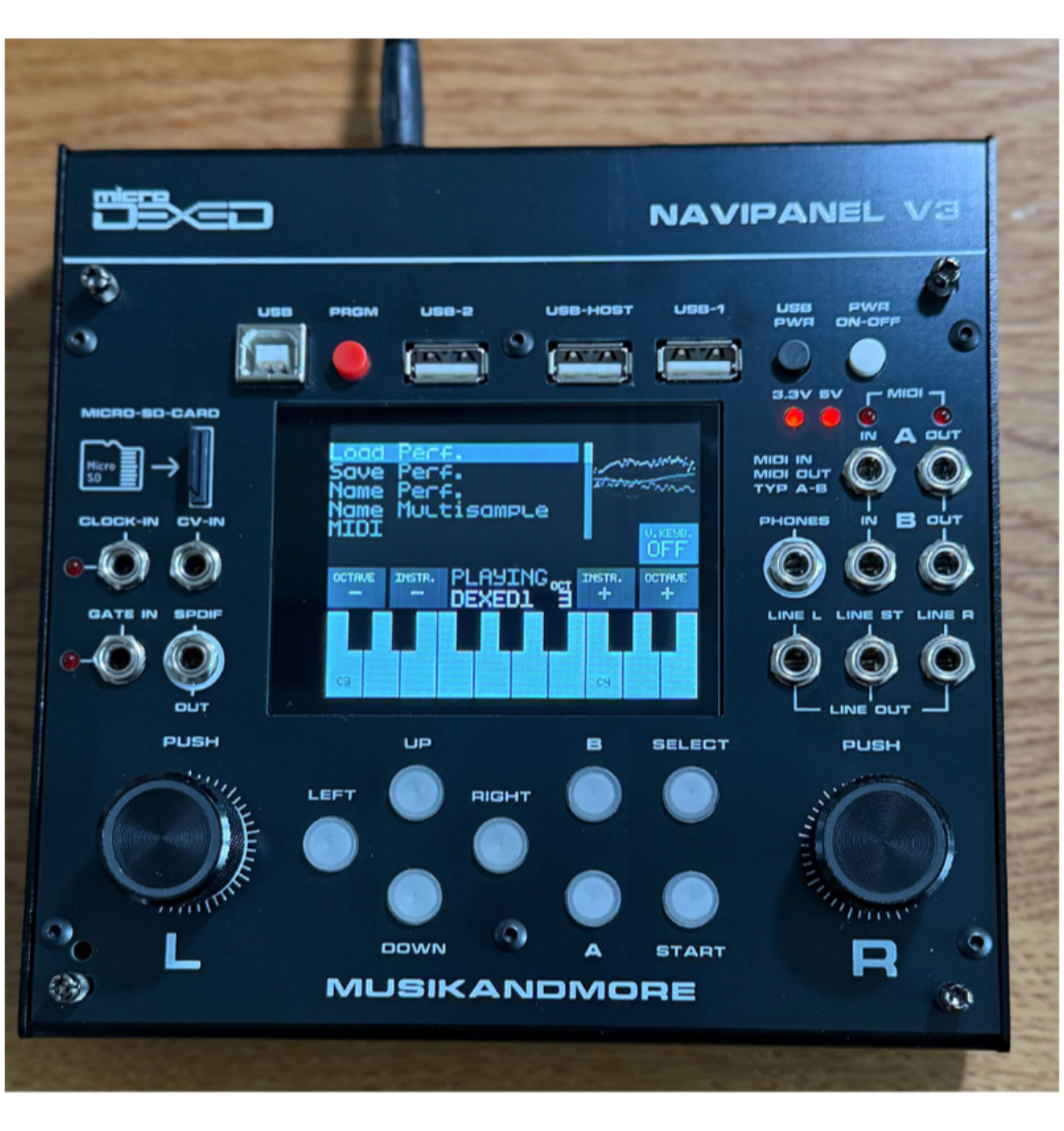
For hardware support, please contact:
Thomas Effendy, **info@musikandmore.net** or **@musikandmore** on Discord (**https://discord.gg/XCYk5P8GzF**)

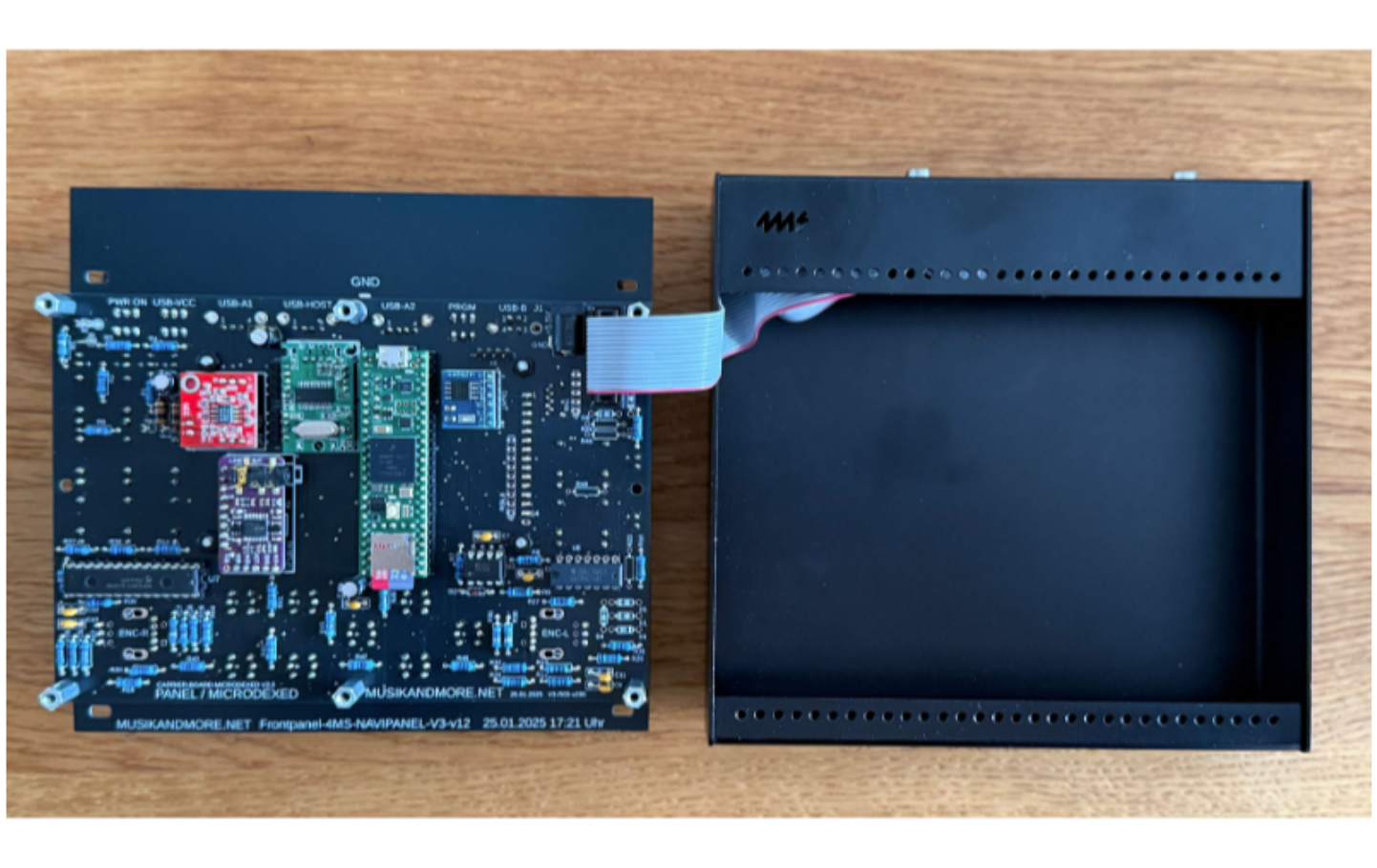
For questions about the Microdexed software, please contact:
Mark Koslowski aka @positionhigh (**https://discord.gg/XCYk5P8GzF**)

29) The finished device NAVIPANEL V3 for Microdexed

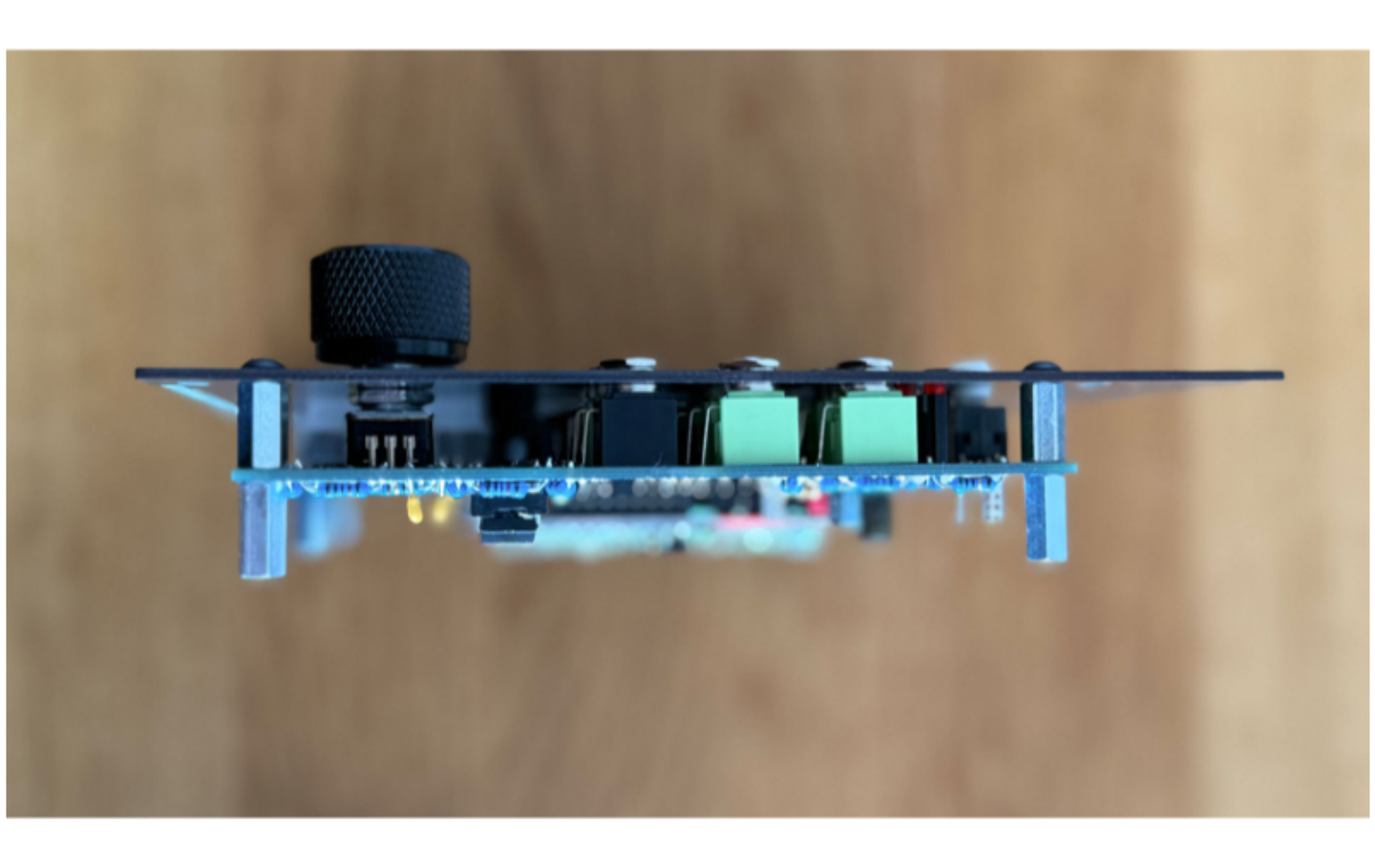
Photos with different housing variants:

Housing variant **4MS pod32** Supply via external power supply 4MS Powerbrick

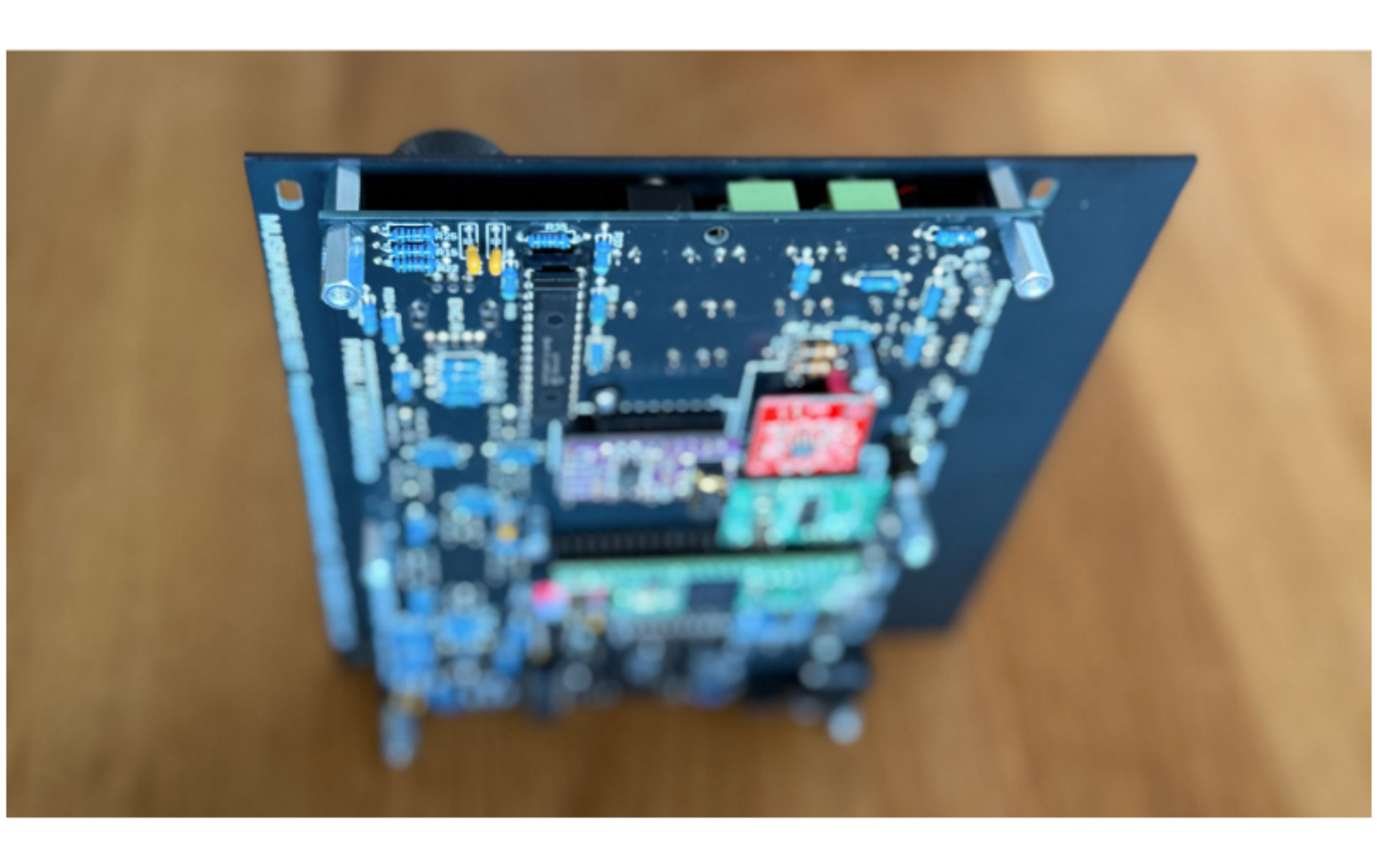




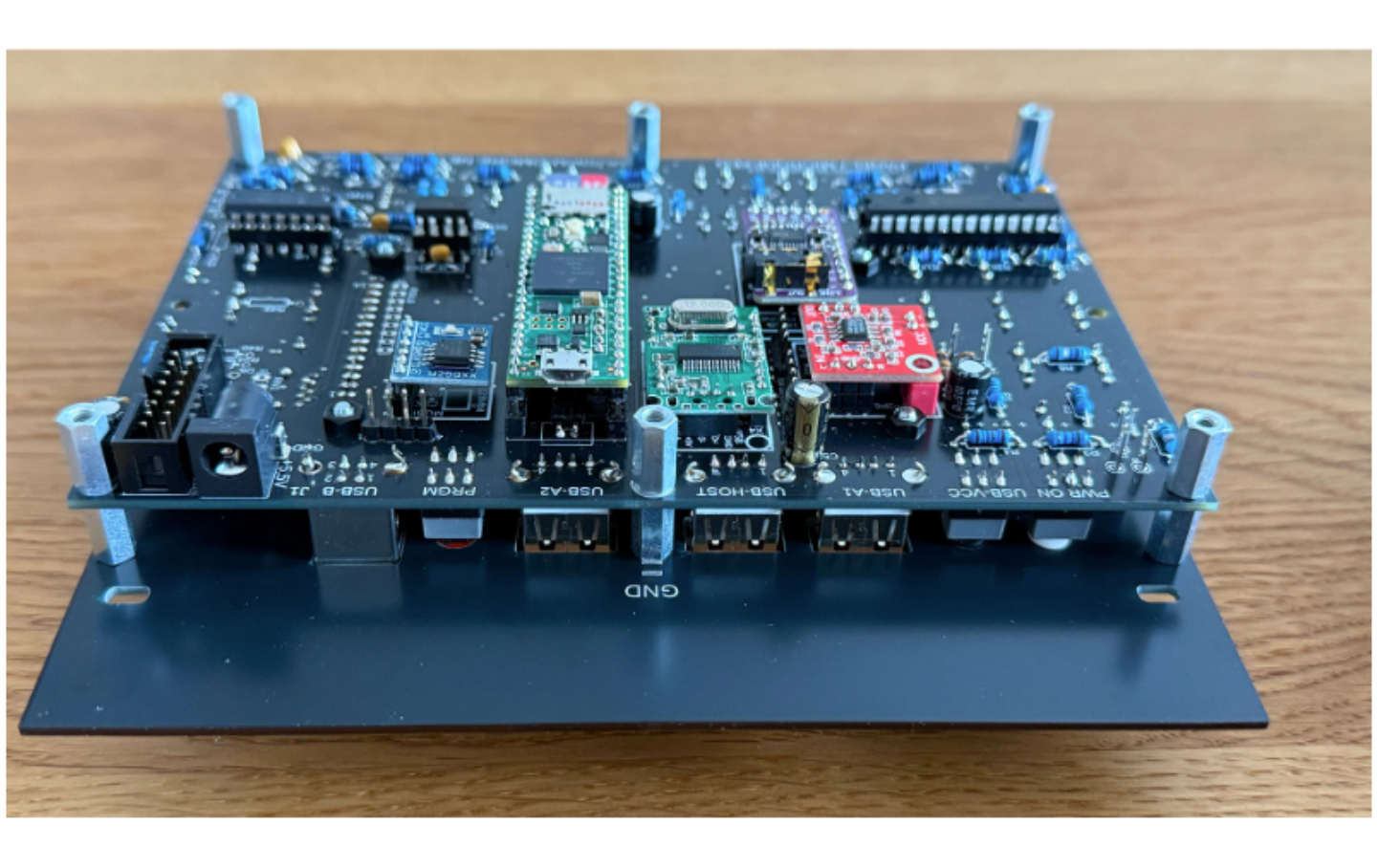
Housing variant **4MS pod32** opened Supply via external power supply 4MS Powerbrick



Housing variant **4MS pod32** side view

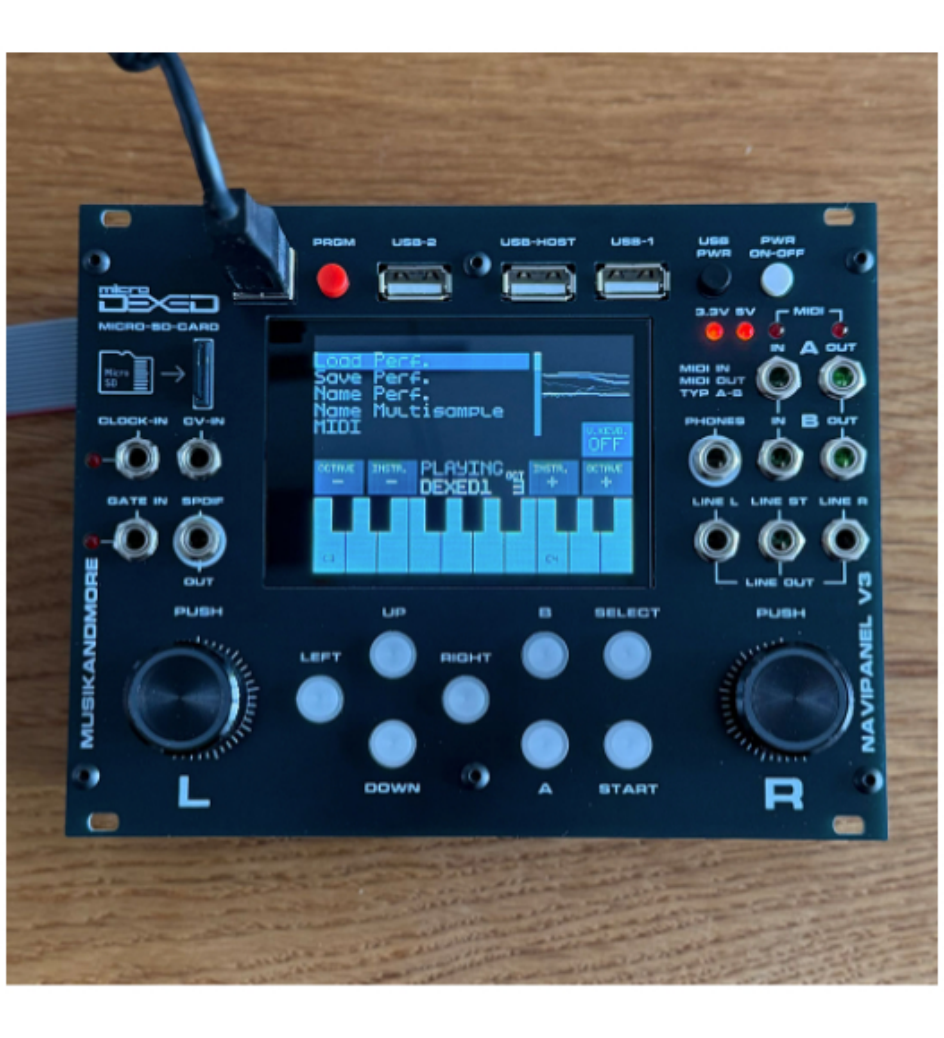


Housing variant **4MS pod32** side view 2

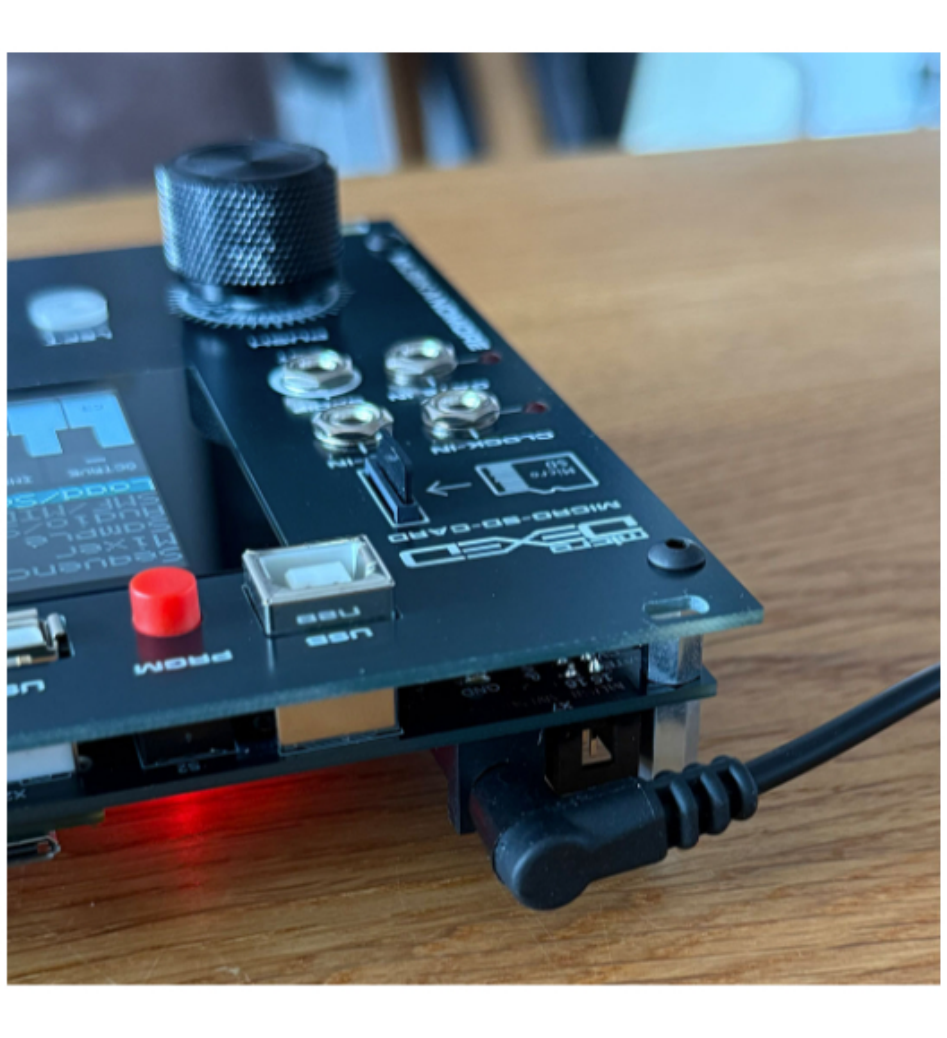


Housing variant **4MS pod32** view assembly/soldering side

Eurorack 3U/32HP case variant



Case variant **Eurorack 3U/32HP**



Eurorack 3U/32HP with external 5V DC

30) Appendix A.

As of: September 18, 2025

Sources / Links / Product recommendations

- Bernstein ball joint tool holder / Link to the product:
  https://www.bernstein-werkzeuge.de/produkte/produktdetails/9-250-esd-kugelgelenk-kombination-vario-6-tlg
- Solder / Link to the product:
  https://www.conrad.de/de/p/stannol-ks115-loetzinn-bleifrei-spule-sn99-3cu0-7-rom1-100-g-1-mm-588742.html
- Soldering extraction system / Link to the product:
  https://www.reichelt.de/de/de/shop/produkt/loetrauchabsaugung_zerosmog_shield_pro-371544
- USB host adapter from prjc.com / Link to product:
  https://www.pjrc.com/store/cable_usb_host_t36.html
- Resistor color code table: **https://www.elektronik-kompendium.de/sites/bau/1109051.htm**
- Current software for NaviPanel-V3 is available at: **https://codeberg.org/positionhigh/MicroDexed-touch/releases**
- Current original manual from Microdexed @positionhigh:
  https://codeberg.org/positionhigh/MicroDexed-touch/raw/branch/main/doc/MicroDexed-touch-manual.pdf
- prjc.com Teensy Software: **https://www.pjrc.com/teensy/loader.html**
- Discord Channel @positionhigh: **https://discord.gg/XCYk5P8GzF**
- Link to the Web Remote Console: **https://positionhigh.codeberg.page/**
- ARCELI USB Isolator Module, Industrial Isolator Protection Against Audio Noise, 1500V Digital Module:
  https://www.amazon.de/dp/B07SJD86TD?ref=ppx_yo2ov_dt_b_fed_asin_title
- Midi cable red pack of 3 classification TYPE A
  https://www.thomann.de/de/befaco_trs_midi_cable_a.htm
- Midi cable grey 3-pack classification TYPE B
  https://www.thomann.de/de/befaco_trs_midi_cable_b.htm
- 4MS pod32 cabinet 32HP (powered)
  https://www.thomann.de/de/4ms_pod32_powered.htm
- **4MS pod32 enclosure 32HP (powered)** (musikandmore.net)
- 4MS pod32 cabinet 32HP (unpowered) (**special purchase via Thomann)**
  https://www.thomann.de/de/4ms.html
- Power supply for Eurorack enclosure 4MS pod32 / maximum output power: 15 V / 3 A 45W
  https://www.thomann.de/de/4ms_power_brick_45w.htm
- **3D case / housing 32HP for NAVIPANEL V1 from mainboard v380** (musikandmore.net)
- **3D case / housing 32TE for NAVIPANEL V2 from mainboard v526** (musikandmore.net)
- **3D case / housing 32HP for NAVIPANEL V3 from mainboard v541** (musikandmore.net)
- USB C Charger/Power Supply Breakout U9 (Amazon)
  https://www.amazon.de/dp/B0CQNCFYGV?ref=ppx_yo2ov_dt_b_fed_asin_title

31) Appendix B. Credit

Contributors

Mark Koslowski aka @positionhigh (**https://discord.gg/XCYk5P8GzF**)
for the excellent software and hardware base.

Holger Wirtz for the original port of the DEXED PC/Desktop OS to the Teensy 4.1 MICRODEXED – Microcontroller

Thomas Effendy **https://musikandmore.net** Hardware development and panel / PCB design

Nicole Effendy – **https://designvorsprung.de** for her patience with the seemingly endless proofreading of the assembly instructions and technical documentation.

32) Appendix C.

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Project: NAVIPANEL V3 for Microdexed
Author: Thomas Effendy (Hardware Version V3-R4-v380 -V3-R5-v541)
Author: Mark Koslowski (Software Microdexed Version 1.9.8.4-1.9.9.9)
Email: **info@musikandmore.net**
Date: 22.09.2025
Version: V.7.0-DE (this document)
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33) Appendix D.

Technical data for NAVIPANEL V3-R5-v541

for Microdexed - Date: September 14, 2025

Print CSV PDF

NAVIPANEL V3 for Microdexed | Date: September 14, 2025	Technical data sheet	ID-(BOM)
01) Modular rack 3U / 32HP / Dimensions (W x L x H) 163x127x33mm	Eurorack	optional…
02) 3D printed Desktop Case 3HE / 32TE / Dimensions (W x L x H) 169x134x38mm	Desktop	optional…
03) Desktop aluminum case 4MS pod32 powered / Dimensions (W x L x H) 166x159x40mm	Metal housing	optional…
04) power supply (USB-C Power Supply Breakout and 4MS 45W Power Brick)	Power supply	optional…
05) 16-pin box connector with 20cm ribbon cable	for modular (+5V)	Eurorack cable
06) DC 5V supply with hollow socket 5.5x2.1mm	switchable	J1 -DC-PWR
07) USB-B for USB PC/MAC	switchable	X7
08) external USB 5V/1A power supply if no PC/Mac is required	switchable	optional…
09) internal / external supply for USB hub	switchable	included
10) USB HOST Hub 1 to 4, 3x USB-A of which are in the front panel	active USB hub	U6
11) 2x USB A connectors on the back via 4-pin connector, can used with external 5V power supply or Eurorack power supply +5V only	USB-A 2.0	X1B - X4B
12) LINE Out Stereo/TRS 3.5mm	audio outputs	TRS 3.5mm
13) LINE-OUT L / TS 3.5mm	audio outputs	TS 3.5mm
14) LINE-OUT R / TS 3.5mm	audio outputs	TS 3.5mm
15) Headphones Stereo /TRS 3.5mm Output 40mW	headphone amplifier	TRS 3.5mm
16) MIDI IN Type A /TRS 3.5mm	MIDI IN Type A	TRS 3.5mm
17) MIDI IN Type B /TRS 3.5mm	MIDI IN Type B	TRS 3.5mm
18) MIDI OUT Type A /TRS 3.5mm	MIDI OUT Type A	TRS 3.5mm
19) MIDI OUT Type B /TRS 3.5mm	MIDI OUT Type B	TRS 3.5mm
20) CLOCK IN 0/5V= LOW/HIGH optocouplers	modular connection	TRS 3.5mm
21) GATE IN = SUSTAIN 0/+3.3V= LOW/HIGH	modular connection	TRS 3.5mm
22) CV IN / Pedal Volume Input 3 Pin TRS +3.3V /Signal /GND	modular connection	TRS 3.5mm
22) CV IN / alternative 0-5VDC / 0-10VDC input (protected with suppressor diodes)	modular connection	TRS 3.5mm
23) SPDIF OUT 44KHz 16Bit / TRS 3.5mm	SPDIF OUT connection	TRS 3.5mm
24) CLOCK OUT TRS 3.5mm 0/5V Optocouplers	CLOCK OUT connection	TRS 3.5mm
25) Switch S1 / Int. USB POWER ON (white)	Switch	S1
26) Switch S3/Ext. 5VDC POWER OFF (black)	Switch	S3
27) Switch S2 / PROGRAM (red) momentary	Button	S2
28) 4 buttons with white LEDs	Buttons	S5 - S7
29) 1 Button with LED blue	Buttons	S9
30) 3 buttons with LEDs red green yellow	Buttons	S8 / S10 / S11
31) RGB Encoder L/R	RGB Encoder L/R	ENC-L / ENC-R
32) 3.3V Power	LED 3mm low current RED	LED1
33) 5V Power	LED 3mm low current RED	LED2
34) MIDI IN	LED 3mm low current RED	LED3
35) MIDI OUT	LED 3mm low current RED	LED4
36) CLOCK OUT	LED 3mm low current RED	LED5
37) SUSTAIN IN	LED 3mm low current RED	LED6
38) CLOCK IN	LED 3mm low current RED	LED7
39) MicroSD card SLOT in the front panel with 32GB MicroSD for external data exchange	SD card	included
40) Teensy 4.1 with 2x 8MB PSRAM	processor	U1
41) Audio PCM 5102A	Audio OUT	U3
42) headphone amplifier TDA1308	headphone amplifier	U5
43) NOR Flash 128Mbit, currently not necessary but implemented in hardware	external memory	U4
Note: the technical data apply from motherboard version…:	V3-R5-v526, May 21, 2025	
	V3-R5-v541, July 02, 2025	
	V3-R6-v582, September 14, 2025	

Generated by wpDataTables

34) Appendix E.

BOM Part list Mainboard PCB NAVIPANEL V3-R5-v578 / September 15, 2025

for Microdexed V3-R5-v541 from July 2nd, 2025 / NAVIPANEL Front Panel PCB V3-v49 from May 21st, 2025.

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Show entries

Seek

part	Value	Detailed Description
C1	100nF	CAPACITOR
C10	100uF/16V	POLARIZED CAPACITOR, European symbol
C11	10nF	CAPACITOR
C12	10nF	CAPACITOR
C13	10nF	CAPACITOR
C14	10uF/16V tantalum	POLARIZED CAPACITOR, European symbol
C15	100nF	CAPACITOR
C16	100uF/16V	POLARIZED CAPACITOR, European symbol
C17	10nF	CAPACITOR
C18	100nF	CAPACITOR
C19	100uF/16V	POLARIZED CAPACITOR, European symbol
C2	100nF	CAPACITOR
C3	100uF/16V	POLARIZED CAPACITOR, European symbol
C4	100uF/16V	POLARIZED CAPACITOR, European symbol
C5	100uF/16V	POLARIZED CAPACITOR, European symbol
C6	100nF	CAPACITOR
C7	100nF	CAPACITOR
C8	0.1uF MKS/MKT	CAPACITOR
C9	10nF	CAPACITOR
CLOCK_IN	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
CV-IN-A1	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
D2	1N4148DO35-7	DIODE
D6	1N5817-B	1.0A SCHOTTKY BARRIER RECTIFIER
D7	1N5817-B	1.0A SCHOTTKY BARRIER RECTIFIER
D8	ZENER 5V1	Zener diode 5V1 1W
EURORACK_CABLE	Flatcable_16pol_20cm	Flatcable_16pol_20cm
EURORACK_IN	PIN HEADER 16POL	HARTING
H1	STANDOFF_M3X11mm_I/I_V2A	STANDOFF_M3X11mm_I/I_V2A
H10-H13	4x_STANDOFF_M3x6mm_I/A_PLASTIC	4x_STANDOFF_M3x6mm_I/A_PLASTIC
H100-H112	12x_NUTS_6mm_Thonk_Jacks	12x_NUTS_6mm thonk.co.uk
H2	STANDOFF_M3X11mm_I/I_V2A	STANDOFF_M3X11mm_I/I_V2A
H20-H23	4x_WASHER_3.2mm_DIN125A_PLASTIC	4x_WASHER_3.2mm_DIN125A_PLASTIC
H3	STANDOFF_M3X11mm_I/I_V2A	STANDOFF_M3X11mm_I/I_V2A
H30-H33	4x_COUNTERSUNK_SCREWS_M3x4mm	4x_COUNTERSUNK_SCREWS_M3x4mm
H4	STANDOFF_M3X11mm_I/I_V2A	STANDOFF_M3X11mm_I/I_V2A
H40-H45	6x_SCREWS_M3x5mm_ISO7380-1_BLACK	6x_SCREWS_M3x5mm_ISO7380-1_BLACK
H46-H49	4x_SCREWS_M3x8mm_ISO7380-1_BLACK	4x_SCREWS_M3x8mm_ISO7380-1_BLACK Panel Eurorack
H5	STANDOFF_M3X11mm_I/I_V2A	STANDOFF_M3X11mm_I/I_V2A
H50-H58	9x_SCREWS_M3x5mm_ISO7380-1_V2A	9x_SCREWS_M3x5mm_ISO7380-1_V2A
H6	STANDOFF_M3X11mm_I/I_V2A	STANDOFF_M3X11mm_I/I_V2A
H60-H96	36x_WASHER_6mm_Thonk_Jacks	36x_WASHER_6mm thonk.co.uk
H7	STANDOFF_M3X11mm_I/I_V2A	STANDOFF_M3X11mm_I/I_V2A
H8	STANDOFF_M3X11mm_I/I_V2A	STANDOFF_M3X11mm_I/I_V2A
H9	STANDOFF_M3X11mm_I/I_V2A	STANDOFF_M3X11mm_I/I_V2A
HEADPHONE	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
IC-SOCKET_14	1x_IC-socket_14-pin	1x_IC-socket_14-pin
IC-SOCKET_28	1x_IC-socket_28-pin	1x_IC-socket_28-pin
IC-SOCKET_6	2x_IC-socket_6-pin	2x_IC-socket_6-pin
IC-SOCKET_8	1x_IC-socket_8-pin	1x_IC-socket_8-pin
J1	DC-PWR-5.5x2.1	CONN PWR JACK 2.1X5.5MM SOLDER
J12-2	U14-TFT-Touch-3-2 "	LOW PROFILE FEMALE HEADER 1x14pol
J2P_POWER-IN	Molex_ 2-pin_90Grd	Molex_ 2-pin_90Grd
JP1	CV-IN	PIN HEADER 1x3pin
JP10	ADDR	LONG PIN HEADER 2x2pol 14mm
JP2	CV-IN	PIN HEADER 1x3pin
JP3	PEDAL	PIN HEADER 1x3pin
JP4	PEDAL	PIN HEADER 1x3pin
JP5	NO_DC/DC	PIN HEADER 1x4pin
JP6	AMP_INPUT U5	LOW PROFILE FEMALE HEADER 3-pin
JP7	GNC/VCC U5	LOW PROFILE FEMALE HEADER 2pol
JP8	AMP_OUTPUT U5	LOW PROFILE FEMALE HEADER 3-pin
JP9	CLK	LONG PIN HEADER 1x3pin 14mm
JUMPER	7x JUMPER 2-pin	7x JUMPER 2-pin
KNOB_RGB_ENC_L	22mm KNOB-ENC-L	22mm KNOB-ENC-L
KNOB_RGB_ENC_R	22mm KNOB-ENC-R	22mm KNOB-ENC-R
L1	100uH	Noise/EMI Suppression Filters Inductor Type
LED1-7_STANDOFF	7x_LED3mm-STANDOFF_d5x9mm	7x_LED3mm-STANDOFF_d5x9mm (000183421)
LED1/3V3	3mm_red_low_current	3mm_red_low_current

LED2/PWR 5V	3mm_red_low_current	3mm_red_low_current
LED3/MIDI-IN1	3mm_red_low_current	3mm_red_low_current
LED4/MIDI OUT1	3mm_red_low_current	3mm_red_low_current
LED5/CLOCK_OUT	3mm_red_low_current	3mm_red_low_current
LED6/SUSTAIN IN	3mm_red_low_current	3mm_red_low_current
LED7/CLOCK-IN	3mm_red_low_current	3mm_red_low_current
LINE-OUT_L	WQP518MA-MONO	Black Thonkiconn Mono 3.5mm Audio Jacks
LINE-OUT_R	WQP518MA-MONO	Black Thonkiconn Mono 3.5mm Audio Jacks
LINE-OUT_ST	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
LOGO1	NO_PB_LOGO	Lead-Free (No Pb) Logo
LOGO2	ROHS_LOGO	Restriction of Hazardous Substances (RoHS) logo
LOGO3	NO_PB_LOGO	Lead-Free (No Pb) Logo
LOGO4	ROHS_LOGO	Restriction of Hazardous Substances (RoHS) logo
MICRO-SD-CARD-32GB	MicroSD card 32GB	MicroSD Card 32GB SANDISK
MICRO SD CARD HOLDER	PJS008U-3000-8_HOLDER	SD Card and MMC Reader (Manual Insertion) thonk.co.uk
MIDI-IN_TYPE_A	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
MIDI-IN_TYPE_B	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
MIDI-OUT_TYPE_A	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
MIDI-OUT_TYPE_B	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
PCB_FRONTPANEL	V3-v49-21-05-2025	PCB_FRONTPANEL V3-v49-21-05-2025
PCB_MAINBOARD	V3-R05-v541-02-07-2025	PCB_MAINBOARD V3-R05-v541-02-07-2025
R1	680R	RESISTOR, European symbol
R10	680R	RESISTOR, European symbol
R11	330R	RESISTOR, European symbol
R12	10K	RESISTOR, European symbol
R13	10K	RESISTOR, European symbol
R14	10K	RESISTOR, European symbol
R15	10K	RESISTOR, European symbol
R16	10K	RESISTOR, European symbol
R17	107R	RESISTOR, European symbol
R18	42R2	RESISTOR, European symbol
R19	42R2	RESISTOR, European symbol
R2	680R	RESISTOR, European symbol
R20	10K	RESISTOR, European symbol
R21	680R	RESISTOR, European symbol
R22	10K	RESISTOR, European symbol
R23	47R	RESISTOR, European symbol
R24	4K7	RESISTOR, European symbol
R25	10K	RESISTOR, European symbol
R26	620R	RESISTOR, European symbol
R27	10K	RESISTOR, European symbol
R28	10K	RESISTOR, European symbol
R29	10K	RESISTOR, European symbol
R3	680R	RESISTOR, European symbol
R30	107R	RESISTOR, European symbol
R31	42R2	RESISTOR, European symbol
R32	42R2	RESISTOR, European symbol
R33	27K	RESISTOR, European symbol
R34	27K	RESISTOR, European symbol
R36	180R	RESISTOR, European symbol
R37	4K7	RESISTOR, European symbol
R38	4K7	RESISTOR, European symbol
R4	1K	RESISTOR, European symbol
R40	910R	RESISTOR, European symbol
R41	680R	RESISTOR, European symbol
R42	680R	RESISTOR, European symbol
R43	680R	RESISTOR, European symbol
R44	680R	RESISTOR, European symbol
R45	680R	RESISTOR, European symbol
R46	680R	RESISTOR, European symbol
R47	680R	RESISTOR, European symbol
R48	680R	RESISTOR, European symbol
R49	1K8	RESISTOR, European symbol
R5	47R	RESISTOR, European symbol
R50	680R	RESISTOR, European symbol
R51	1K	RESISTOR, European symbol
R6	47R	RESISTOR, European symbol
R7	220R	RESISTOR, European symbol
R8	470R	RESISTOR, European symbol
R9	10K	RESISTOR, European symbol
RGB_ENC_L	PEL12T-4225T-S1024	Illuminated Rotary Encoder w/ RGB LED and select switch
RGB_ENC_R	PEL12T-4225T-S1024	Illuminated Rotary Encoder w/ RGB LED and select switch
RN1	10K	SIL RESISTOR 5-pin
RN2	10K	SIL RESISTOR 5-pin
RSIL8	10K	SIL RESISTOR 9-pin
S1	DPDT Latching Push Button WHITE	DPDT Latching Push Button WHITE thonk.co.uk
S10_BUTTON_A	LED_RED	LED_RED thonk.co.uk
S11_BUTTON_B	LED_GREEN	LED_GREEN thonk.co.uk
S2	DPDT Momentary Push Button RED	DPDT Momentary Push Button RED thonk.co.uk
S3	DPDT Latching Push Button BLACK	DPDT Latching Push Button BLACK thonk.co.uk
S4_BUTTON_UP	LED_WHITE	LED_WHITE thonk.co.uk
S5_BUTTON_DOWN	LED_WHITE	LED_WHITE thonk.co.uk
S6_BUTTON_LEFT	LED_WHITE	LED_WHITE thonk.co.uk
S7_BUTTON_RIGHT	LED_WHITE	LED_WHITE thonk.co.uk
S8_BUTTON_SEL	LED_YELLOW	LED_YELLOW thonk.co.uk
S9_BUTTON_START	LED_BLUE	LED_BLUE thonk.co.uk
SPDIF_OUT_TRS	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
SUSTAIN_INPUT	WQP-PJ366-STEREO	Green Thonkiconn Stereo 3.5mm Audio Jacks (PJ366ST)
U1	TEENSY41 with PSRAM 2x 8MB	TEENSY41 with PSRAM 2x 8MB
U11	4N36M	General Purpose 6-Pin Phototransistor Optocouplers
U12	4N36M	General Purpose 6-Pin Phototransistor Optocouplers
U13	TRACO TBA1-0511	DC/DC CONVERTER 5V 1W
U14_TFT_TOUCH	TFT_TOUCH_CAP_3.2 inch	TFT_TOUCH_CAPACITIVE_3.2 inch
U2	6N138	MOTOROLA OPTO COUPLER
U3-X1	5-pin	LOW PROFILE FEMALE HEADER 5-pin
U3-X2	9-pin	LOW PROFILE FEMALE HEADER 9pol
U4-X1	128Mbit	LOW PROFILE FEMALE HEADER 6-pin
U7	MCP23017SP	MCP23017SP 16-port I/O - I2C
U8	CD74HCT14E	Hex Schmitt trigger INVERTER
X1	USB1	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X11	I2C-R	PIN HEADER 1x5pol or JST 5pin RM2.54
X12	I2C-L	FEMALE HEADER 5-pin
X14	SUST-PEDAL	FEMALE HEADER 3-pin
X15	VOL PEDAL	FEMALE HEADER 3-pin
X1A	USB1	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X1B	USB1-A1	Vertical,Top Entry USB Connector KUSBVX Series
X2	USB2	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X2A	USB2	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X2B	USB2-A2	Vertical,Top Entry USB Connector KUSBVX Series
X3	USB3	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X3A	USB3	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X3B	USB3-A3	Vertical,Top Entry USB Connector KUSBVX Series
X4	USB4	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X4A	USB4	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X4B	USB4-A4	PIN HEADER 1x4pin
X5	USB HOST	PIN HEADER 1x4pin
X5A	USB5	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X5B	USB5	2 Pin - 2mm Dual Row Single Wafer, Vertical T/H HDR
X6	USB CLIENT1	PIN HEADER 1x4pin
X7	USB-B Client	USB B-type Receptacle Vertical, 4 Position, THT
X8	VCC Breakout	FEMALE HEADER 2x5pin

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35) Appendix F

Changes:

PCB version V3-R4-v380 from April 7th, 2025 / NAVIPANEL V3-v31 from January 25th, 2025.

Changelog: from March 30, 2025 to April 15, 2025

- New 3D case design by Mark Koslowski for FRONTPANEL V3 Eurorack
  3D case / 32HP case for NAVIPANEL V3 (musikandmore.net) (New option)
- Jumper J1, J2, J3 , J4 for the CV-IN, optionally PEDAL INPUT Volume or Control-Voltage 0-5V or 0-10V R40/R49 (New option)
- Suppressor diodes 1N5817 D2,D3,D4,D5 removed.
- USB Host (X5) 4-pin in the front panel changed to USB-A3 in the front panel (X5 provided as a 4-pin connector on the solder side.
- R/C filter combination (attenuation) for the analog input A1 integrated (New option)
- D8 Zener diode 5V1 in the 5V supply input as reverse polarity protection and short-term overvoltage limitation to max. 5.1VDC (New option)
- USB-C charger and power supply module integrated. (New option). Product link: **https://www.amazon.de/dp/B0CQNCFYGV?ref=ppx_yo2ov_dt_b_fed_asin_title**
- J2 2-pin connector for external +5V/GND input - jumper for USB-C power module offset.
- For USB-C 2 additional GND pads routed (additional)
- MIDI Out Type A and Type B sockets swapped on PCB (Fixed)

36) Appendix F

Changes:

Main PCB version V3-R5-v526 from May 16, 2025 / NAVIPANEL V3-v49 from May 21, 2025.

Changelog: from May 16, 2025 to July 2, 2025

- New 3D case design by Mark Koslowski for FRONTPANEL V3 Eurorack
  3D case / 32HP case for NAVIPANEL V3 (musikandmore.net) (Final version with MIDI to CV integration)
- Sockets and connector strips for the optional **MIDI to CV** and **PEDAL-USB expansion boards**
- Integration of CLOCK-IN and CLOCK-OUT with optocouplers for galvanic isolation and level adjustment.
- Voltage converter DC-DC 5VCC -> 5VDD for the optocouplers.
- C5 electrolytic capacitor reduced from 470µF/6.3V to 220µF/10V
- All 3.5mm TR/TRS jacks changed to “Stereo” (green) except for LINE OUT (black) R and L

37) Appendix F

Changes:

Main PCB version V3-R5-v541 from July 2nd, 2025 / NAVIPANEL V3-v49 from May 21st, 2025.

Changelog: from 02.07.2025 to 21.08.2025

- 3 x 3mm mounting holes for the optional **MIDI to CV** and **PEDAL-USB expansion boards**
- Voltage converter – track for 5V VDD for optocoupler fixed
- Dimensioning of a resistor R41-R48 for button LEDs changed uniformly to 680R
- C5 electrolytic capacitor reduced from 220µF/10V to 100µF/16V
- SIL RN1 10K network changed from the solder side to the component side. Space problem with J2P VCC/GND connector
- CV-IN for 0-5V input the resistor R40 changed from 1K/0.1% to 910R/0.1%
- Inductance L2 100µH removed (GND Line…)

38) Appendix F

Changes:

Main PCB version V3-R6-v582 from September 14th, 2025 / NAVIPANEL V3-R03-v53 from September 14th, 2025.

- Text 5V and 3.3V swapped in the front panel
- Parts lists as subpages for components that are included in the scope of delivery but are not directly located on the PCBs

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- Interesting links
- Construction instructions NAVIPANEL-V3/ V7.0-DE
- Construction instructions NAVIPANEL-V3/ V6.8-DE
- Assembly instructions MIDI-to-CV-PEDAL-USB/ V1.0-DE
- Assembly instructions for the 8HP front panel MIDI-to-CV/ V1.0-DE
- Assembly instructions PEDAL-USB/ V1.0-DE
- Assembly instructions for the 8HP front panel PEDAL-USB/ V1.0-DE
- mdt_PSRAM-CAP_TOUCH-MAM-CV-1.9.9.9
- mdt_PSRAM-CAP_TOUCH-MAM-APC-1.9.9.9
- mdt_PSRAM-CAP_TOUCH-MAM-APC-1.9.9.9
- mdt_PSRAM-CAP_TOUCH-MAM_SPDIF-1.9.9.9
- MicroDexed-touch-manual-version-0.57.pdf
- codeberg.org/positionhigh/MicroDexed-touch
- Web Microdexed MDT remote

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