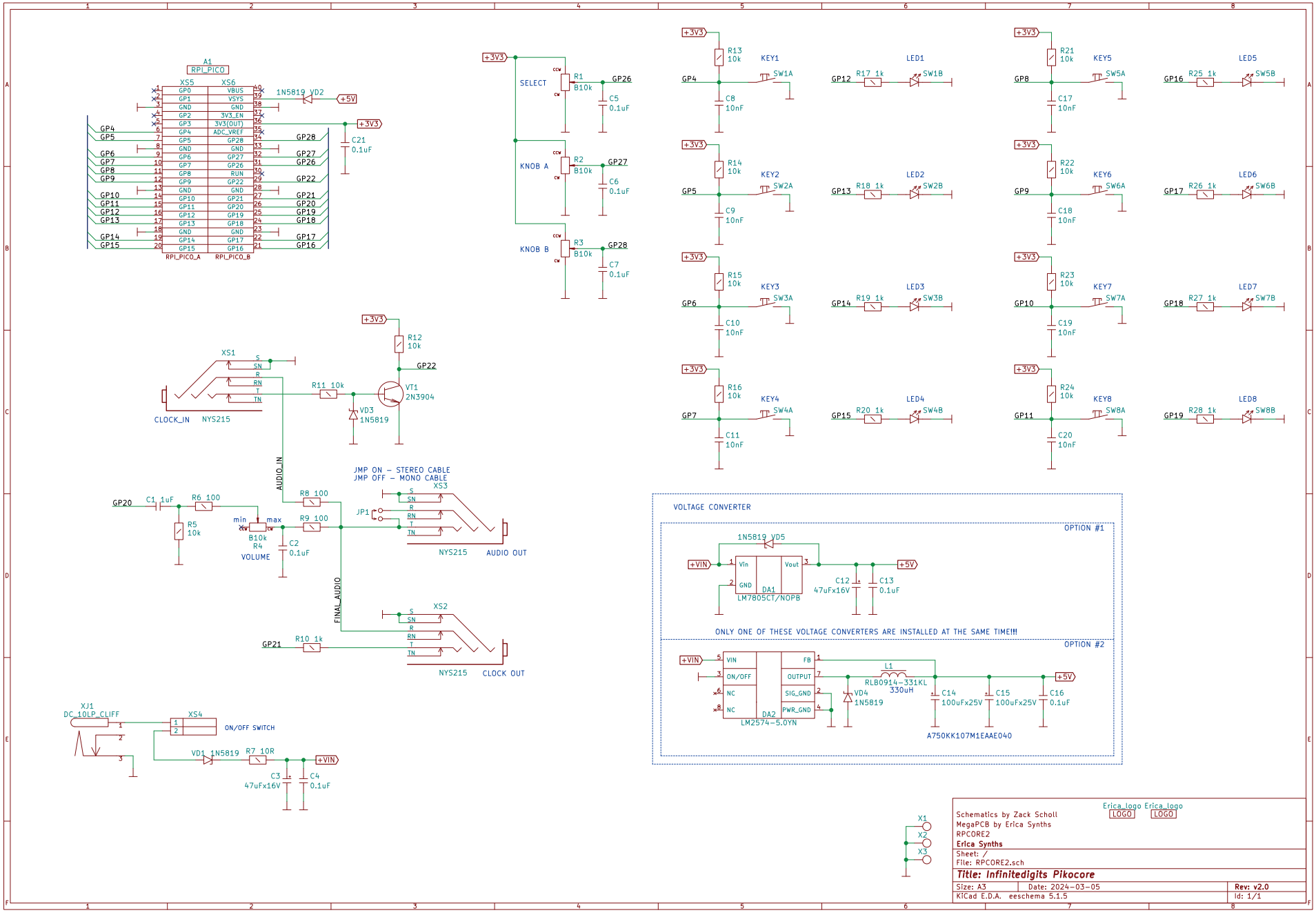
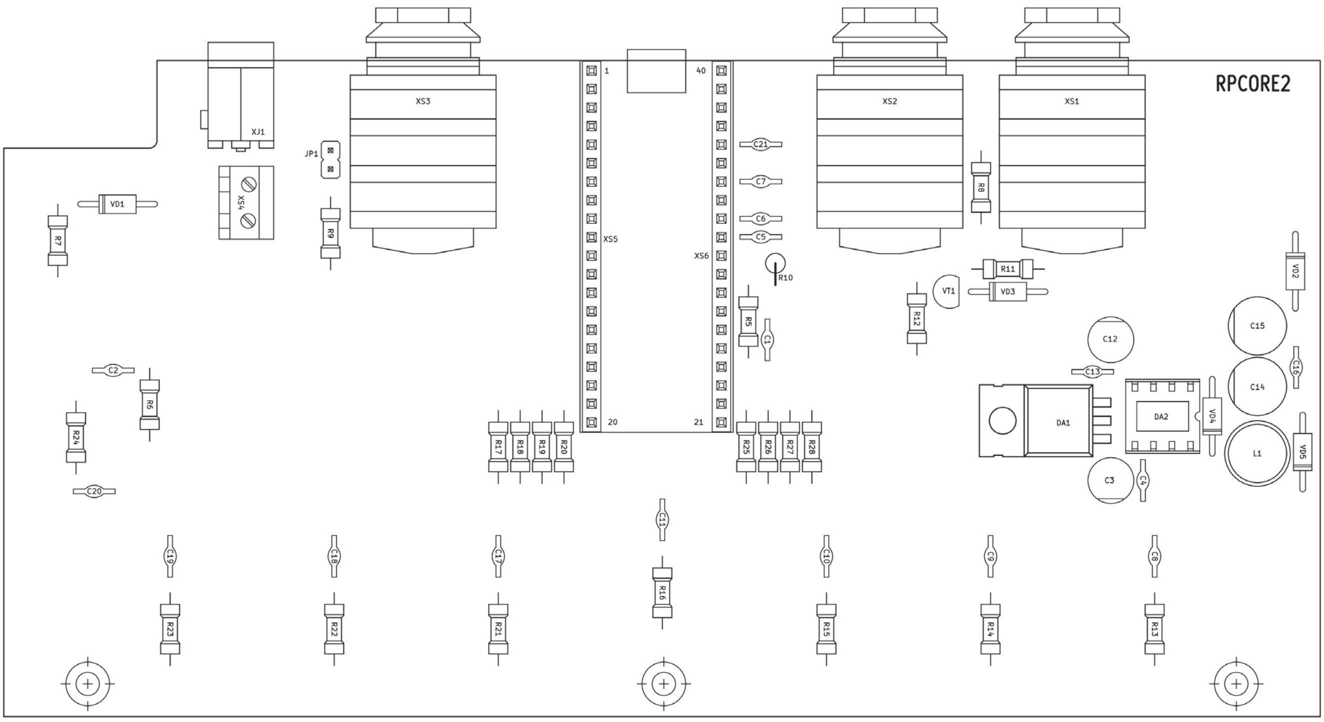
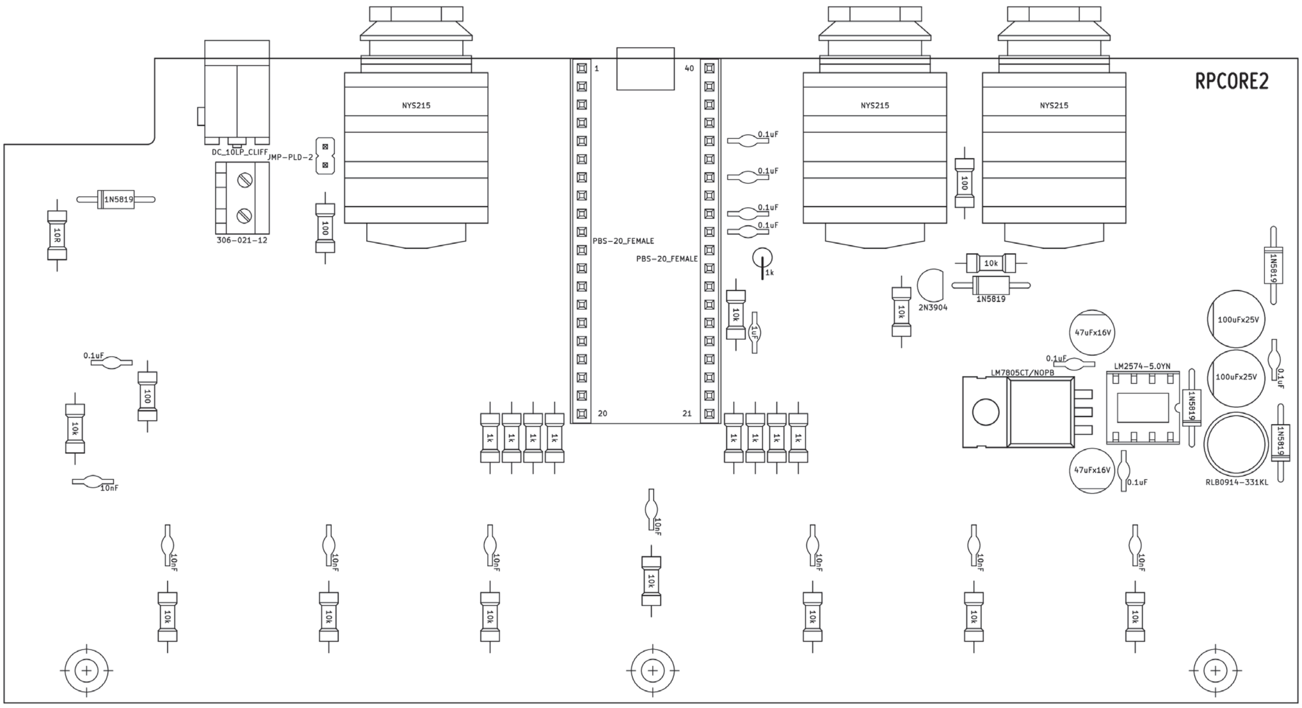
PIKOCORE ASSEMBLY MANUAL

Thank you for purchasing Infinite **Digits Pikocore XL DIY kit by Erica Synths!**
The Pikocore is a lo-fi music mangler based on the Raspberry Pi, developed by Zack Scholl: https://infinitedigits.co/wares/pikocore/. The original DIY kit comes in a miniature pocket calculator formfactor, and we at Erica Synths wanted to make it more playable, so we reached out Zack and agreed to develop Pikocore XL version that has identical functionality, but comes in Erica Synths signature hands on user interface and proper aluminum enclosure.
Infinite Digits Pikocore XL by Erica Synths is full DIY kit that includes all components to build an instrument and put in in action straight away. The RP board in the kit is pre-programmed and ready to use.

Before you start soldering, we highly recommend printing out the schematics and part placement diagrams with designators and values and follow step-by step instructions below. This will help you to avoid mistakes in the build process.
There are two options for +5V regulators on the PCB – a switching regulator and a linear voltage regulator (LDO). Because a power consumption of the instrument is comparably small, the kit contains components for linear voltage regulator. When building the kit, **do not populate** DA2, C14, C15, C16, L1 and VD4.

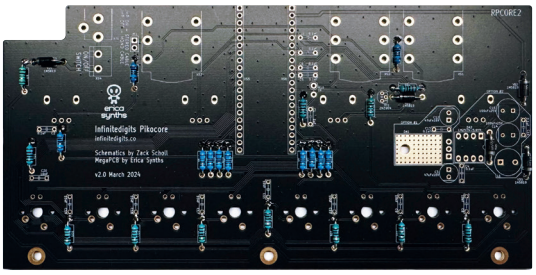

A1
RPI_PICO
XS5
XS6
RPI_PICO_A
RPI_PICO_B
1N5819 VD2
+5V
+3V3
C21
0.1uF
SELECT
KNOB A
KNOB B
R1
R2
R3
B10k
C5
C6
C7
0.1uF
GP26
GP27
GP28
KEY1
KEY2
KEY3
KEY4
SW1A
SW2A
SW3A
SW4A
SW1B
SW2B
SW3B
SW4B
LED1
LED2
LED3
LED4
R13
R14
R15
R16
R17 1k
R18 1k
R19 1k
R20 1k
C8
C9
C10
C11
10nF
KEY5
KEY6
KEY7
KEY8
SW5A
SW6A
SW7A
SW8A
SW5B
SW6B
SW7B
SW8B
LED5
LED6
LED7
LED8
R21
R22
R23
R24
R25 1k
R26 1k
R27 1k
R28 1k
C17
C18
C19
C20
GP16
GP17
GP18
GP19
XS1
CLOCK_IN
NYS215
R12
R11 10k
VT1
2N3904
VD3
1N5819
GP22
AUDIO_IN
JMP ON – STEREO CABLE
JMP OFF – MONO CABLE
XS3
JP1
NYS215
AUDIO OUT
GP20
C1 1uF
R6 100
R5
10k
min
max
B10k
R4
VOLUME
C2
0.1uF
R8 100
R9 100
FINAL_AUDIO
XS2
GP21
R10 1k
NYS215
CLOCK OUT
VOLTAGE CONVERTER
OPTION #1
1N5819 VD5
+VIN
Vin
Vout
GND
DA1
LM7805CT/NOPB
C12
47uFx16V
C13
0.1uF
ONLY ONE OF THESE VOLTAGE CONVERTERS ARE INSTALLED AT THE SAME TIME!!!
OPTION #2
VIN
ON/OFF
NC
FB
OUTPUT
SIG_GND
PWR_GND
DA2
LM2574-5.0YN
L1
RLB0914-331KL
330uH
VD4
1N5819
C14
100uFx25V
C15
100uFx25V
C16
0.1uF
A750KK107M1EAAE040
XJ1
DC_10LP_CLIFF
XS4
ON/OFF SWITCH
VD1 1N5819
R7 10R
C3
47uFx16V
C4
0.1uF
X1
X2
X3
Erica_logo Erica_logo
LOGO
LOGO
Schematics by Zack Scholl
MegaPCB by Erica Synths
RPCORE2
Erica Synths
Sheet: /
File: RPCORE2.sch
Title: Infinitedigits Pikocore
Size: A3
Date: 2024-03-05
Rev: v2.0
KiCad E.D.A. eeschema 5.1.5
Id: 1/1


RPCORE2
XJ1
XS3
XS2
XS1
XS4
XS5
XS6
JP1
VD1
VD2
VD3
VD4
VD5
VT1
DA1
DA2
L1
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
1
40
20
21

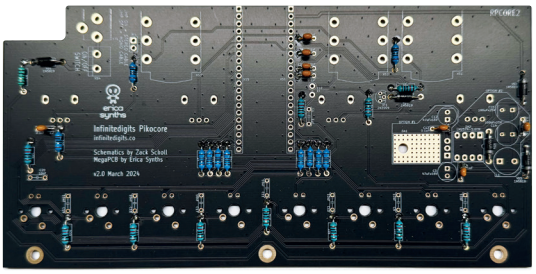

RPCORE2
NYS215
NYS215
NYS215
DC_10LP_CLIFF
JMP-PLD-2
306-021-12
1N5819
PBS-20_FEMALE
PBS-20_FEMALE
2N3904
LM7805CT/NOPB
LM2574-5.0YN
RLB0914-331KL
47uFx16V
100uFx25V
0.1uF
10nF
10k
1k
100
10R
1
40
20
21

Place the Pikocore PCB in a PCB holder for soldering or simply on top of some spacers (I use two empty solder wire coils here).

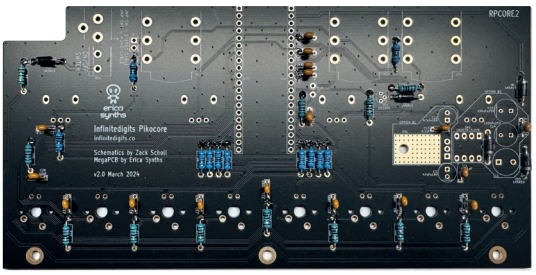
I usually start populating PCBs with lower, horizontally placed components. In this case theses are **resistors and diodes.** Bend the resistor leads and insert them in the relevant places according to the part placement diagram above. There is one vertically placed resistor – we'll install it later. Now, proceed with diodes. Remember – when inserting the diodes, orientation is critical! A thick **white stripe** on the PCB indicates **the cathode of a diode** – match it with the stripe on the component. Flip the PCB over and solder all components. Then, use pliers to cut off the excess leads.



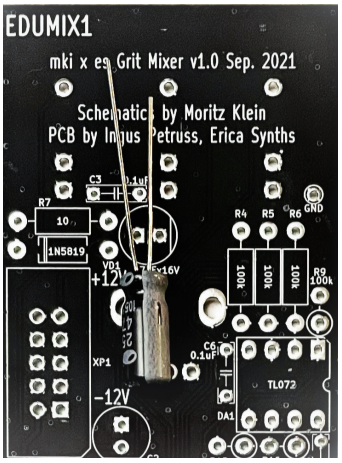
Now, we recommend to **sort ceramic capacitors.** There 100nF, 10nF and 1uF ceramic capacitors in the kit. 100nF have 104, 10nF have 103, and 1uF has 105 printed on the capacitor. Start with **populating 100nF** capacitors.



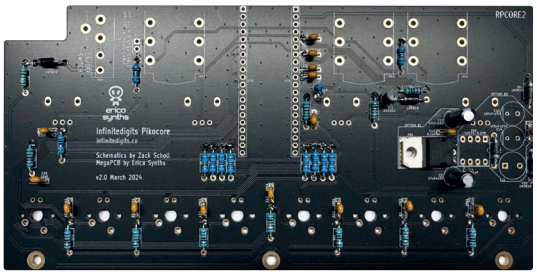
Then proceed with other ceramic capacitors.



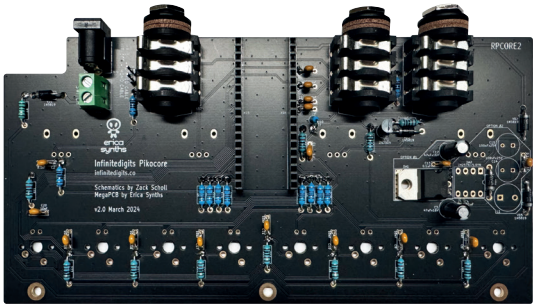
Now, **insert & solder the electrolytic capacitors.** Electrolytic capacitors are bipolar, and you need to mind their orientation. The **positive lead of each electrolytic capacitor is longer**, and there is a minus stripe on the side of the capacitor's body to indicate the negative lead. On our PCBs, the positive pad for the capacitor has a square shape, and the negative lead should go into the pad next to the notch on the silkscreen.



Also, **install the voltage regulator** (LDO) – bend it's leads and solder it in place. The LDO will disperse all heat generated in the process of lowering the voltage. Before soldering, make sure, the LDO touches a heatsink on the PCB (no big deal, if it doesn't because not that much heat is generated). Also **install and solder remaining 1k vertically placed resistor.** When completed, your PCB should look like this:

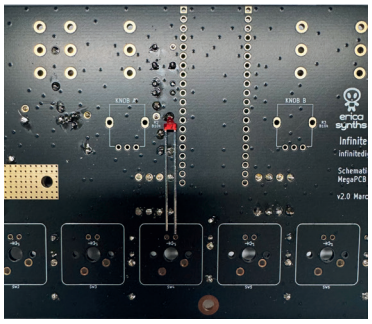


Now, **solder all jack sockets and connectors.** Make sure all components are properly pushed in relevant places and connectors are aligned with a silkscreen and vertical. We recommend to solder one pin of the component, and double check alignment. Also, solder the two pin male connector for a jumper next to the XS3 jack socket. If you will use mono jack for output audio, do not install the jumper. At this stage your PCB should look like this:

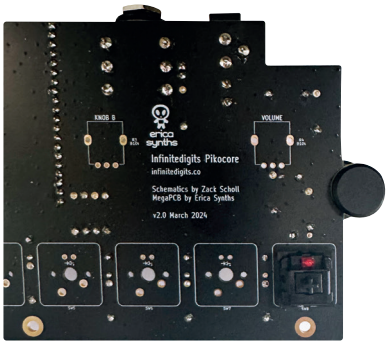


Now, turn the PCB around and inspect your solder joints. **Make sure all components are soldered properly and there are no cold solder joints or accidental shorts.** Clean the PCB to remove extra flux, if necessary.

Now, let's proceed with **cherry keys**! Each key has an LED inside, and **orientation of the LED is critical.** The longer lead is anode and all LEDs have to be aligned with the PCB as shown below.



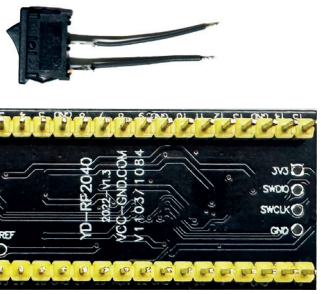
Place the cherry key in the relevant position, insert the LED and hold both components in place and solder just one pin of the cherry key. Now, make sure the cherry key is **centered in its place and aligned** with a silkscreen. Then solder the second pin and the LED.



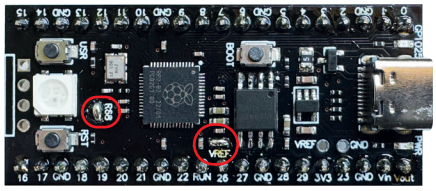
Proceed with remaining 7 sherry keys and LEDs.

Now, install and solder all **4 potentiometers.**

Cut a wire in the kit in two pieces and solder it to the **power switch.** Also, solder the **male connectors to the RP board.** Start with one pin, make sure a connector is aligned with the silkscreen and is positioned vertically. Do not install these components, yet.

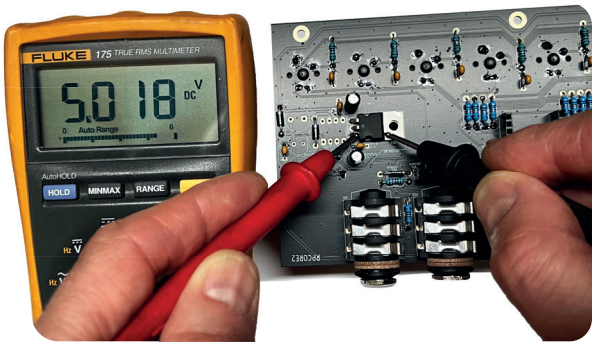


In order to ensure correct operation of the instrument, you need to solder two "jumpers" on the RP board. Just put the solder blob on smt polygons indicated in the picture.



At this point it's good **idea to test**, if the voltage regulator works. Use one excess lead of resistor to emulate a closed switch and connect the power supply.

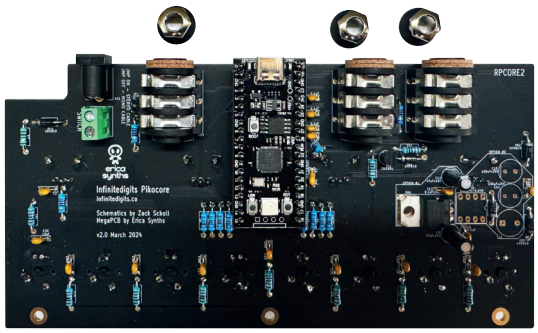
Measure voltage between pins 2 and 3 of the LDO.



If voltage reads something around 5 volts, you are good to install the RP board. Disconnect a power supply and **install the RP board.** Once it's installed, power the unit on and make sure, the LEDs on the **cherry keys lit up sequentially and the LEDs on the RP board are on.**

Push on the **cherry key caps.**

Remove nuts from jack sockets, but leave both washers on.



Now you can **insert the PCB in the enclosure.** Make sure the DC connector clicks in the relevant opening and **washers of the jack sockets touch rear panel.** Tighten jack socket hex nuts and then **fix the PCB with 3 screws** in a cherry key area.

Then place **washers on the potentiometers and fix** them with the hex nuts.

Next, **push in the switch** and connect the wires to the green connector.

Attach anti-slip pads to the bottom part of the enclosure.

The last step is to install **knobs of the potentiometers.**

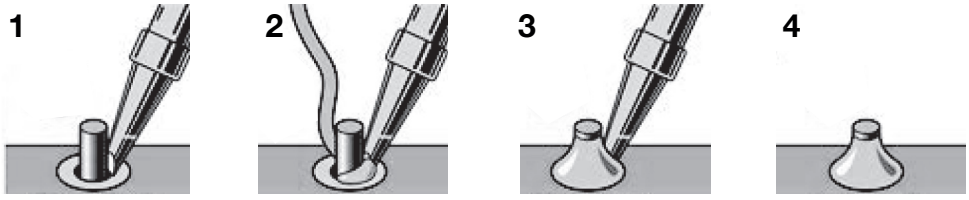
Congratulations! **You have completed the assembly of the Infinite Digits Pikocore XL DIY kit by Erica Synths!** Connect it to the power supply and make some noise! The unit will work straight away and does not need any calibration.

Enjoy!

SOLDERING APPENDIX

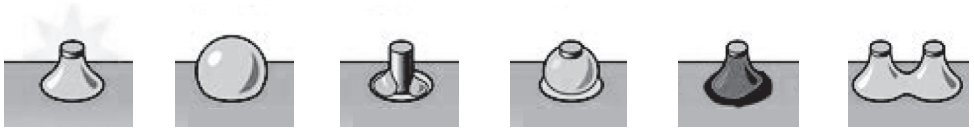
If you've never soldered before – or if your skills have become rusty – it's probably wise to check out some **THT** (through-hole technology) **soldering tutorials on YouTube.** The main thing you have to remember while soldering is that melted solder will flow towards higher temperature areas. So you need to make sure you apply equal heat to the component you are soldering and the solder pad on the PCB. The pad will typically absorb more heat (especially ground-connected pads which have more thermal mass), so keep your soldering iron closer to the pad on the PCB. It's critically important to dial in the right temperature on your soldering station. I found that about 320 °C is the optimal temperature for most of parts, while for larger elements like potentiometers and sockets, you may want to increase that temperature to **370 °C.**

Here's the recommended soldering sequence:



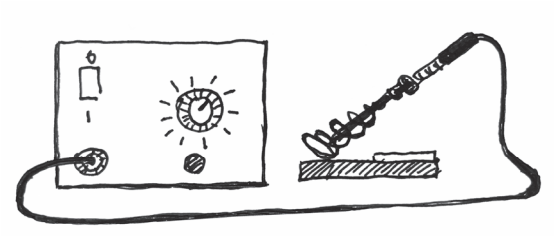
Heat part and pad 2 - 3 sec | Add solder | Continue heating 1 -2 sec. | Let cool

After you have completed soldering, inspect the solder joint:

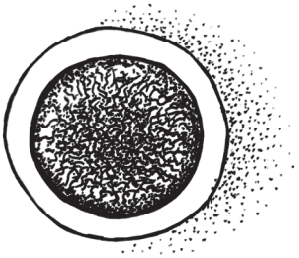


Perfect | Too much solder | Not enough solder | Cold joint | Too much heat | Short

DIY electronics is a great (and quite addictive) hobby, therefore we highly recommend you invest in good tools. In order to really enjoy soldering, you'll need:

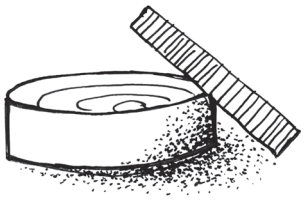


A decent soldering station. Top-of-the-line soldering stations (brands like Weller) will cost 200€ and above, but cheaper alternatives around 50€ are often good enough. Make sure your soldering station of choice comes with multiple differently-sized soldering iron tips. The most useful ones for DIY electronics are flat, 2mm wide tips.



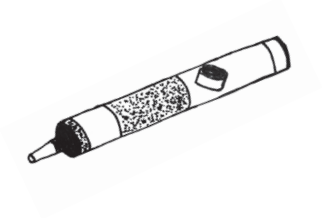
When heated up, the tips of soldering irons tend to oxidize. As a result, solder won't stick to them, so you'll need to clean your tip frequently. Most soldering stations come with a **damp sponge for cleaning the iron tips –** but there are also professional solder tip cleaners with golden curls (not really gold, so not as expensive as it sounds). These work much better because they do not cool down the iron.

Solder wire with flux. I find 0,7mm solder wire works best for DIY projects.

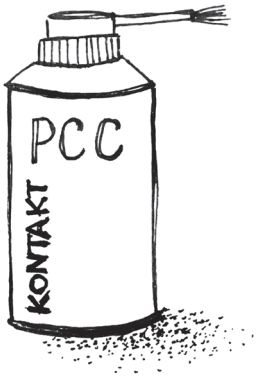


Some **soldering flux** paste or pen will be useful as well.

Cutting pliers. Use them to cut off excess component leads after soldering.



A solder suction pump. No matter how refined your soldering skills are, you will make mistakes. So when you'll inevitably need to de-solder components, you will also need to remove any remaining solder from the solder pads in order to insert new components.



Once you have finished soldering your PCB, it's recommended to remove excess flux from the solder joints. **A PCB cleaner** is the best way to go.

All of these tools can be found on major electronic components retailer websites, like Mouser, Farnell and at your local electronics shops. As you work your way towards more and more advanced projects, you'll need to expand your skillset and your tool belt – but the gratification will be much greater.