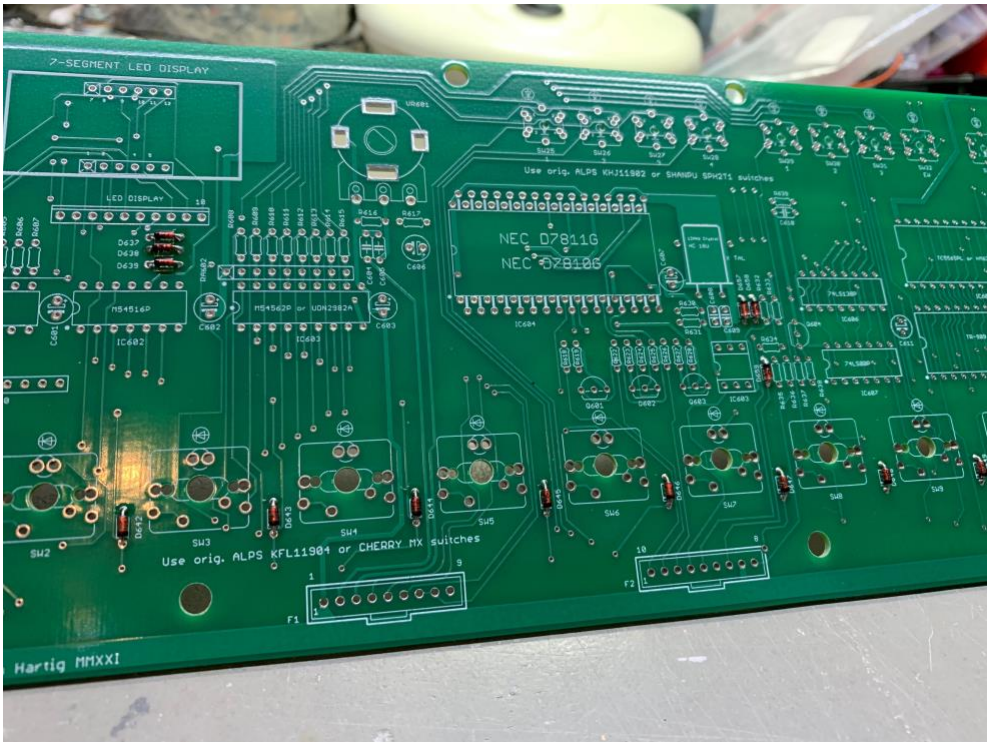
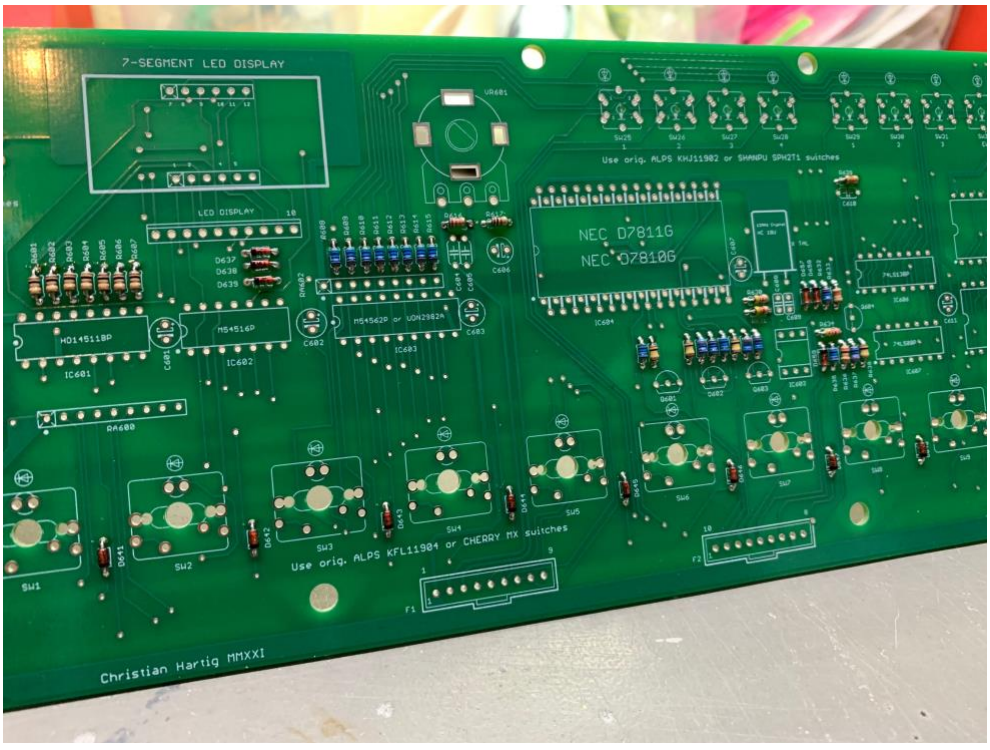
RE-909: The sequencer

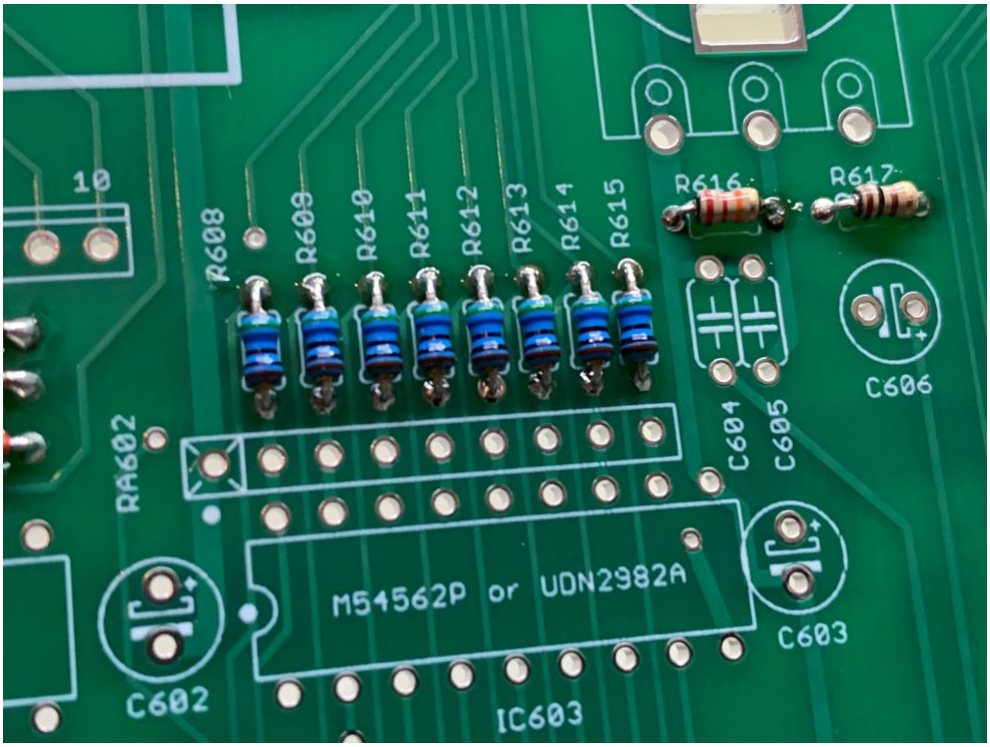
Let's start with the sequencer board: First solder all 1N4148 diodes, always pay attention to the mounting direction! The ring at the diode coincides with the line in the component drawing!



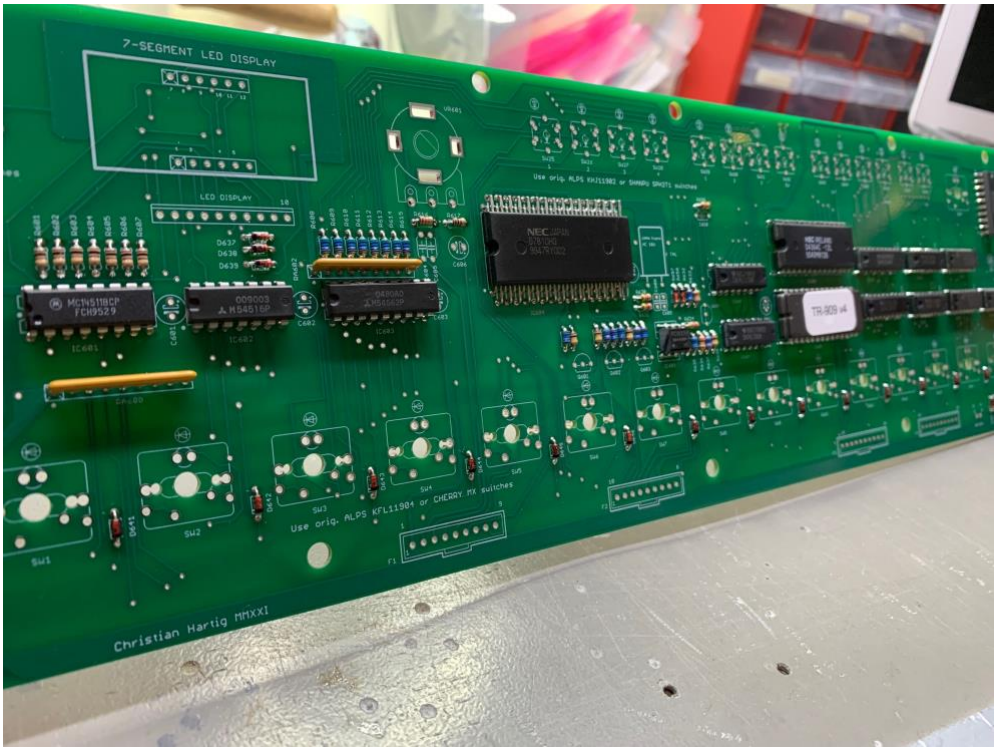
After soldering, check again the **correct installation direction!** Next, solder in all resistors. You can use so called 1/8 Watt or 1/4 Watt resistors. If you don't have small resistors available, you can also use normal ¼W resistors and have to "lay them down" and solder them. You can also mix it up... does not matter as long as the resistor values are correct.



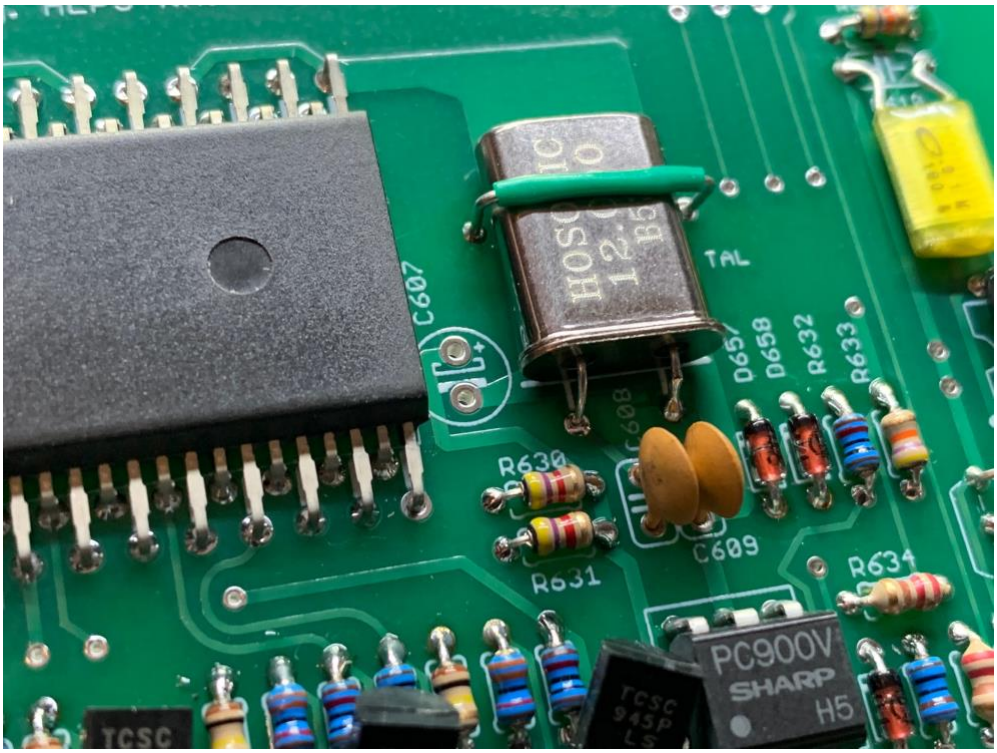
TIP: If you use the original ALPS LED pushbuttons, use a **22 Ohm** resistor for R608 to R615. If you use the Shanpu SPH2 pushbuttons, then use **560 Ohm** or **680 Ohm**. Then the buttons have the optimal luminosity and do not flicker.

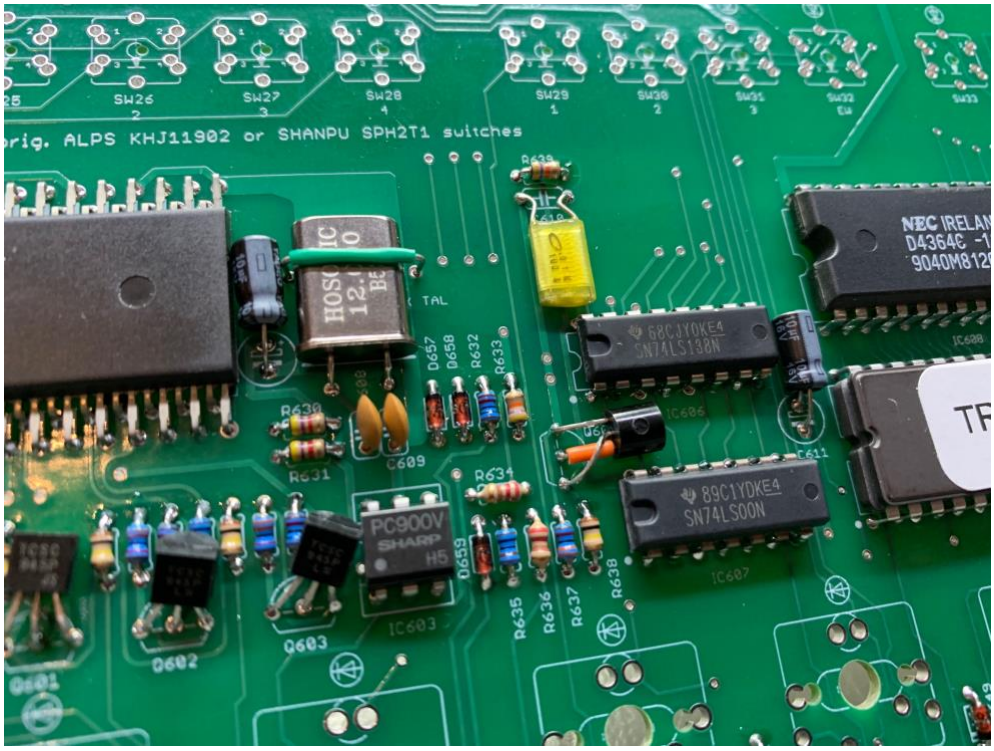


Now all ICs can already be inserted. Always pay **attention to the correct installation direction** of the ICs!
At all ICs the marking shows either to LEFT or to TOP!
Also the two 1K x8 resistor networks are soldered now.
Pin 1 of the resistor network points to the left, to the point on the component drawing on the board.



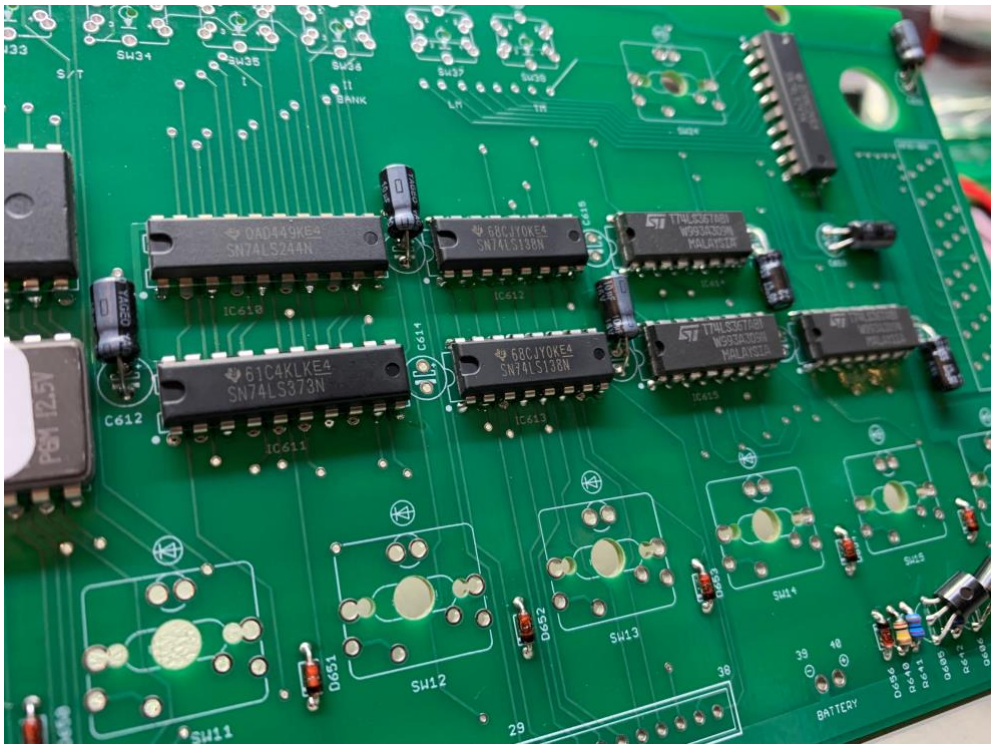
After that you can insert all transistors, the quartz and the capacitors and solder them cleanly. **Pay attention to the mounting direction of the electrolytic capacitors**! With the quartz, the ceramic and the film capacitors there is no direction specification! Secure the quartz after soldering with a piece of insulated wire. By the way: There are different 12MHz crystals, **even if they look the same**. Look in the datasheet of your component, with which charge capacitance it works. This determines the capacitance of the two capacitors C608 and C609! If your crystal works e.g. with a charge capacitance of 33nF, then your capacitors must also have **33nF**!



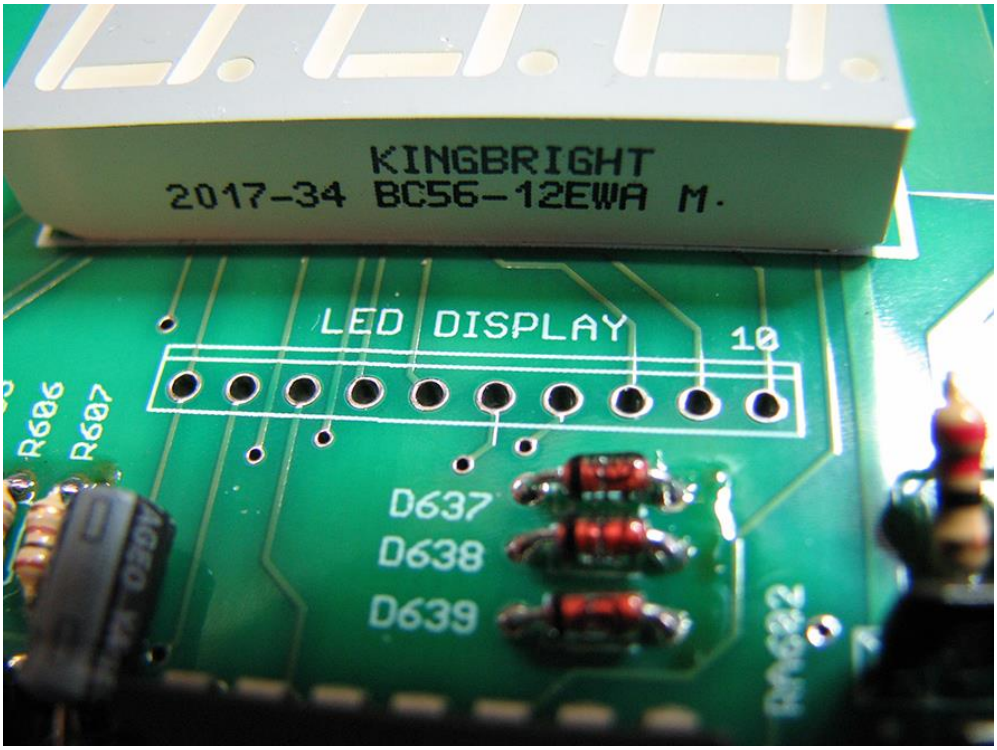


Maybe you noticed the strange transistor **Q604** in my setup: I use a **BC549C** at this point, this gives me a stronger MIDI signal. Since this transistor is **not** PIN compatible, I had to twist it a bit. This method **works great though!**

As soon as all resistors, semiconductors, diodes and capacitors are ready, we come to the **mechanical components**.



By the way: The second connector below our display is for the original LED display of the Roland TR-909, if you have one of those.



The electromechanical components

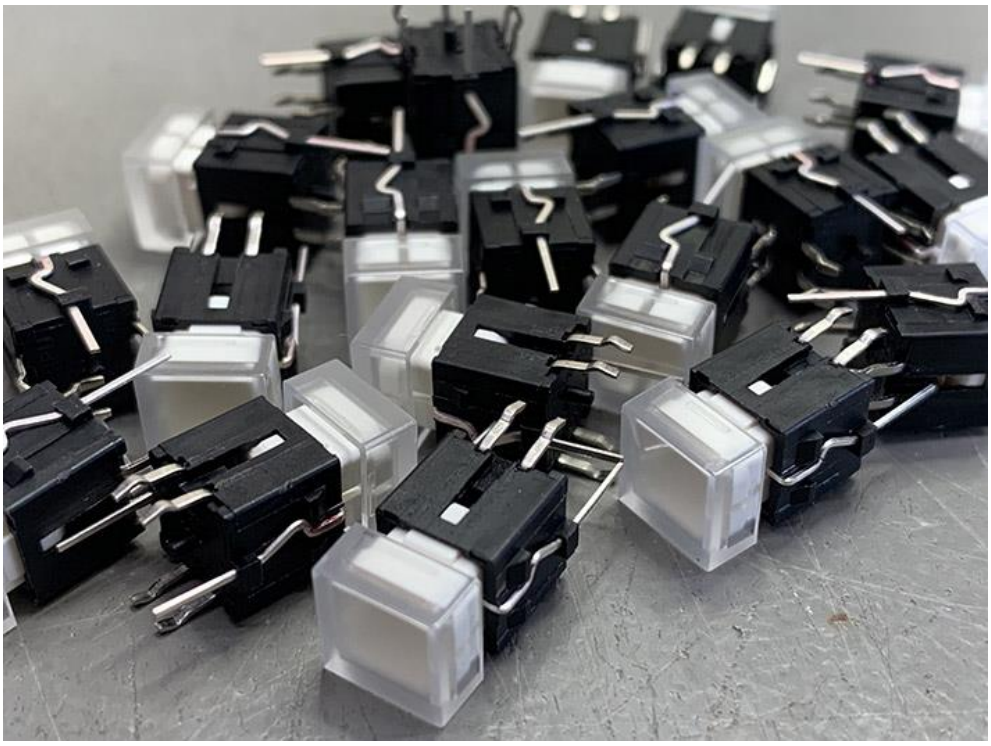
With the Rev2 sequencer board we use other LED buttons than in the first version! These do not only look a little bit different, but they are also soldered in differently!

The Rev2 sequencer board is designed so that you can use either the original **ALPS KHJ** buttons of the TR-909 or the **Shanpu SPH2T1**. We use the small LED pushbuttons with a small PCB adapter, which raises the height by another 1.6mm, even if the Shanpu pushbutton is already higher than the previous pushbutton of the Rev1 sequencer board.

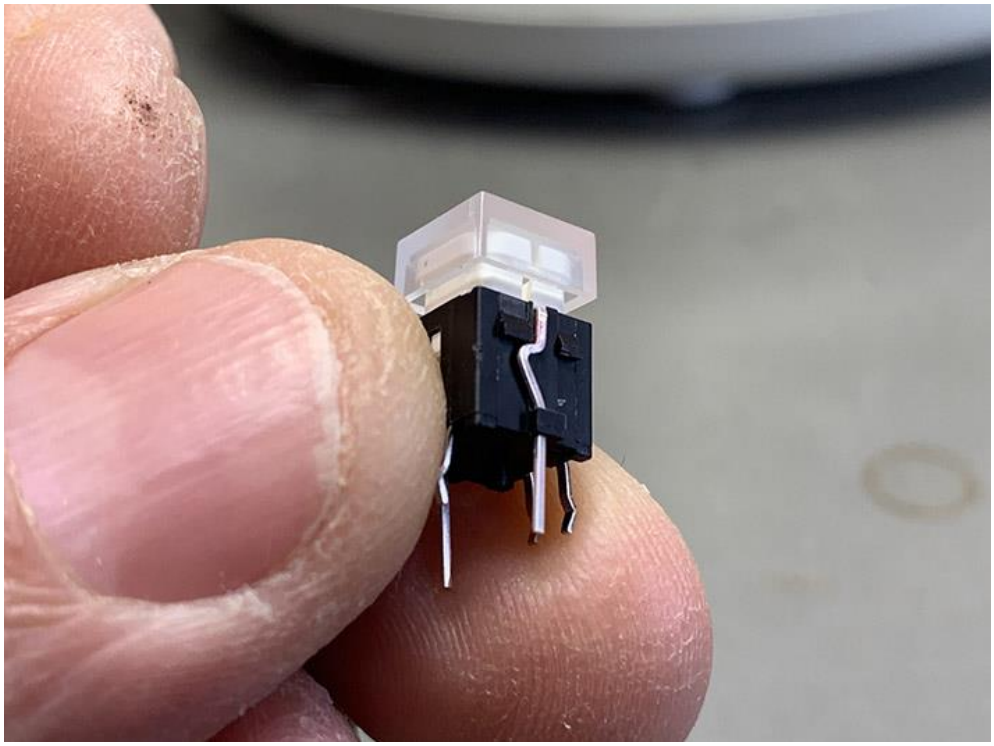
Let's start at the beginning. You have 20 LED buttons and 20 translucent caps to go with them.

First place all caps on the buttons. The caps **"snap"** into place audibly.

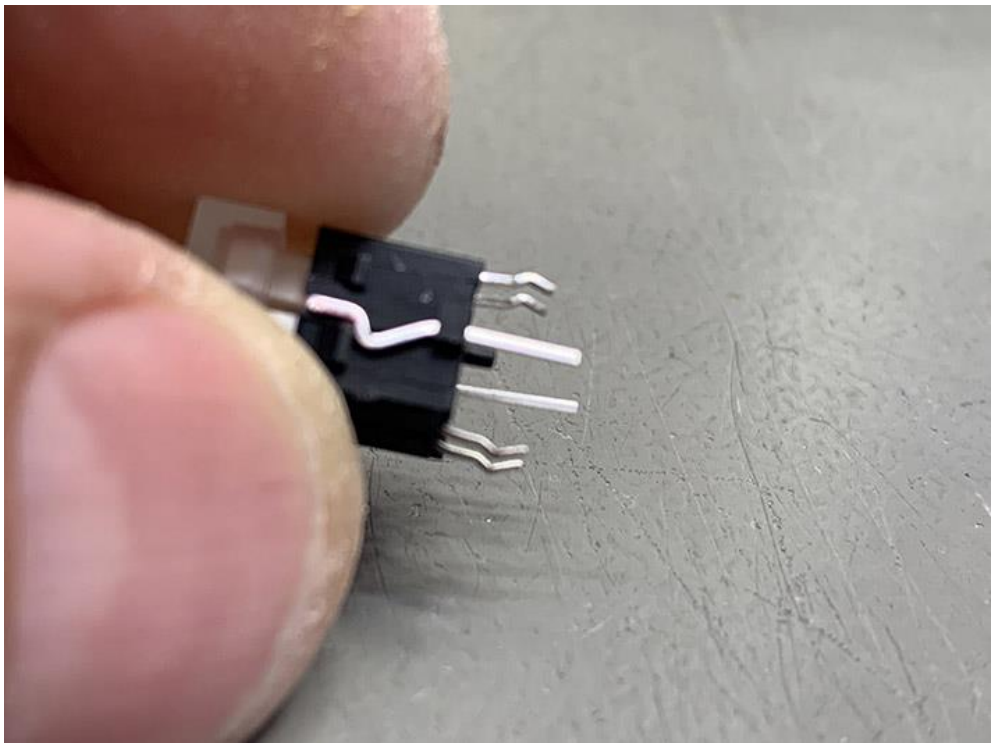
Putting on the key caps should not have been a problem. You now have 20 buttons with the corresponding caps.



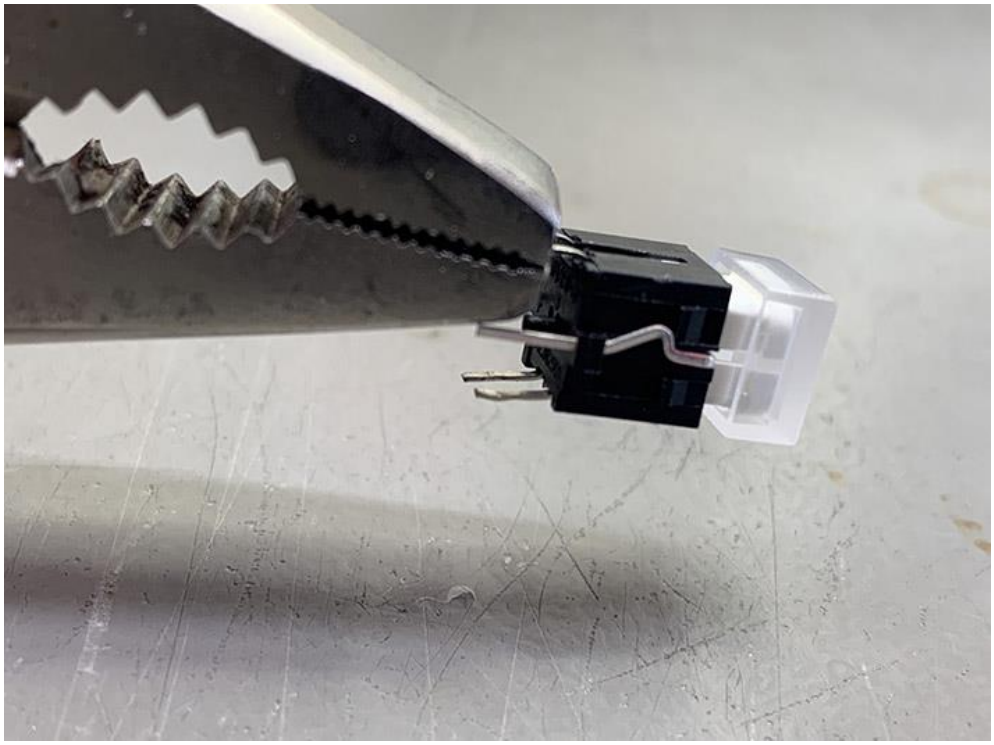
Now take a close look at these LED switches: The four lateral connections are somewhat **"bent"** and one of the connections of the LED is slightly "reddish" colored. The slightly reddish colored connection is a bit shorter and this is the cathode! The **cathode is the negative** terminal and must always point downwards **when inserted into the board**!!!



You have to **flatten** or straighten the four connections on the outside!

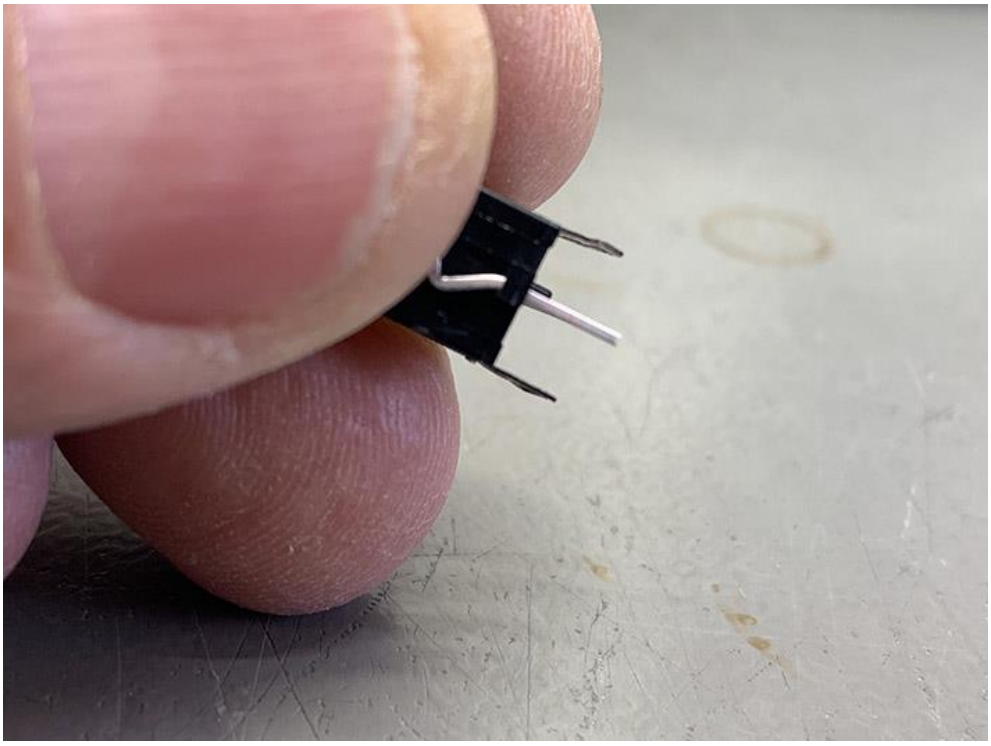


For this you take a simple plier and press these legs a little **"flat"**. This makes it easier to stick the buttons through the holes of the adapters and the sequencer board later.

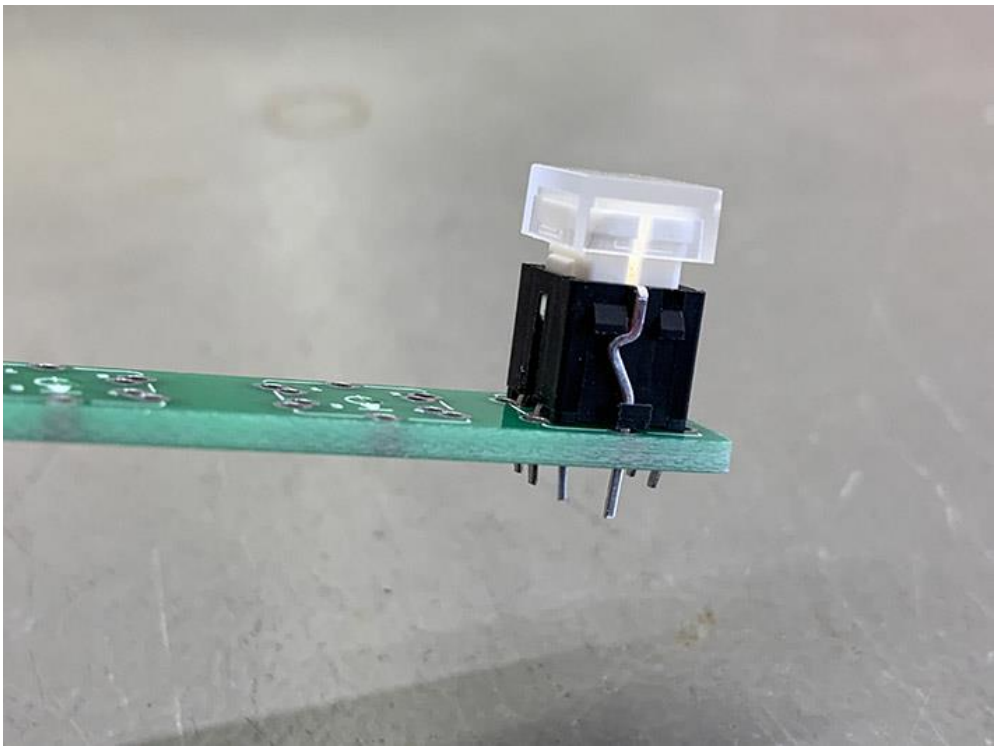


This flattening of the connections has to be done with all 20 switches!
As already said, this will make the assembly more easy later!

This is what the switch legs look like when they are "straightened".

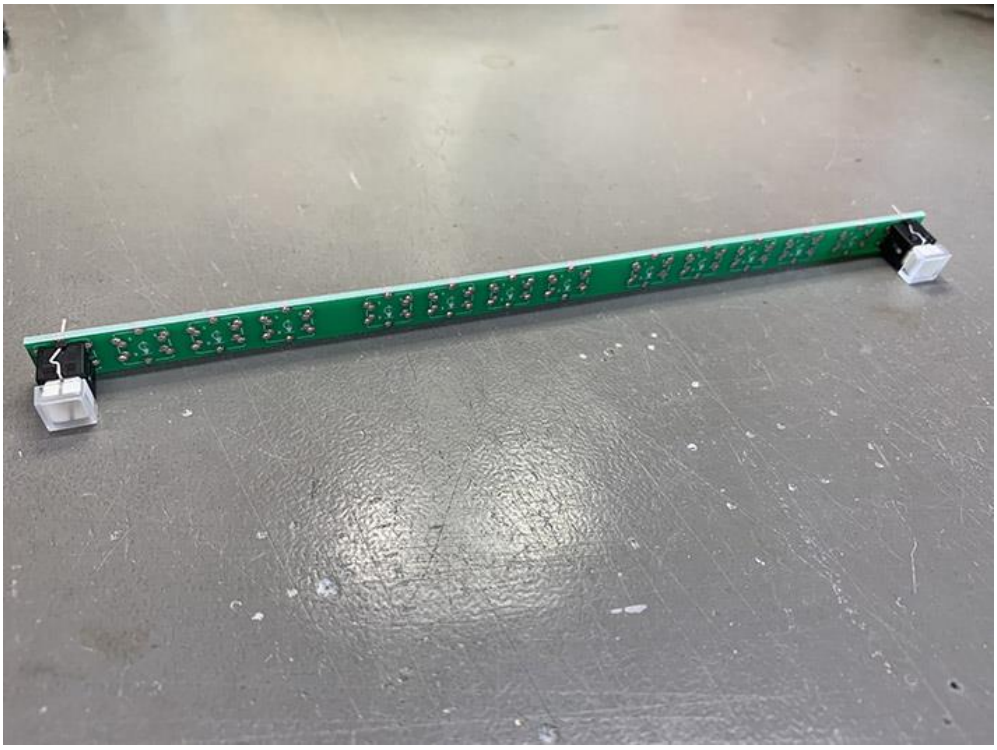


Insert a pushbutton on each side of the adapter board. The cathode of the button also points **"down"**, i.e. to the side with the printed arrow **pointing down**.

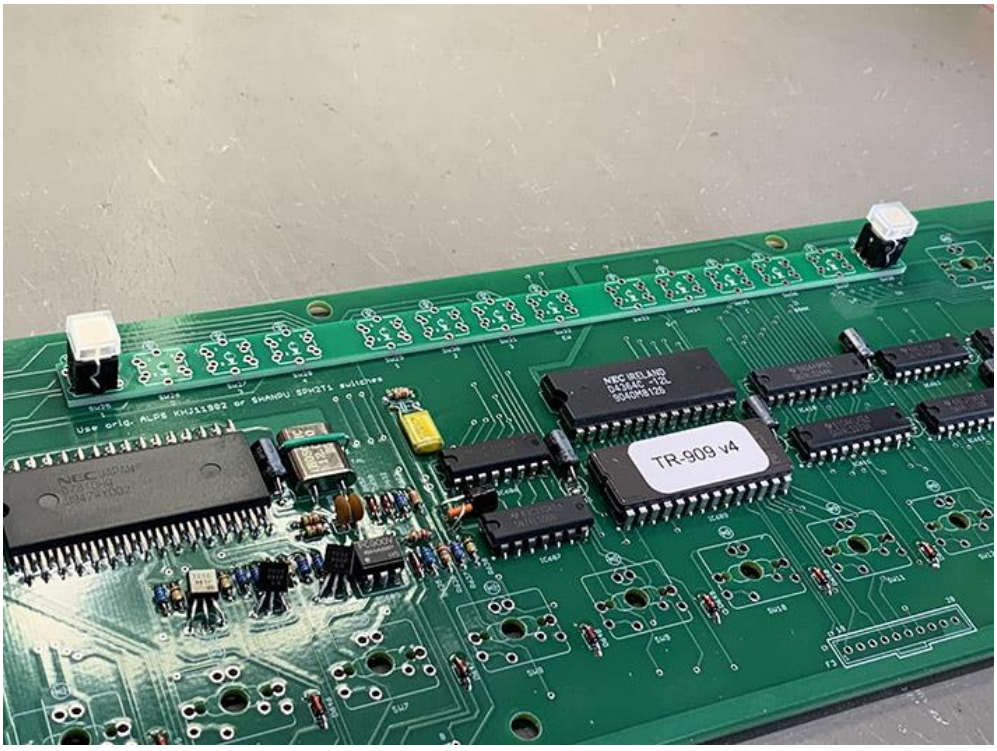


Push the buttons all the way in until it sits flat and angled on the board. Start with only two buttons and then put the adapter board together with the buttons on the sequencer board!
For support and to prevent the buttons from being pressed in the wrong way, the buttons have short pins on the bottom that fit into the respective hole in the adapter board. This is the only way to insert the switch correctly!

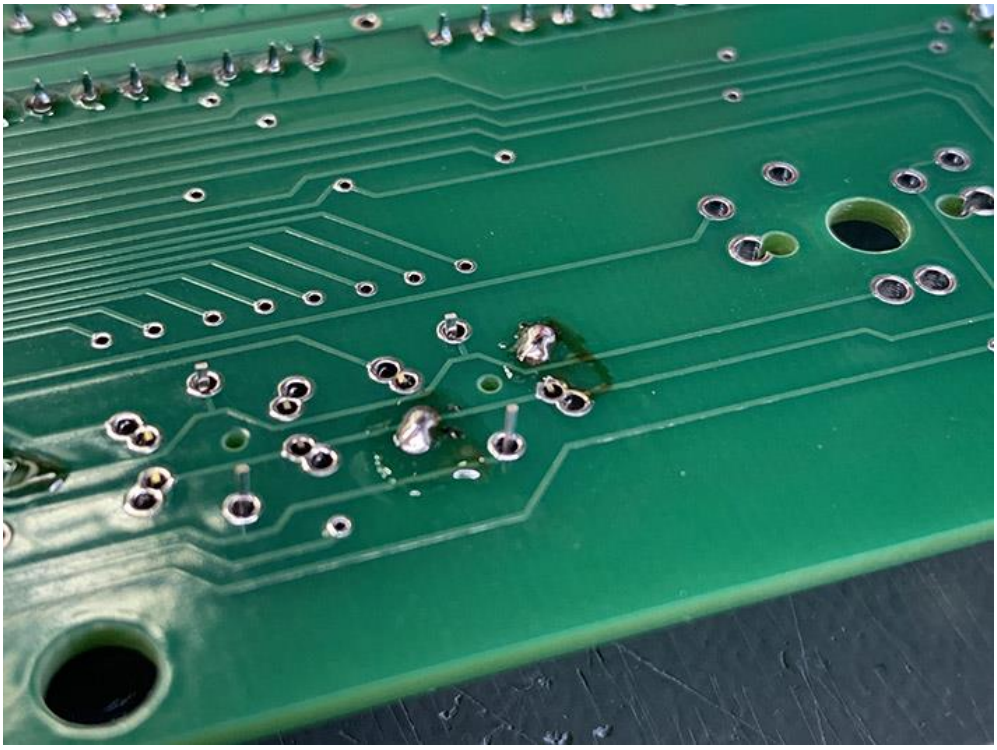
Here once again the right direction can be seen.



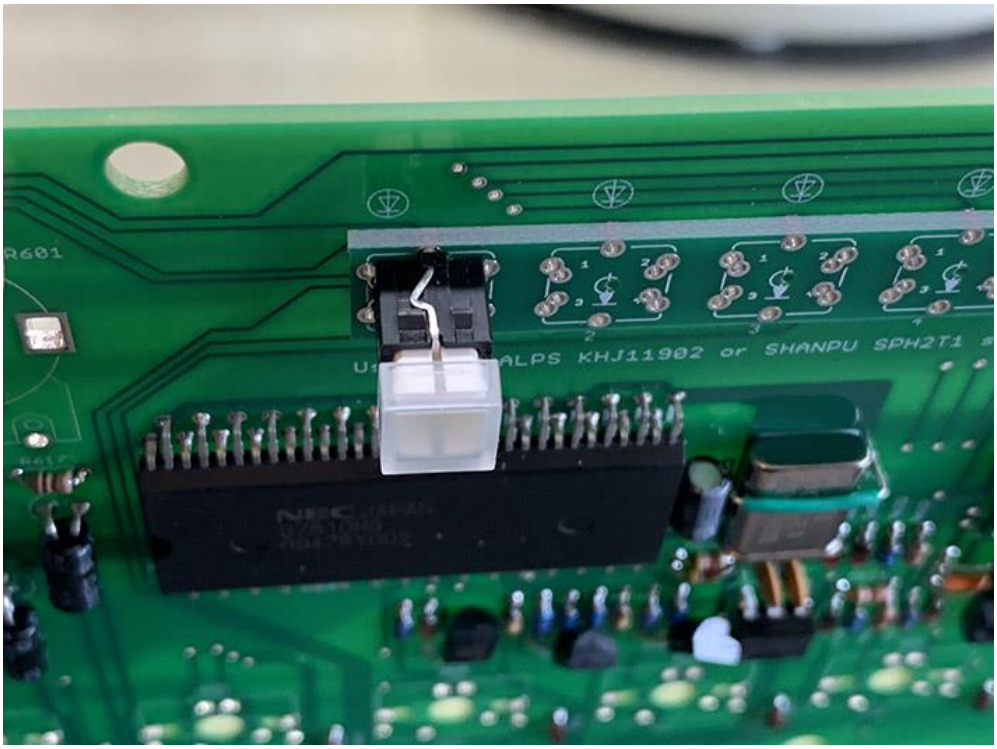
Place the adapter board with the two switches on the sequencer board and make sure that the adapter board is sitting flat on the board.



Turn the sequencer board over and check the exact fit of the adapter board with the buttons. Now solder two opposite connections of each switch and check again the fit and whether the adapter board is really completely seated flush!

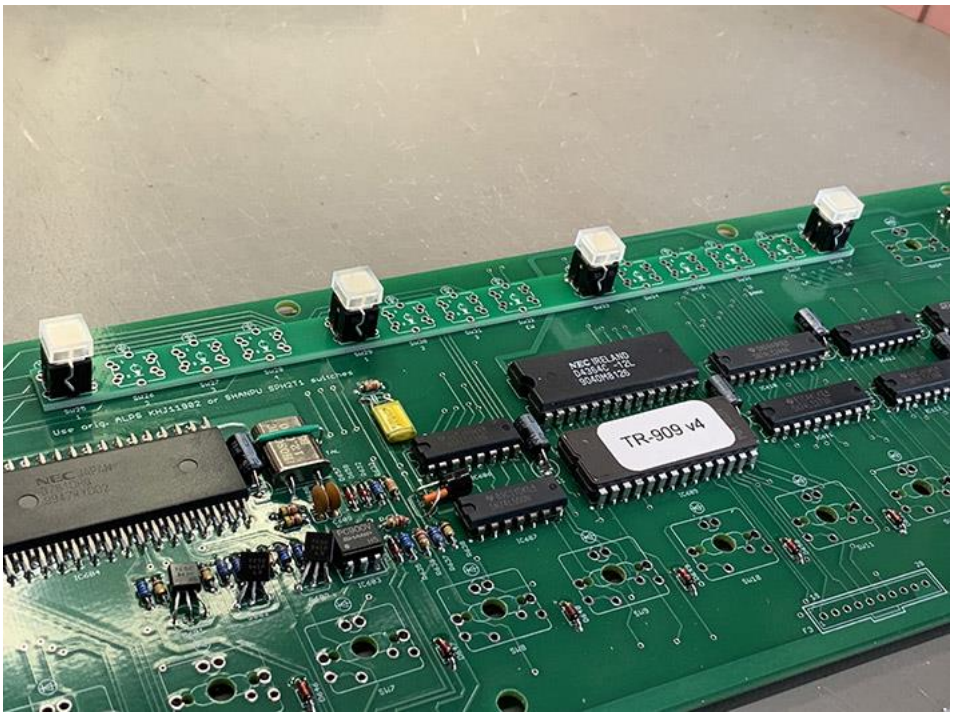


Always check the correct fit!

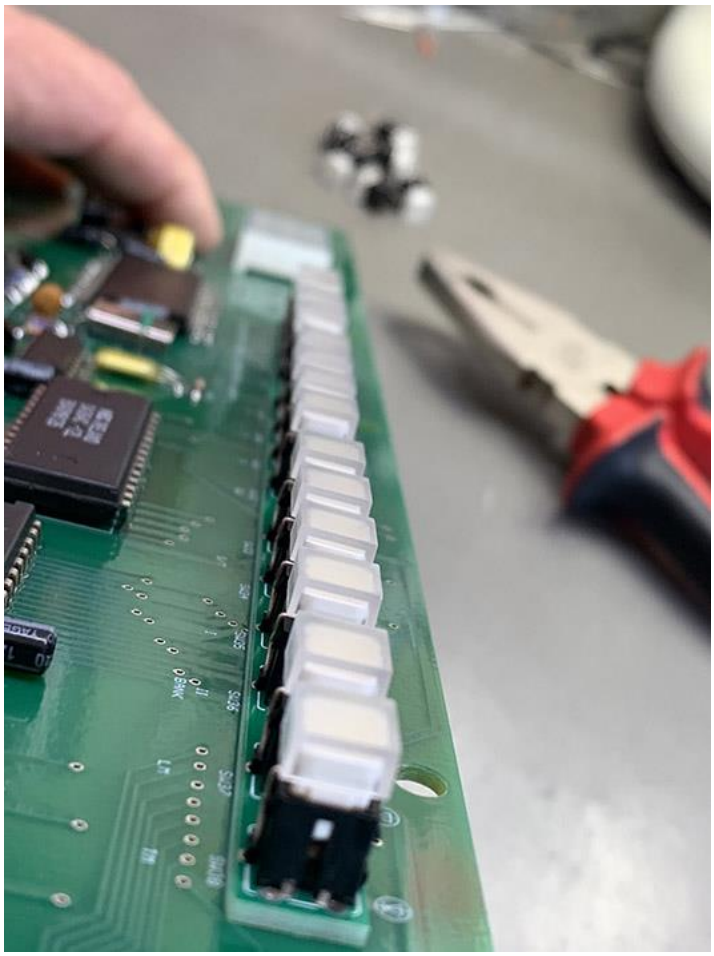


When the first two buttons are soldered, set the next two buttons as shown in the picture.

Check if the adapter board sits flat in the middle of the sequencer board and then solder the two middle buttons as well.

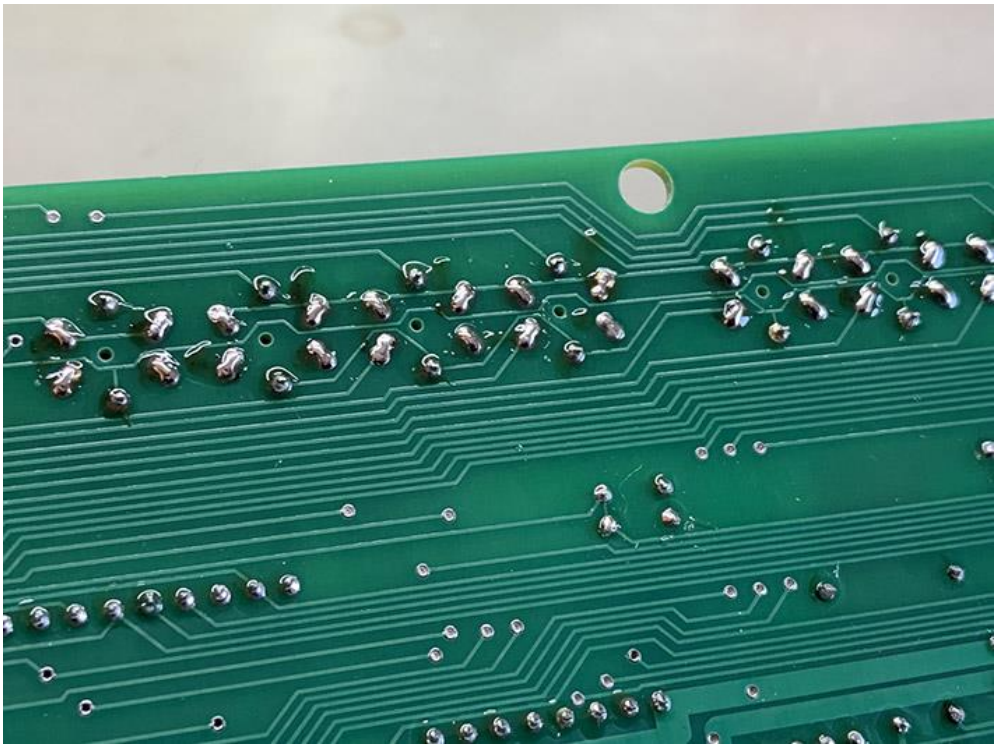


Then you can insert all the other buttons and see if they all sit well in a row. Correct the position of the switches if necessary.

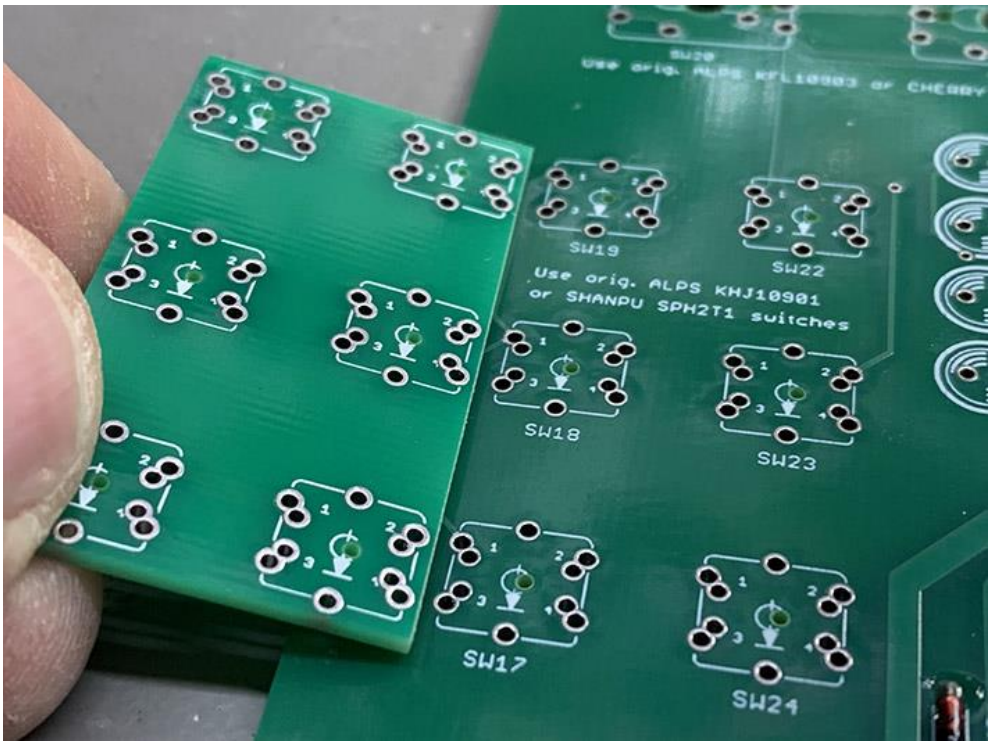


If everything fits perfectly, then you can solder all connections. You have now done a good part of the work! Time for a coffee in between!

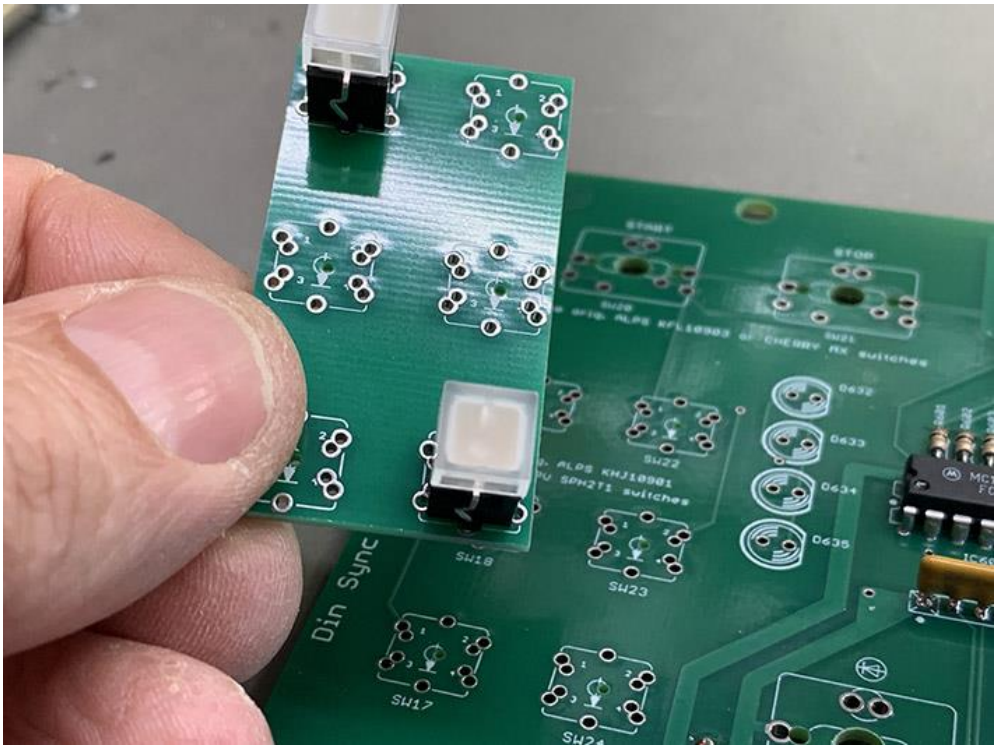
You earned it!



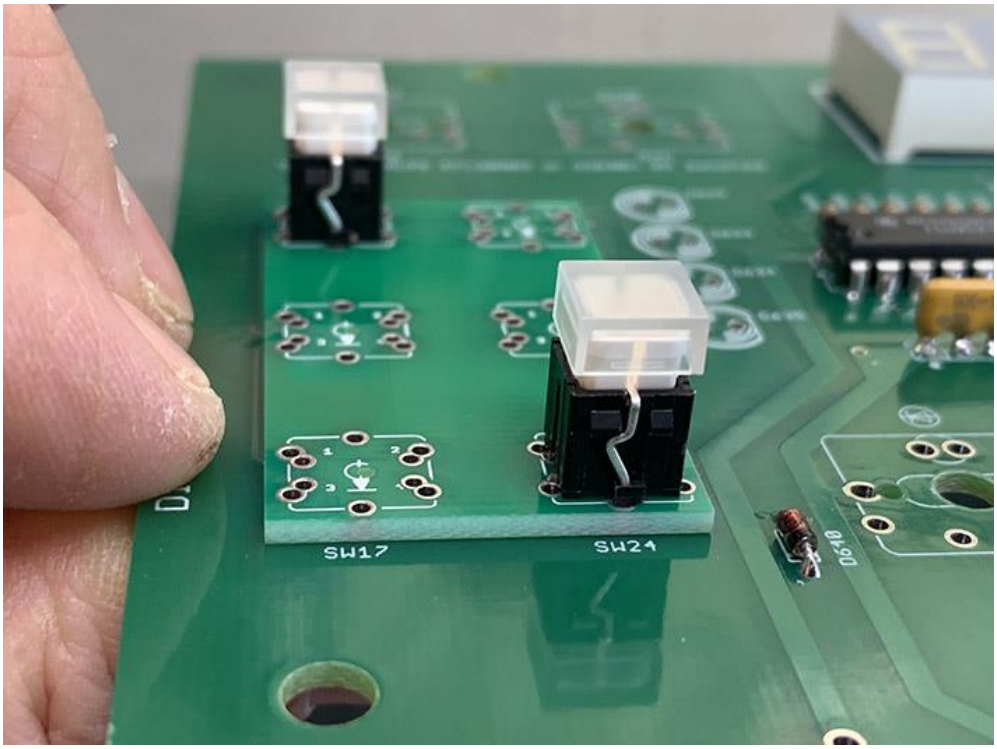
You do it with the small adapter board exactly the same way as with the first one.
First insert two switches, align everything and then solder two switches at two points.



First insert two switches...

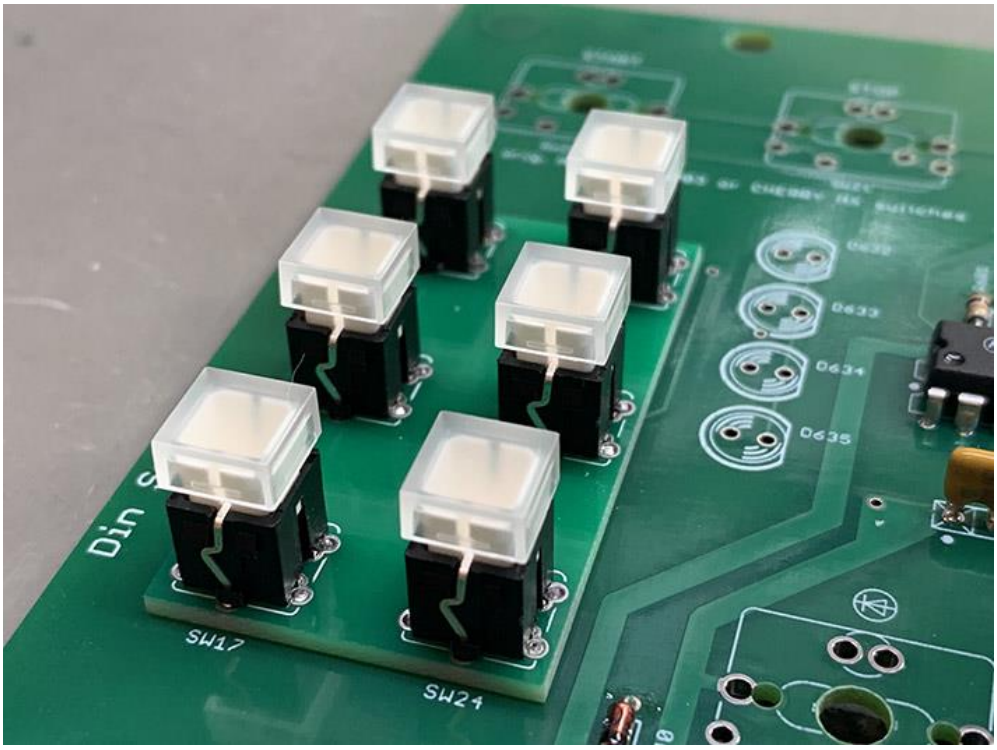


Put to the sequencer board...

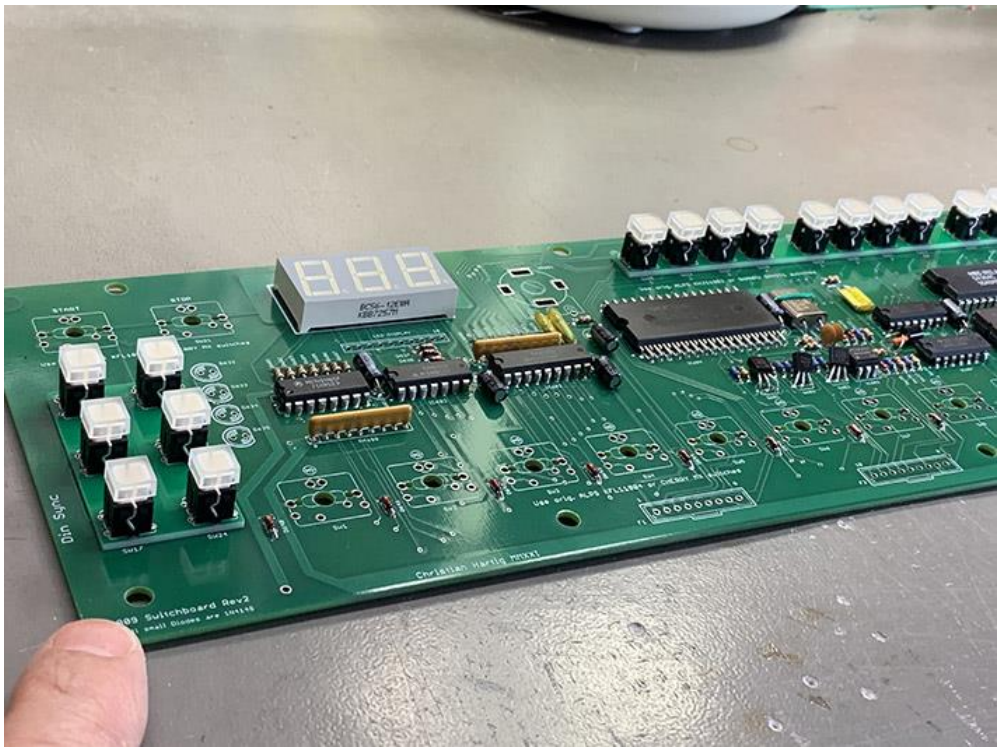


If everything fits well and the adapter board is sitting flush, you can insert all remaining switches and if necessary align them a bit.

If everything fits, solder all contacts.



Then the sequencer board should look like this:



No, no... don't take a break again!
Now it goes on with the tempo potentiometer

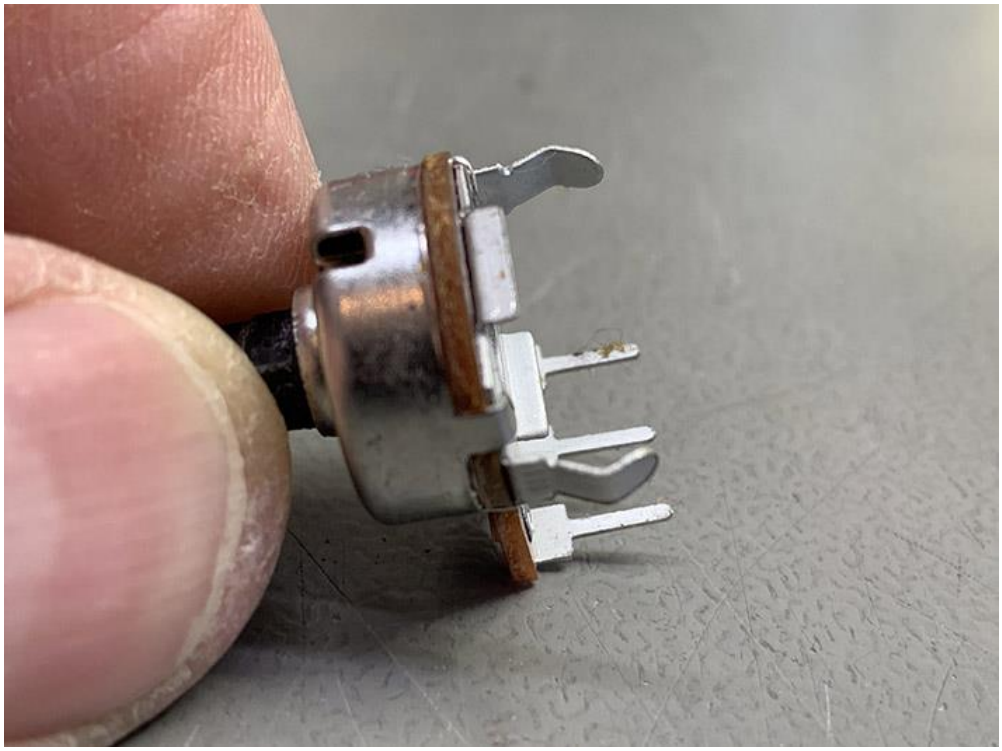
We also have to "edit" this part a bit

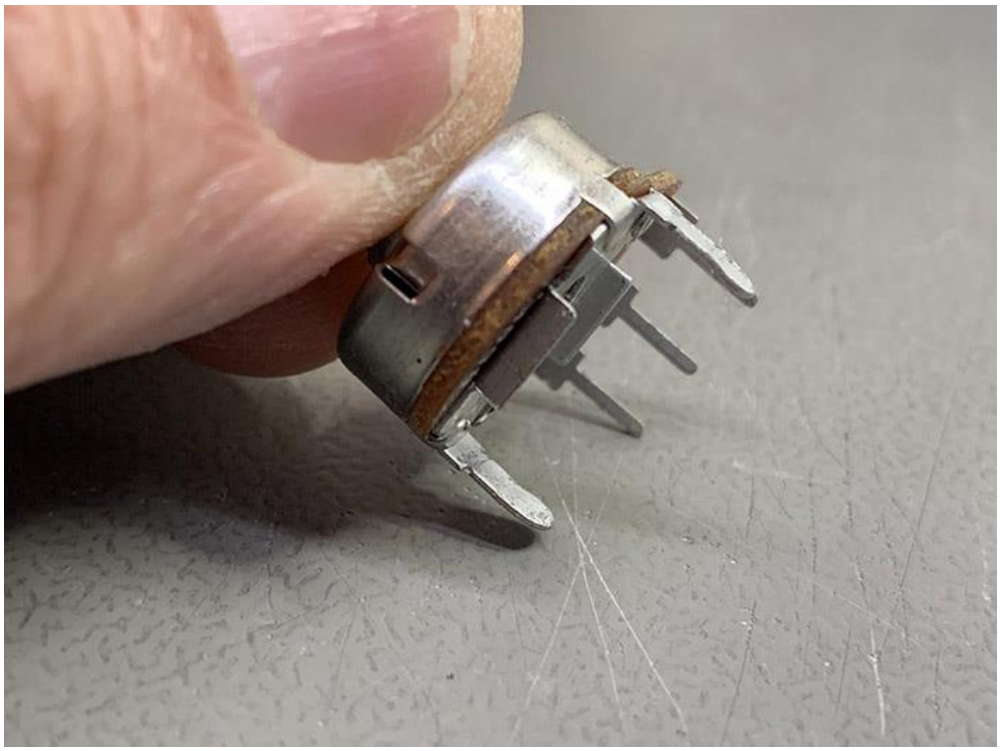
The tempo potentiometer has a very short shaft and there is another rounding at the bottom, **at the end of the shaft**.

In order to be able to use the potentiometer optimally and so that the pot knob fits perfectly later, you should file away this rounding under the heel to the same level as the flattened side.

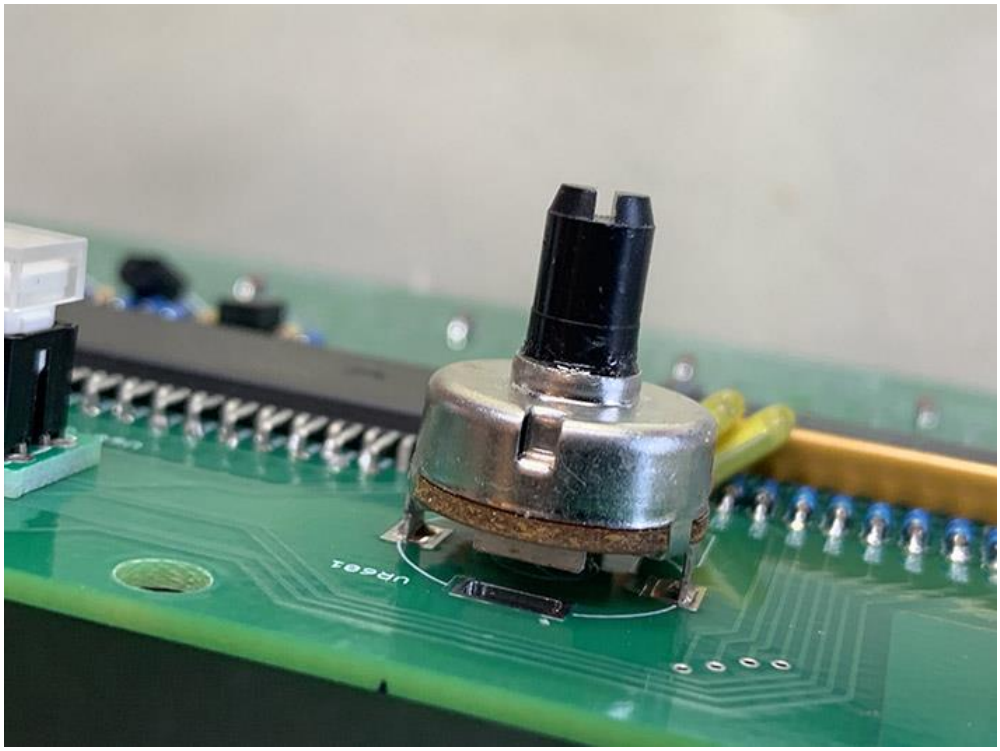
Something like this:

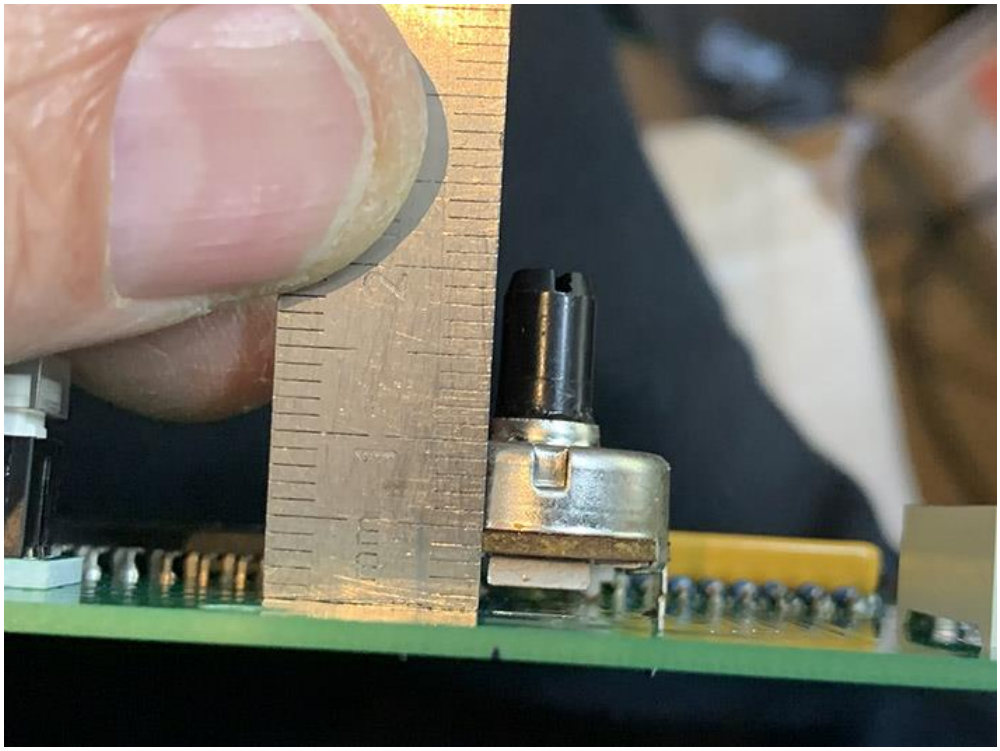
Then we take a look at the lateral housing legs of the potentiometer. They are slightly bent.
These legs must also be bent **"straight"** with pliers before the potentiometer is inserted and soldered.





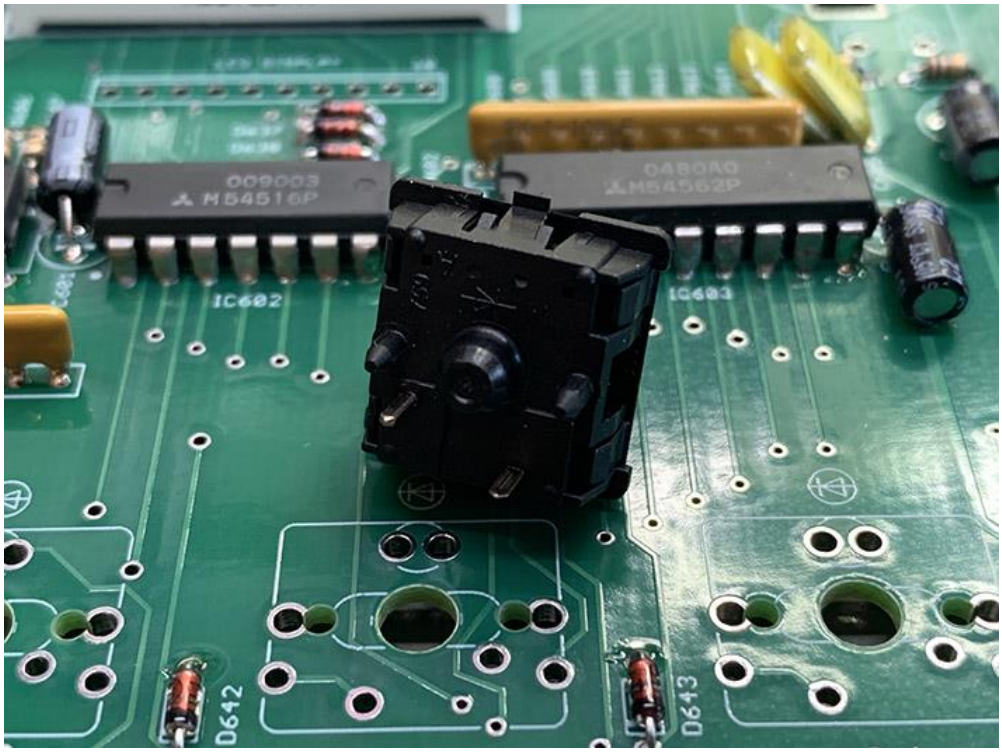
The tempo potentiometer is soldered in such a way that it is at a distance of about **3 - 3.5 millimeters** from the sequencer board.



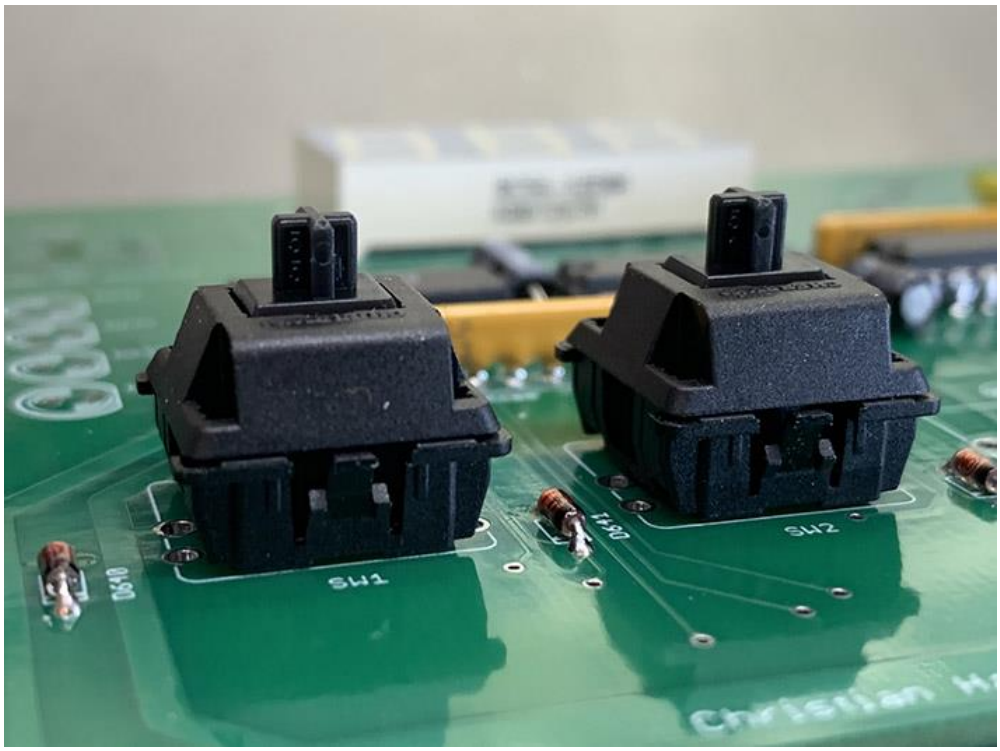


When soldering, make sure that the potentiometer is straight and angled.

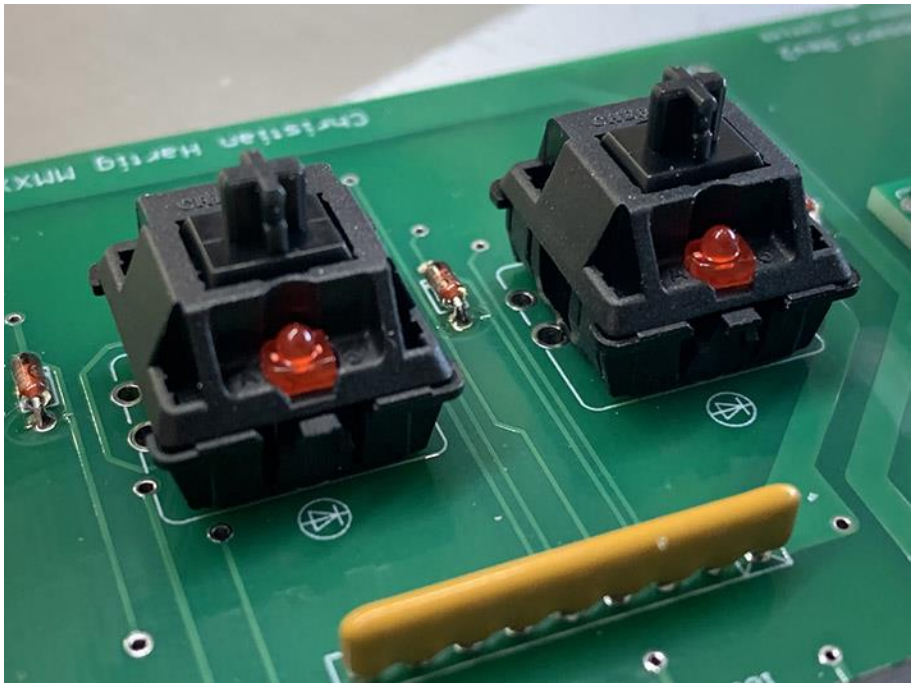
Next, it's the turn of the large Cherry pushbuttons.
Here, too, the original ALPS buttons can be used, as well as Cherry MX1, with or without guide pins.



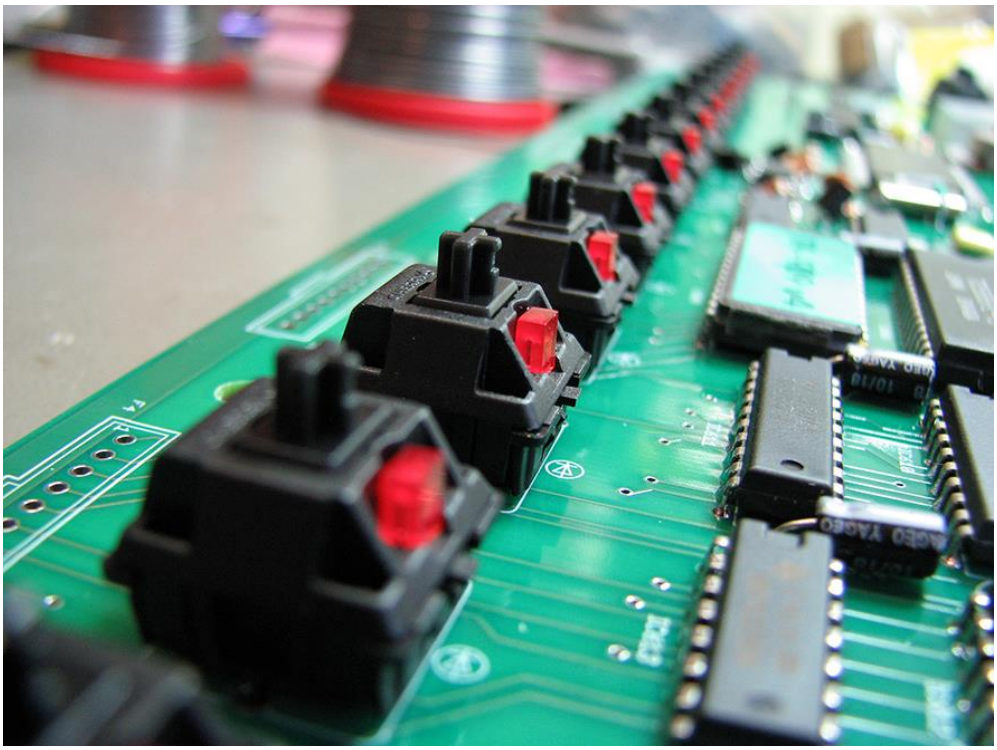
Press the pushbuttons straight into the openings from above and make sure that you do **not bend** the electrical connections. The two guide pins ensure that the button is not twisted or crooked. Press the pushbuttons firmly onto the board so that they are really fully seated.

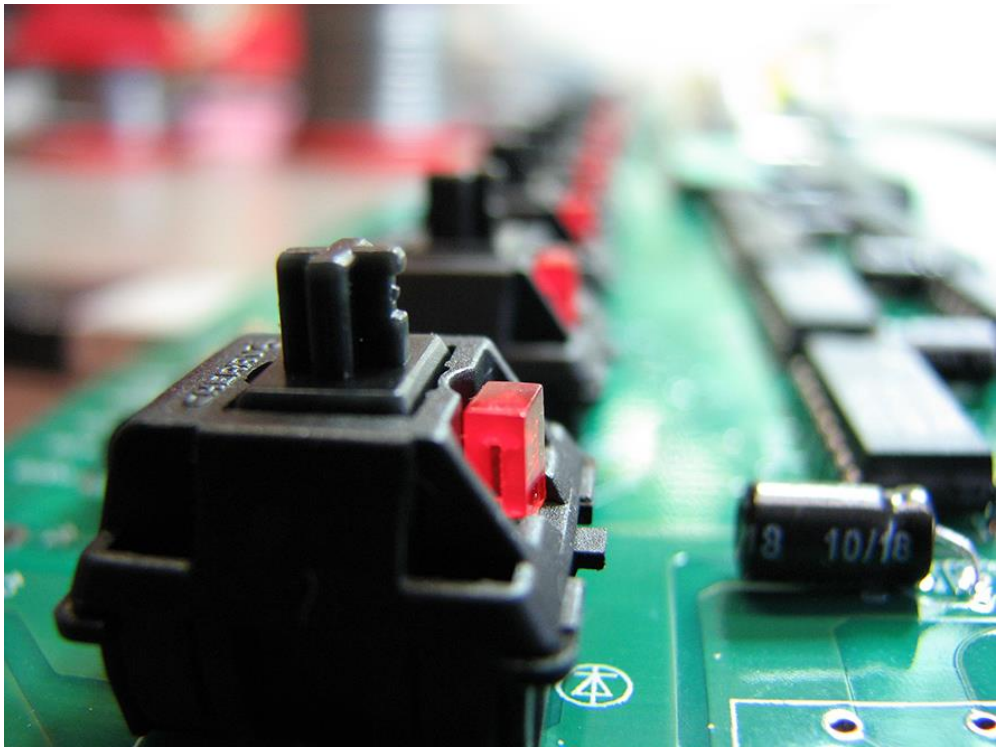


Solder all electrical connections of the pushbuttons and then put the LEDs into the pushbuttons.
I use 1.8mm LEDs, which I bought in a model store.
But any other red LED will do, as long as the body is not larger than **4 x 3 x 2 millimeters**!
The **shorter leg is the cathode** and must be on the left side in the direction of the printed arrow!



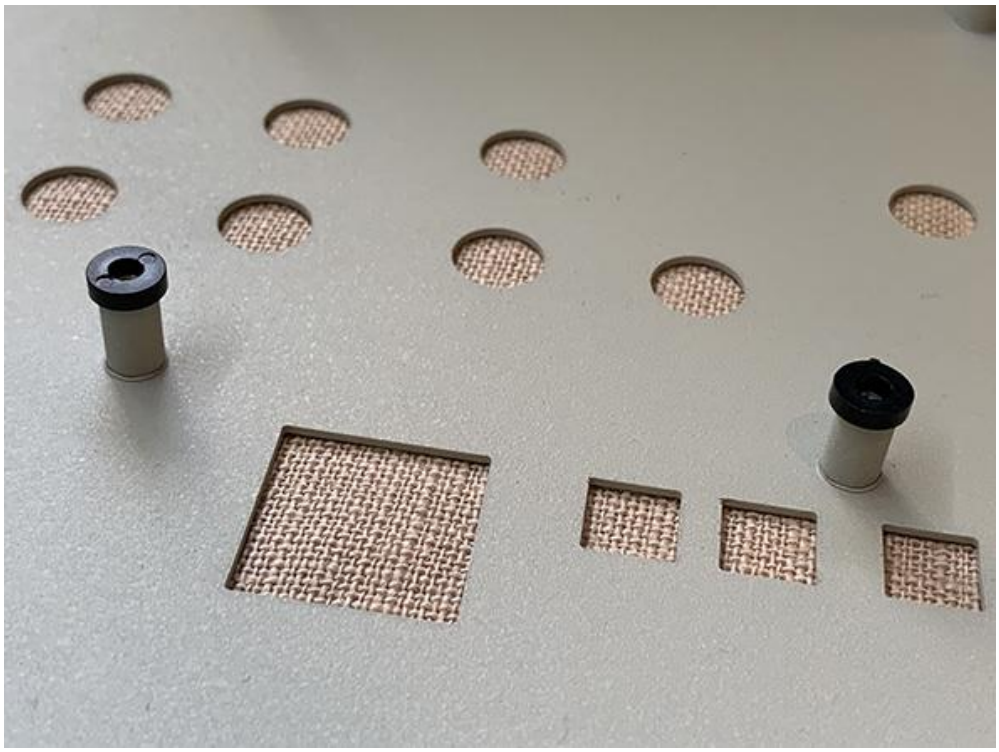
Insert the LEDs one after the other from the top through the button housings and through the circuit board and push them down as far as possible. After pushing them through, spread the legs of the LEDs slightly so that they do not fall out again. Then solder all LEDs and make sure that the LEDs do not get too warm.
After soldering the LEDs should not protrude over the shoulder of the button.



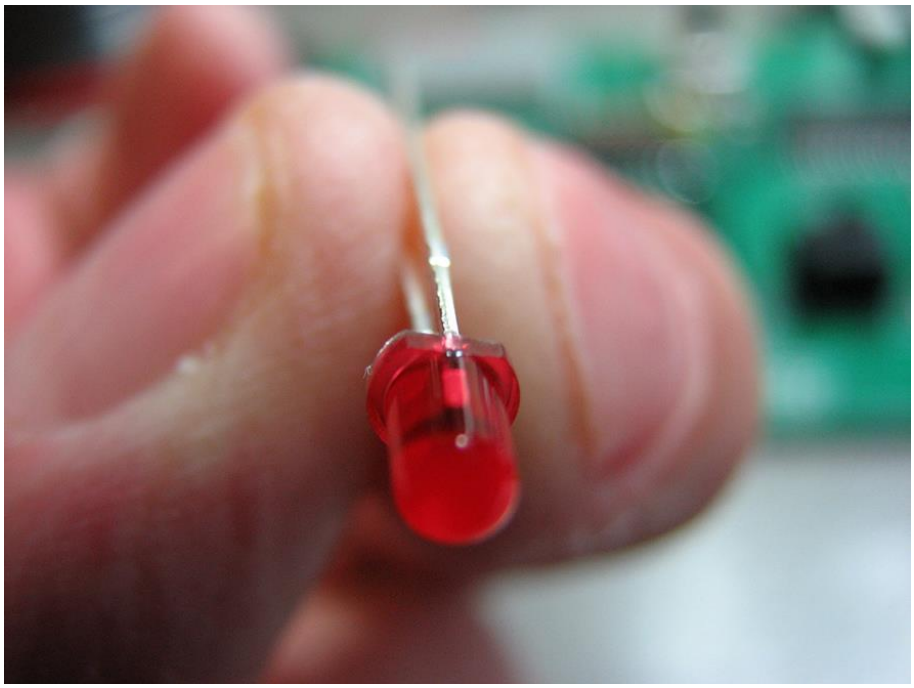


Okay, so if you built your sequencer board like this, you still need 2mm plastic spacers for the case and exactly 10 of them.
The spacers are glued to the inside of the lower 10 threaded sleeves.
Just apply them with a few drops of universal glue and let them dry.

You can get these spacers for M3 screws at a craft store, on Ebay, or they were included with your case kit. They are **2 millimeters thick**.



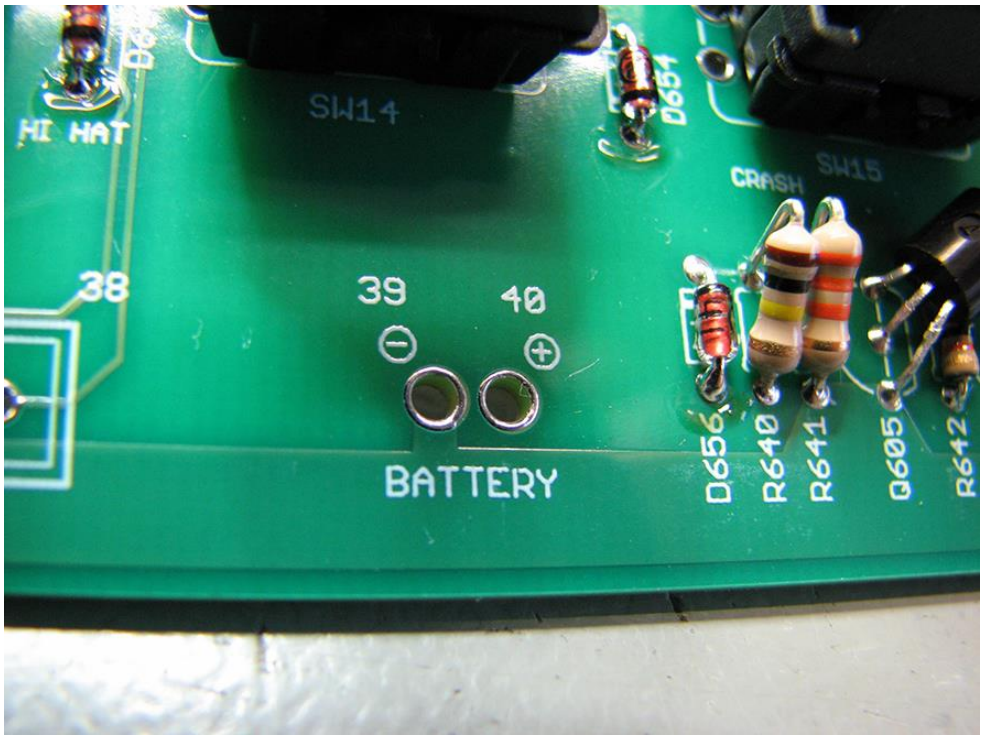
Now solder in the **scale LEDs**. Again we have to pay attention to the correct mounting direction. One LED has a short leg (cathode) or a flattening in the housing, which also marks the **cathode side**.



If you look at the print on the board it is immediately clear **how the LEDs** must be soldered. The flat housing side or also short leg to the **RIGHT**.

These LEDs can also be installed **WITHOUT** a spacer: Put all four LEDs into the board, spread the connectors a little bit and screw the whole sequencer board shortly into the top case.
Then push the LEDs from the inside through the openings in the case as far as you think is right.
Align the LEDs a little bit in height and then just solder them.
This way you save the spacers!

Finally, the battery connection remains. This is the connector for the battery box with the two AA batteries that support the SRAM and hold the patterns in memory.
Just **pay attention to the correct polarity** here when you connect a battery pack.



Now you can supply the sequencer board with power from the power supply:

GND, +5V and the cable for the reset voltage.
The latter is important, because reset is the same +5V voltage, but it is output with a time delay. **Otherwise the CPU would not start correctly.**