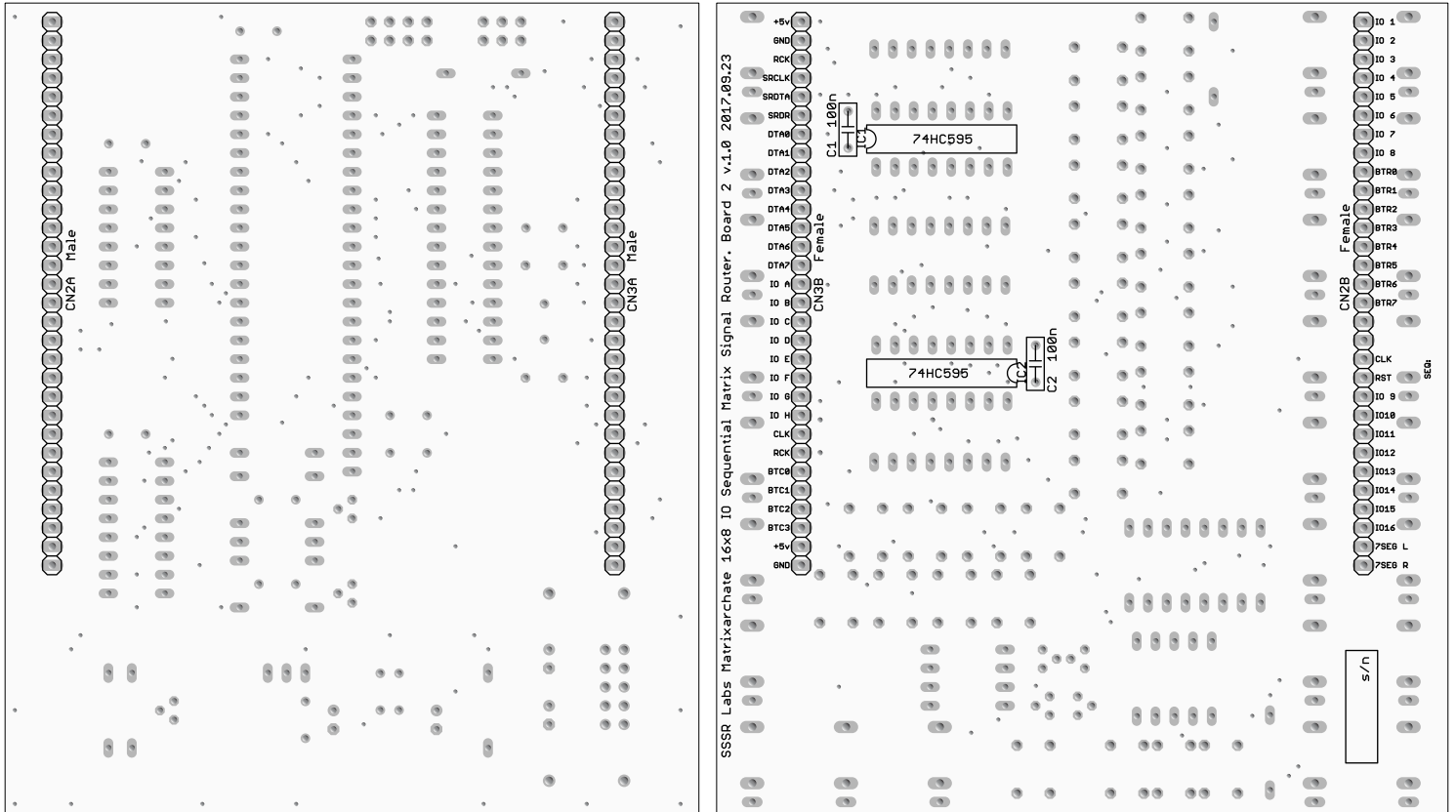


**PCB VERSION 1.0:
DON'T SHOOT YOURSELF IN THE FOOT!
PLEASE READ PAGE 15 CAREFULLY!**

A déjà vu is usually a glitch in the Matrix. It happens when they change something.



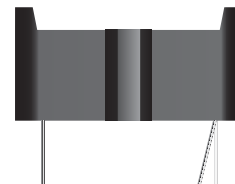
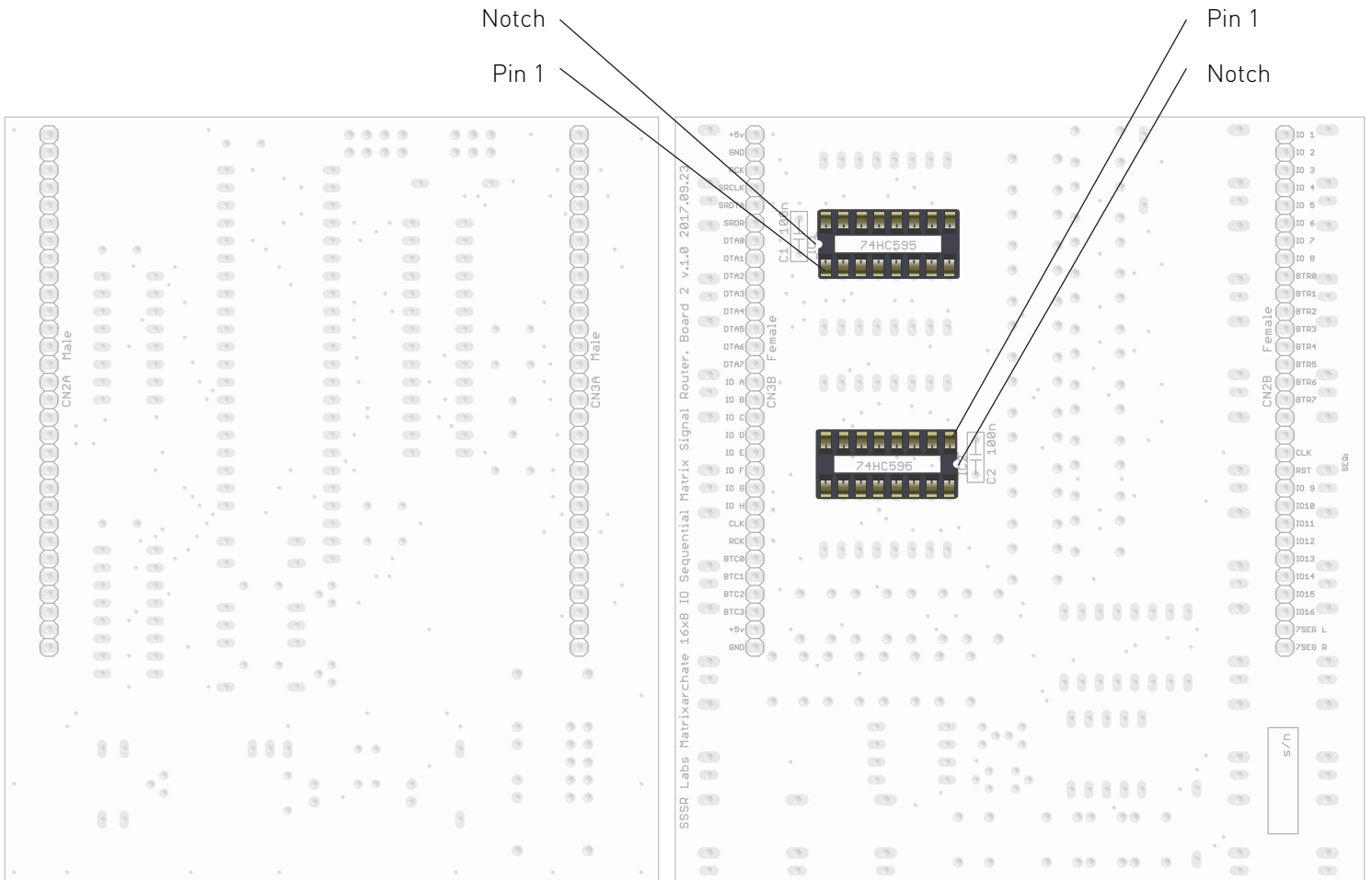
Step 1: PCB Bottom side

The SM010 DIY Kit contains two boards:

Board 1. (Rear) This board contains the power connector, microcontroller, and the matrix switch chip.

Board 2. (Front) This board is entirely dedicated to the interface.

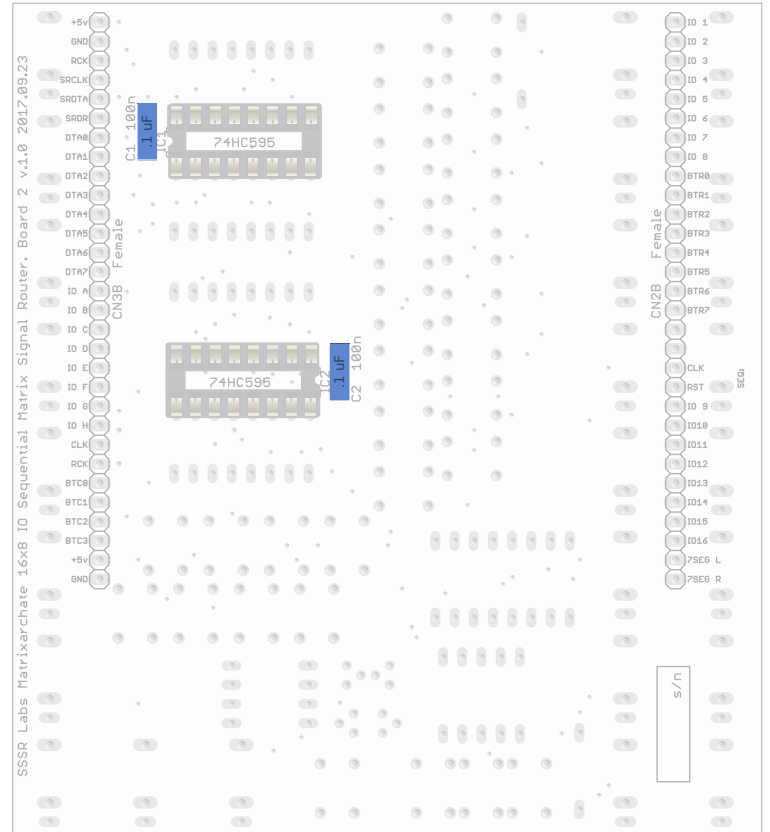
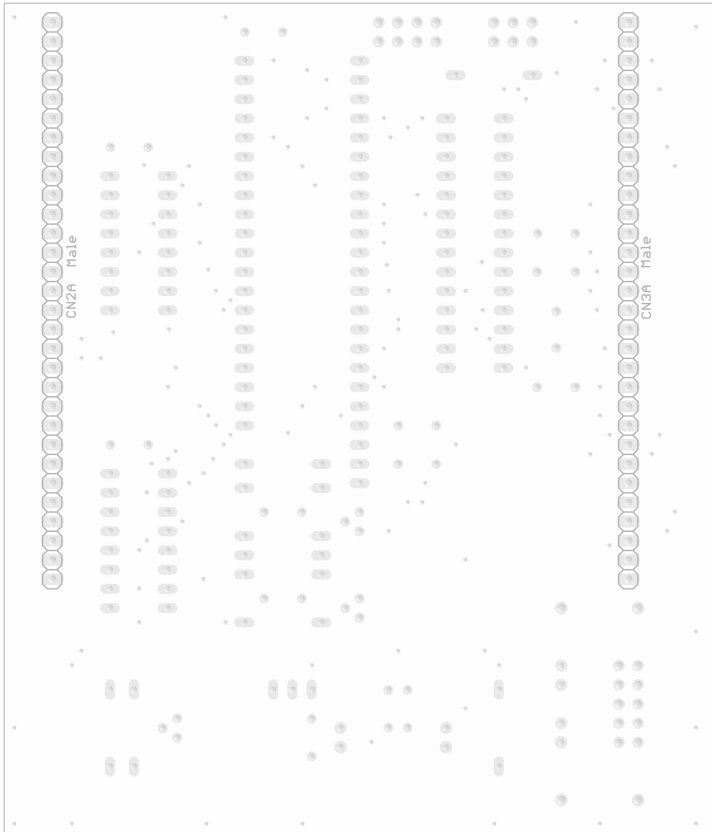
Most of the components have to be placed on the top side of both boards, but you must start with soldering the back side — the one shown above. It is used for pin-headers, which connect boards together, and for two shift registers handling the LED matrices. You could speed up the building process using a tool holding the boards firmly during stuffing and soldering.



Step 2: IC Sockets for the board 2

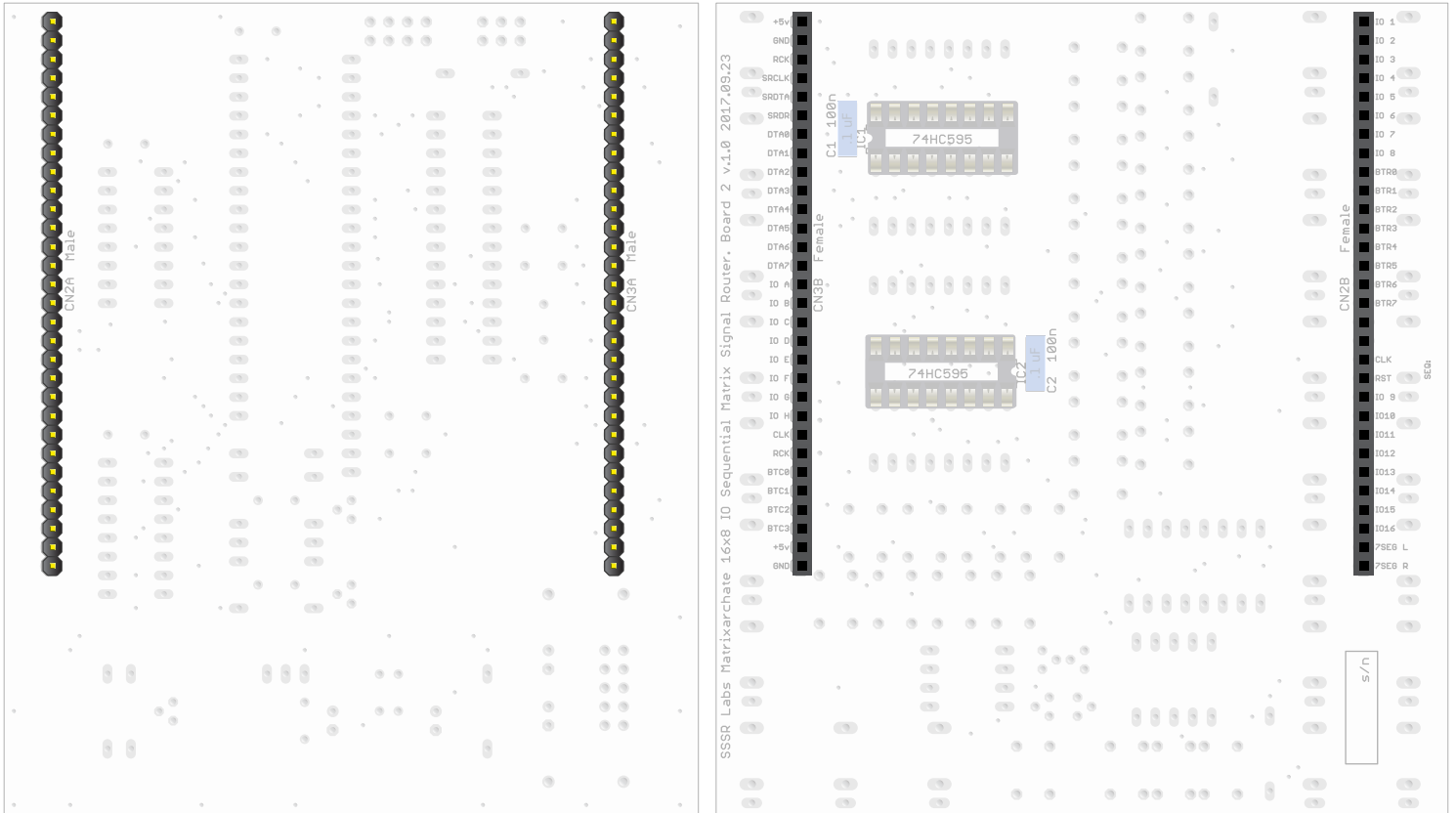
Insert two DIP IC sockets. Please pay attention to the correct orientation, which is different for this particular sockets!

These sockets tend to slip off the holes, so it's practical to gently bend their pins towards each other to help them fit in the holes while you're flipping the board over and soldering them. It's recommended to solder just two pins in the diagonally opposite corners of each socket and then, if needed, reflow them while pushing the socket closer to the surface of the PCB. Then solder the rest of the pins.



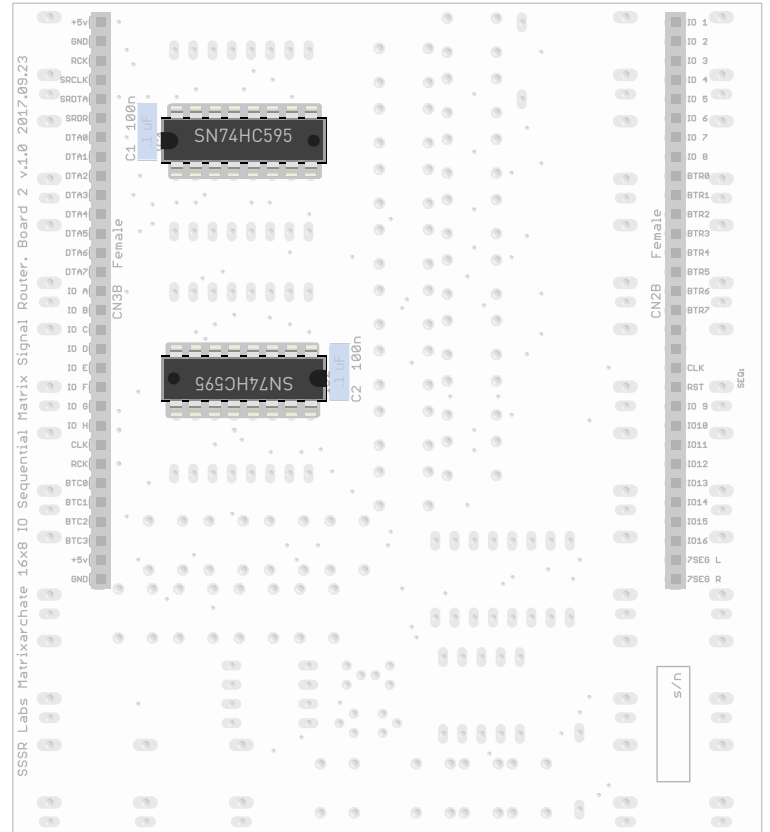
Step 3: Bypass capacitors

These two 100nF capacitors must also be placed on this side. These are not polarized components labeled as “104”, “100n” or “.1μF”.



Step 4: 30-pin Headers

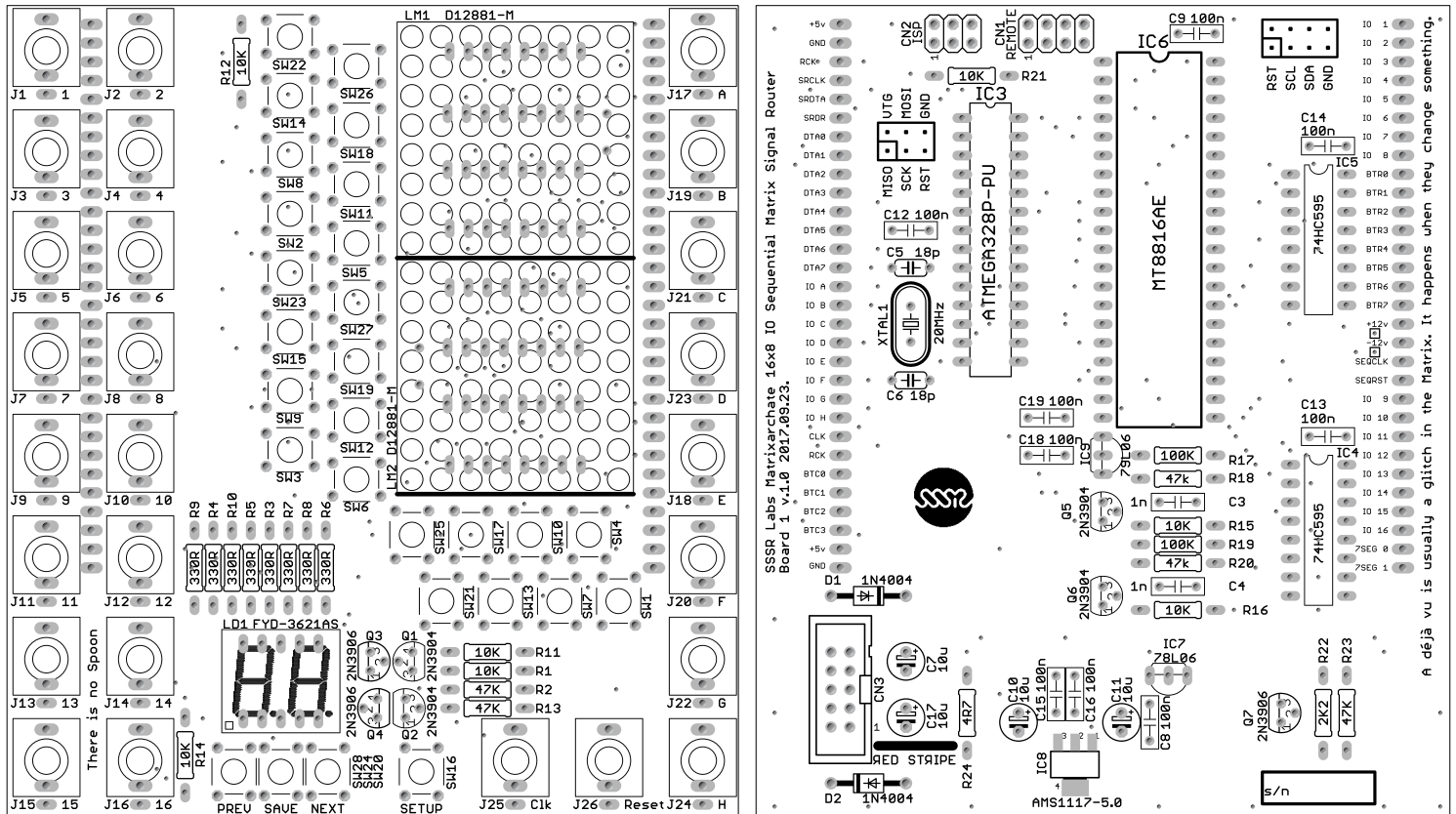
In order to align both boards perfectly, you need to solder all pin-headers at once when they are in their working position. Connect each pair, then insert the male sides into the Board 1, then carefully wear the Board 2 on the female sides to form a sandwich. Then solder pins at each corner of each board to let headers keep this sandwich together. After soldering the rest, you can disassemble the sandwich and continue to the next step.



Step 5: ICs

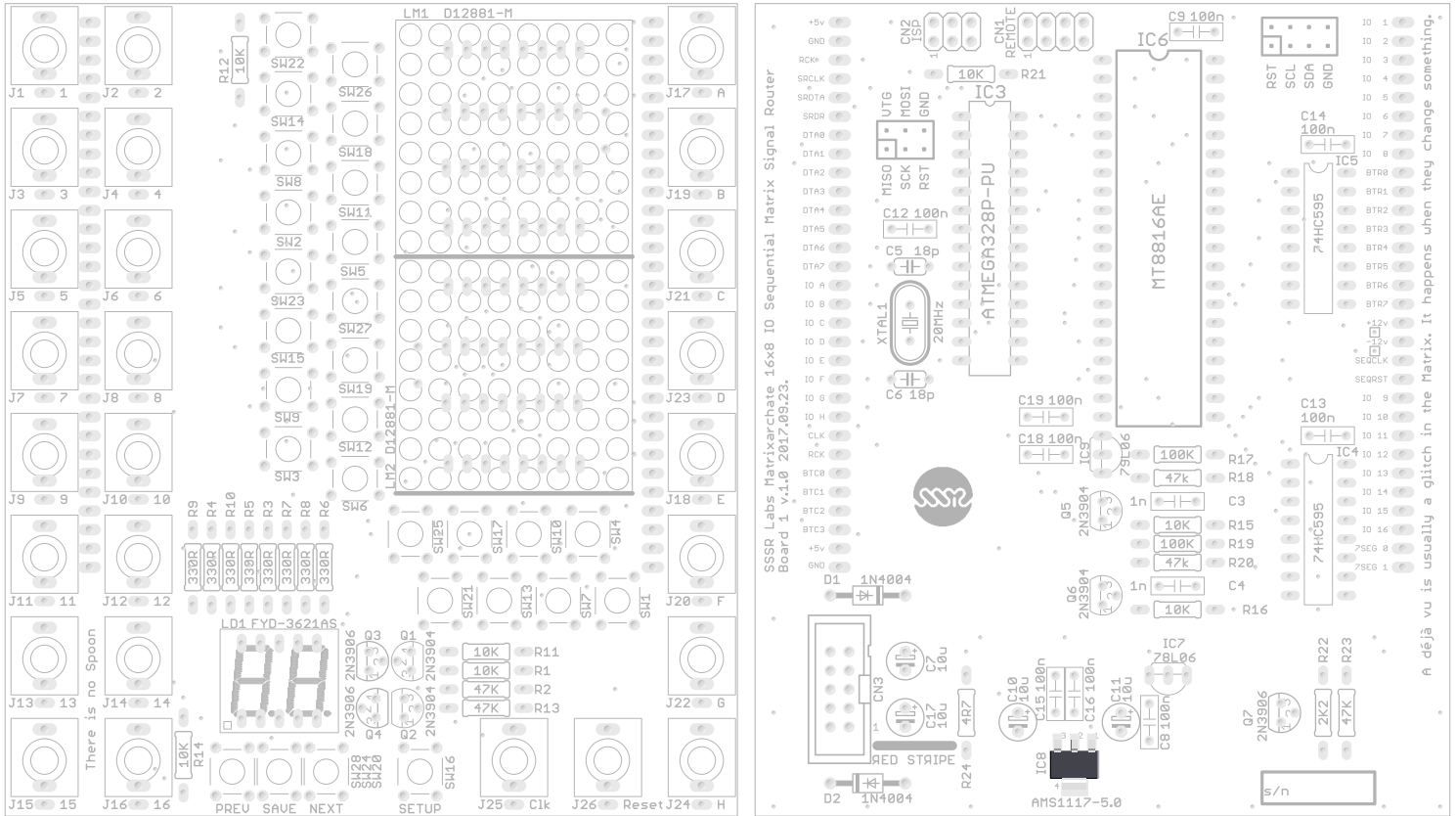
Insert all chips into its sockets. Please pay attention to the orientation! All capacitors are installed near the Pin 1

You've finished working with this side! It's highly recommended to clean the top side of this boards now, before installing the rest of components.



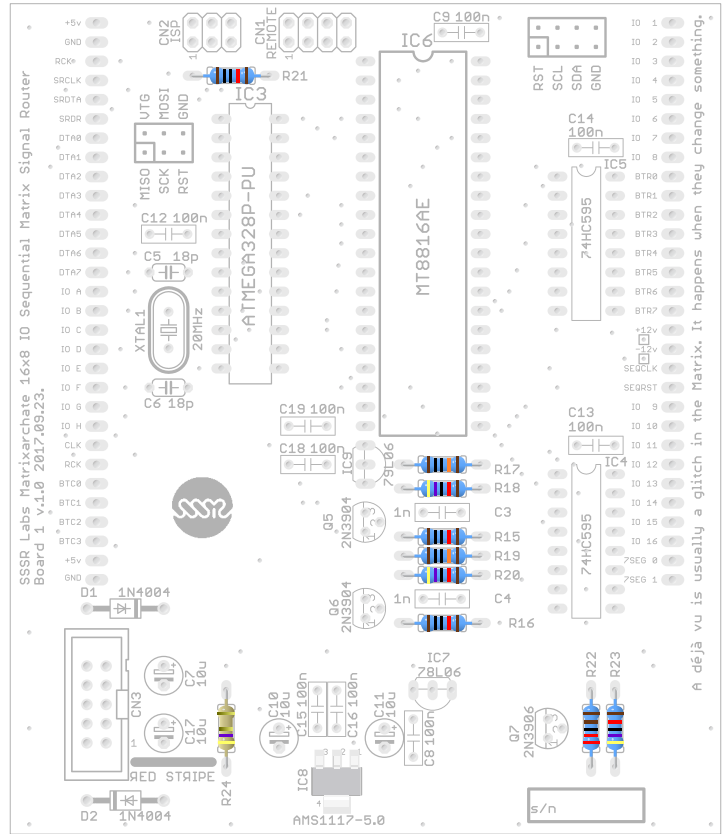
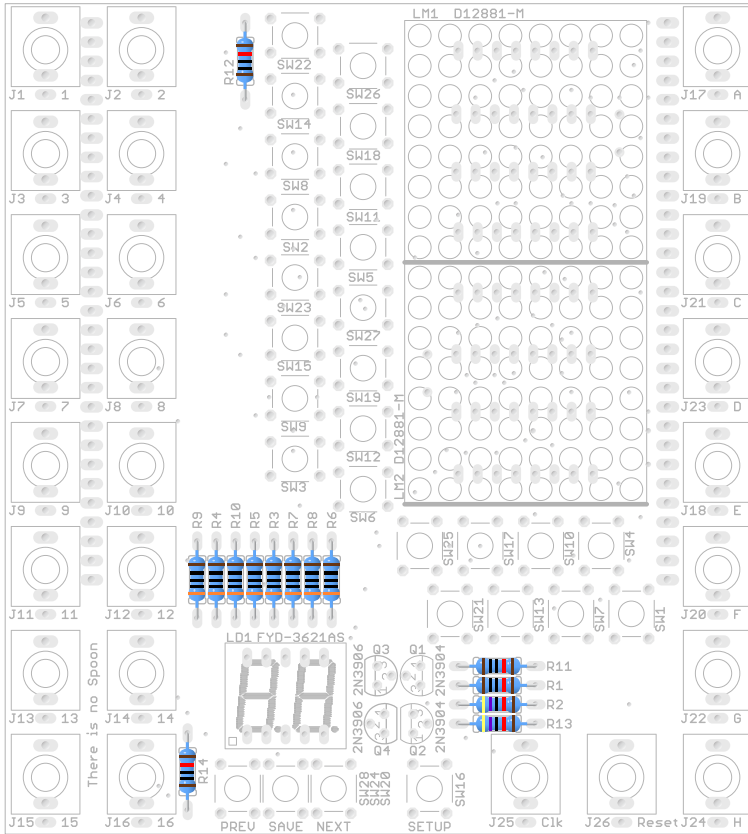
Step 6: Top Side of the PCB

The rest of the components will be installed on this side. Short instructions: please assemble the module in the following order: Solder SMD voltage regulator, resistors, diodes, quartz crystal, 18 pF capacitors, IC sockets, 1 nF capacitors, 100 nF capacitors, all T092 components (transistors, voltage regulators). Install and solder remaining pin-headers, electrolytic capacitors, insert ICs, insert jack sockets, pushbuttons and all displays, insert the windows (if needed), remove the rear protective film off the windows, put the front panel on, and fasten few nuts by hand, solder everything but displays, solder displays tightly pressing them to the windows, then put on the rest of nuts, remove the front film, ..., PROFIT! If you need more details, the following pages will guide you through this process more detailed.



Step 7: Voltage regulator

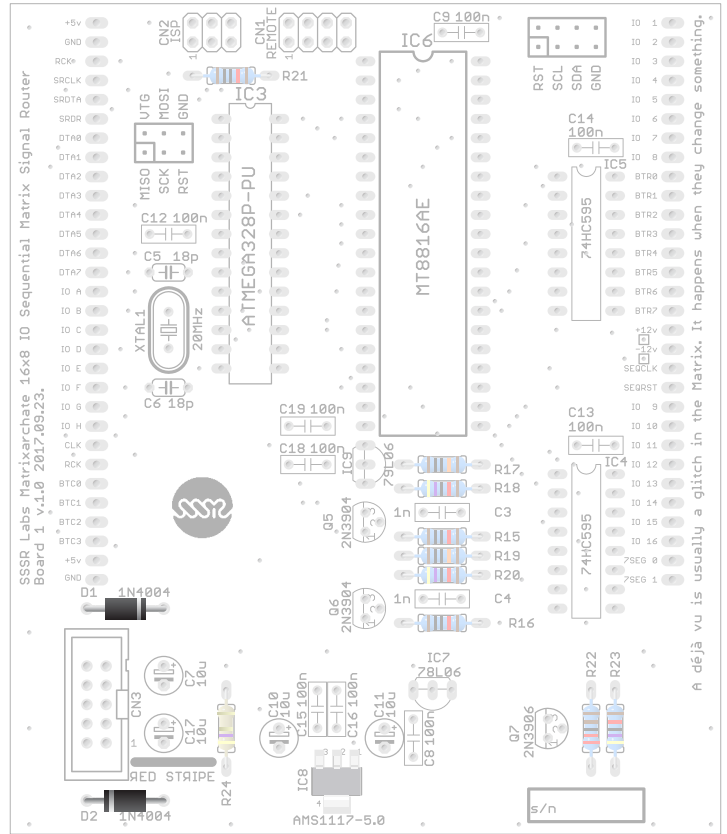
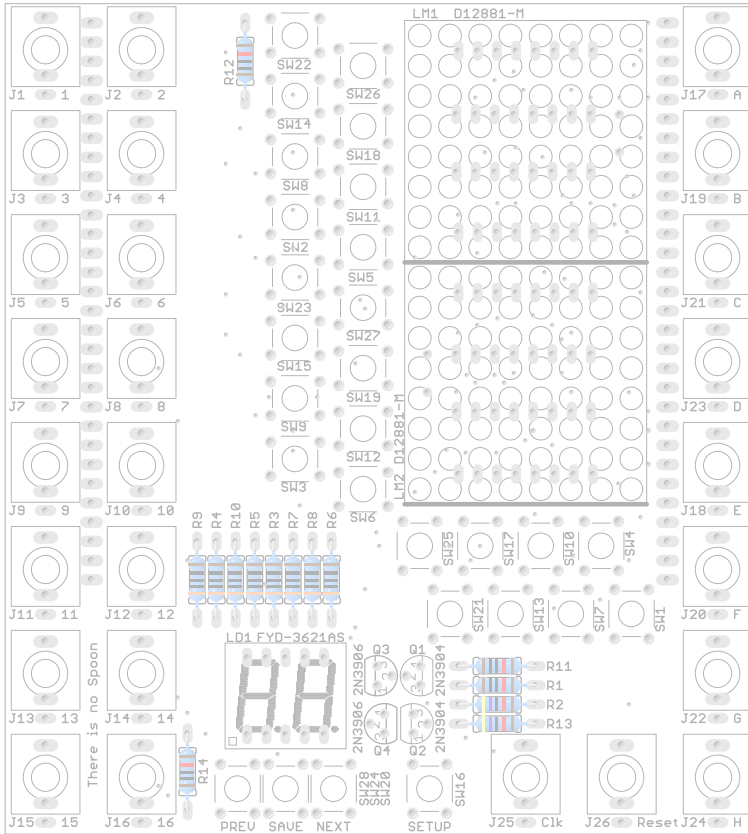
The AMS1117-5.0 is the only SMD component in our DIY kit. Place it accurately aligned to its footprint, then solder just the pin 1. Adjust the orientation of the regulator with a pair of tweezers, keeping the solder melted, then let it cool down and finally solder the pin 3. Only after that, solder the pin 2 and the heatsink pin. This one will require long heating up. Don't worry about the overheating, this component is designed to be heated seriously!



Step 8: Resistors

Install the resistors. You can use the above picture as the reference to verify values before soldering.

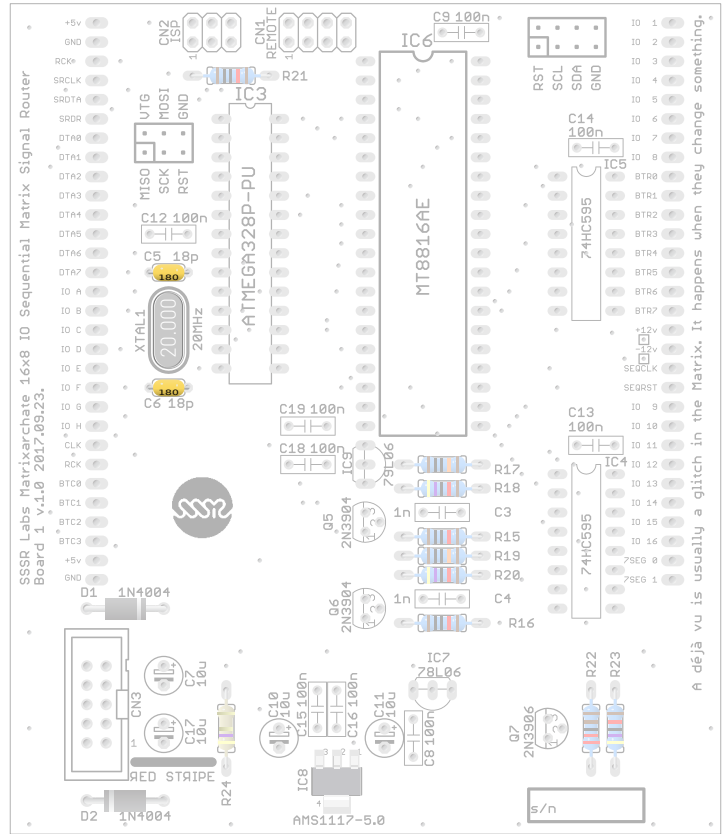
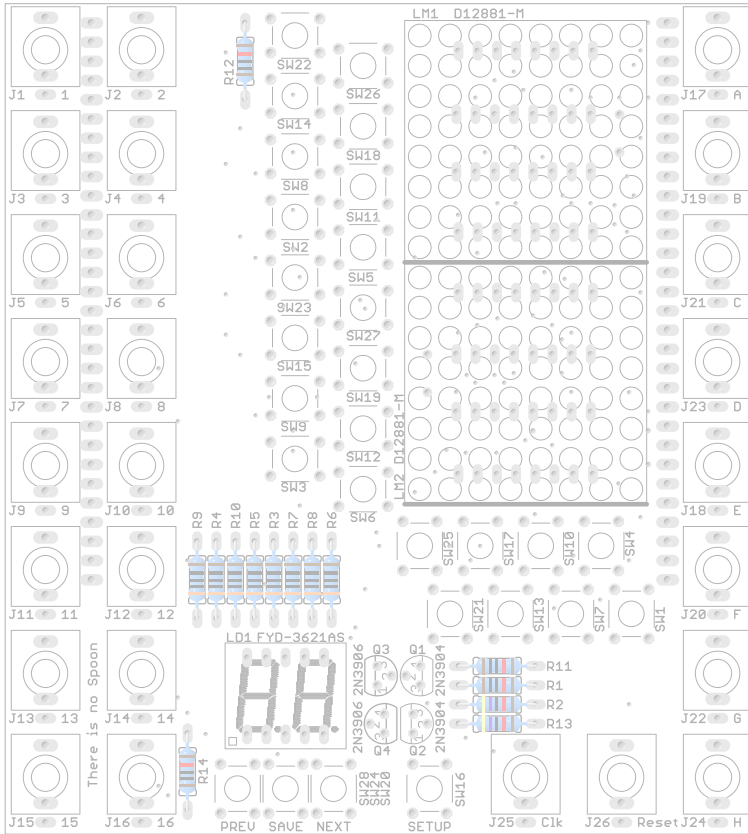
Solder all resistors to the top side of the PCB, then proceed to step 9 and then flip the PCB over, cut the leads and reflow and solder everything to the back side. This technique is the best method to accurately and firmly solder radial components, so it is recommended to use with all components allowing you access to the top side.



Step 9: Protection Diodes

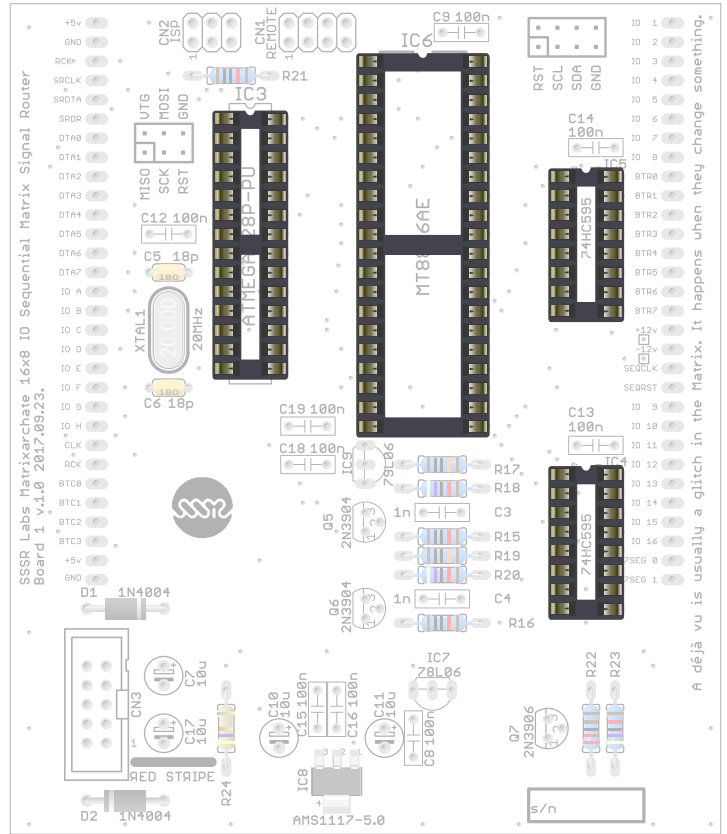
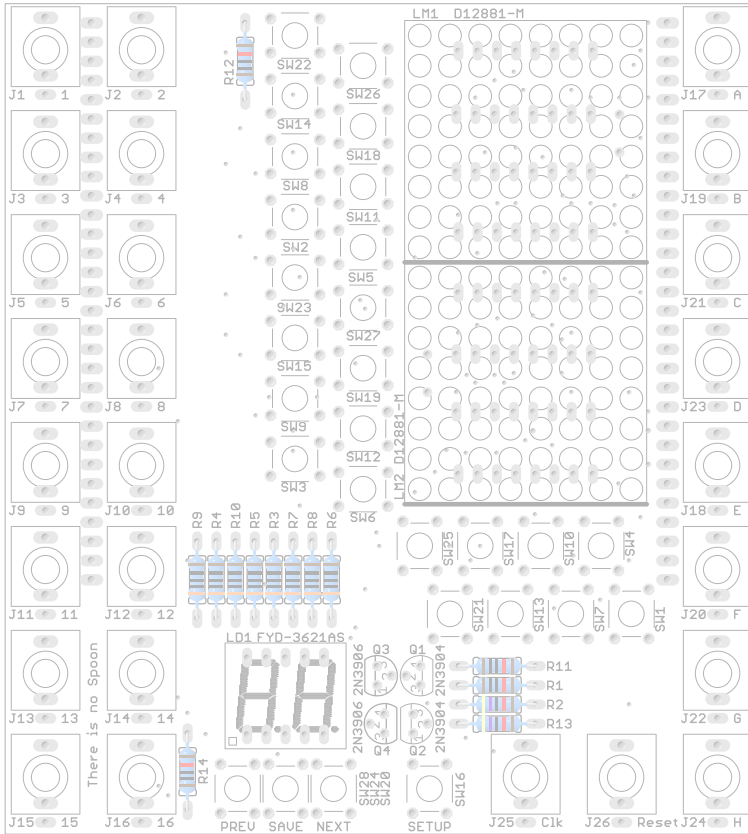
Solder two protection diodes. The 1N4004 may be substituted with any diode of the 40xx series: 1N4001–1N4007. Take care of the right orientation. (Refer to the picture)

It's time to cut the leads and reflow installed components on the back side.



Step 10: The Crystal and 18p capacitors

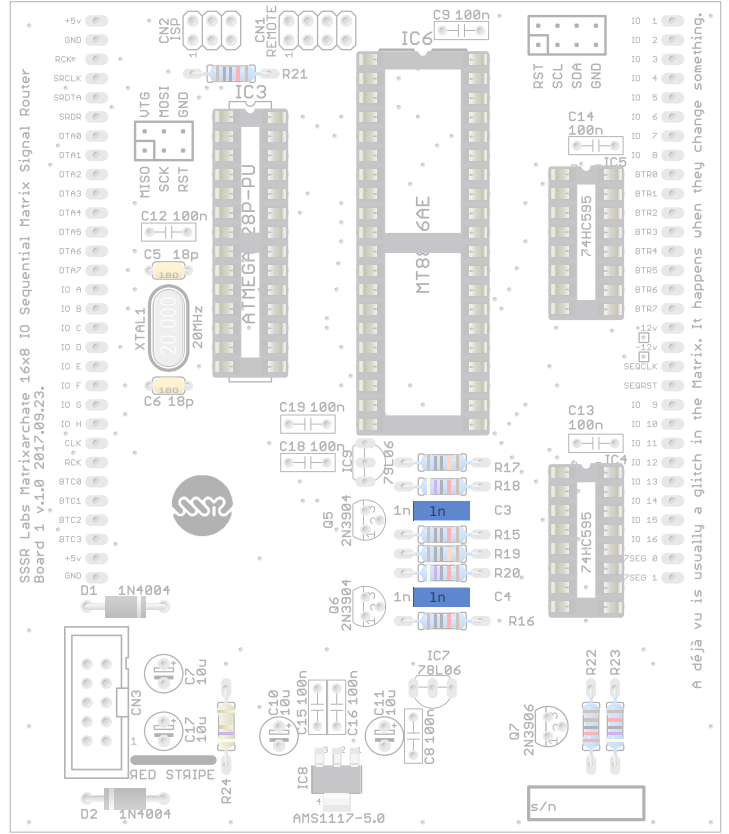
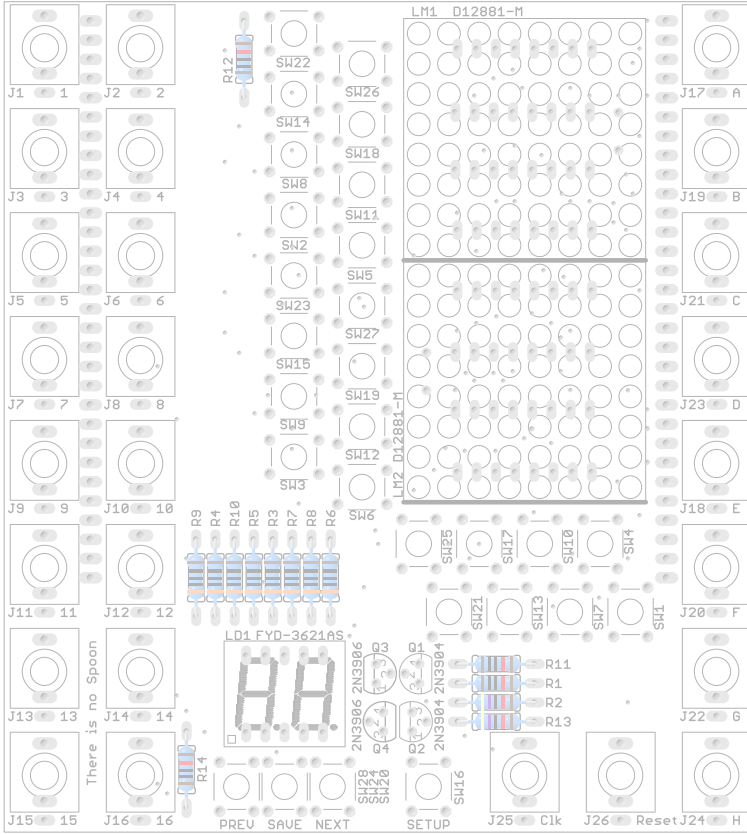
Solder two 18 pF capacitors. Insert the crystal's pins into the plastic spacer of the similar shape and then solder them.



Step 11: IC Sockets

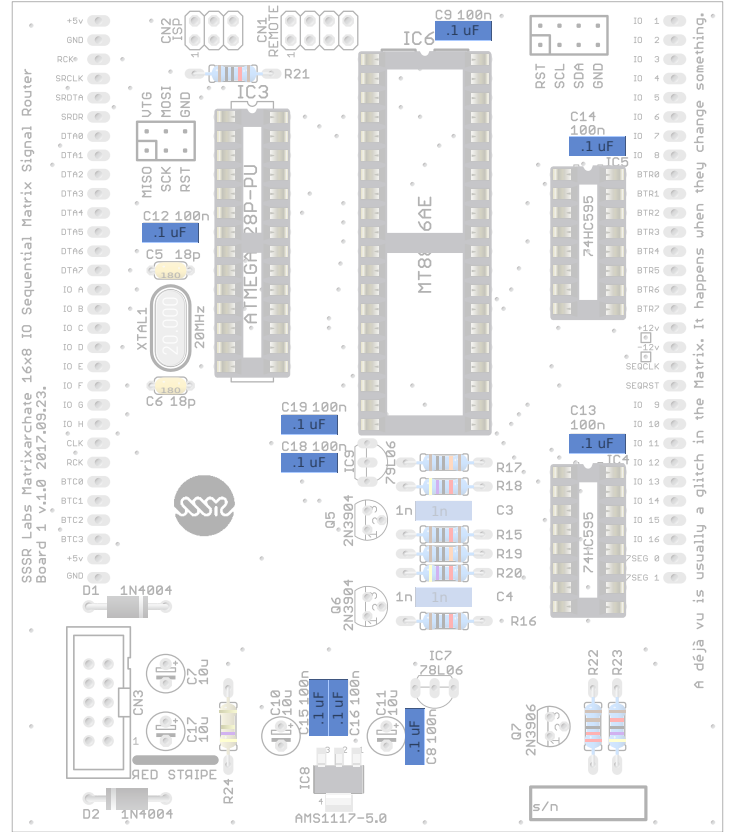
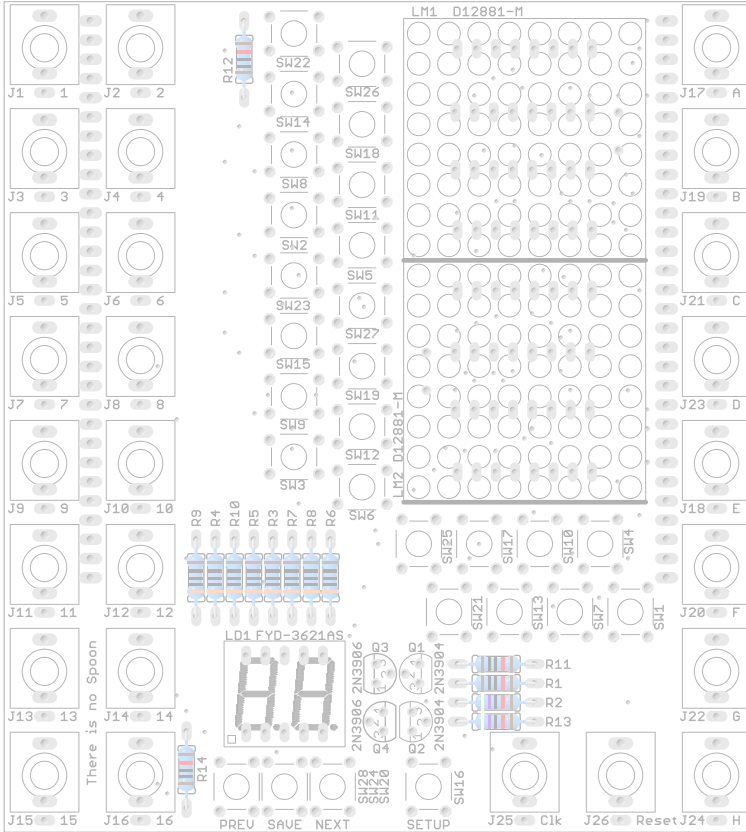
Insert all DIP IC sockets. Please pay double attention to the correct orientation. The pin 1 of each chip on this side is directed up. Please refer to page 3 for best practice for installing IC sockets.

A déjà vu is usually a glitch in the Matrix. It happens when they change something.



Step 12: 1 nF Capacitors

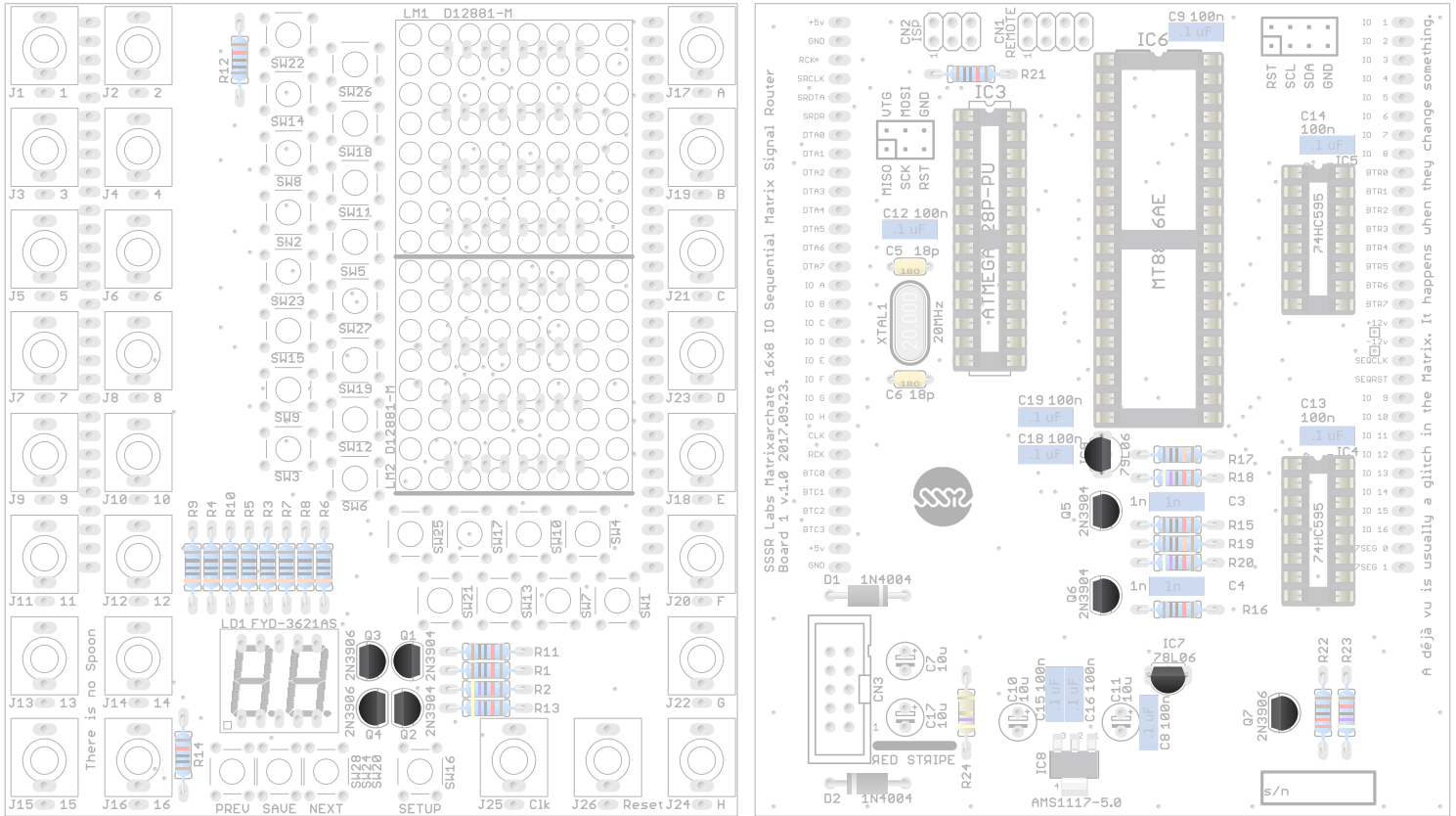
Solder the 1 nF capacitors, which are labeled as “102” or “1n”.



Step 13: 100 nF Capacitors

Solder the 100 nF capacitors, which are labelled as “104” or “100n” or “0.1 μ F”.

A déjà vu is usually a glitch in the Matrix. It happens when they change something.

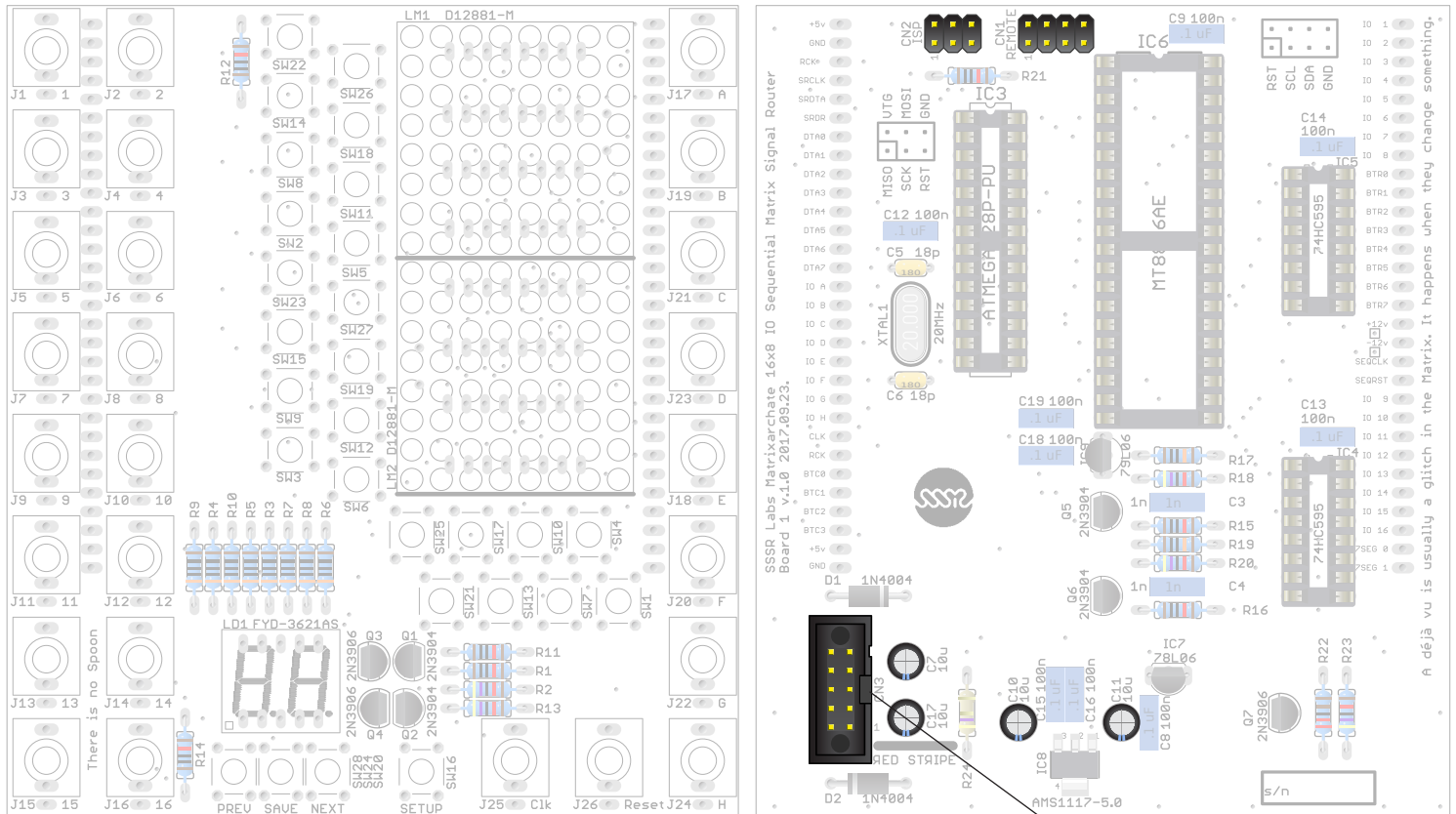


Step 14: Transistors and Voltage Regulators

There are two errors on the silkscreen of the PCB version 1.0.

1. IC9 (79L06) is shown contrariwise. You should place this regulator exactly as shown in the picture.
2. IC7 (78L10) is labeled as 78L06. The correct IC is included to all kits.

Everything else is correct. Certain components in the TO92 package will need their leads to be bent a little to better fit into their holes. Use sharp metal tweezers to do it.

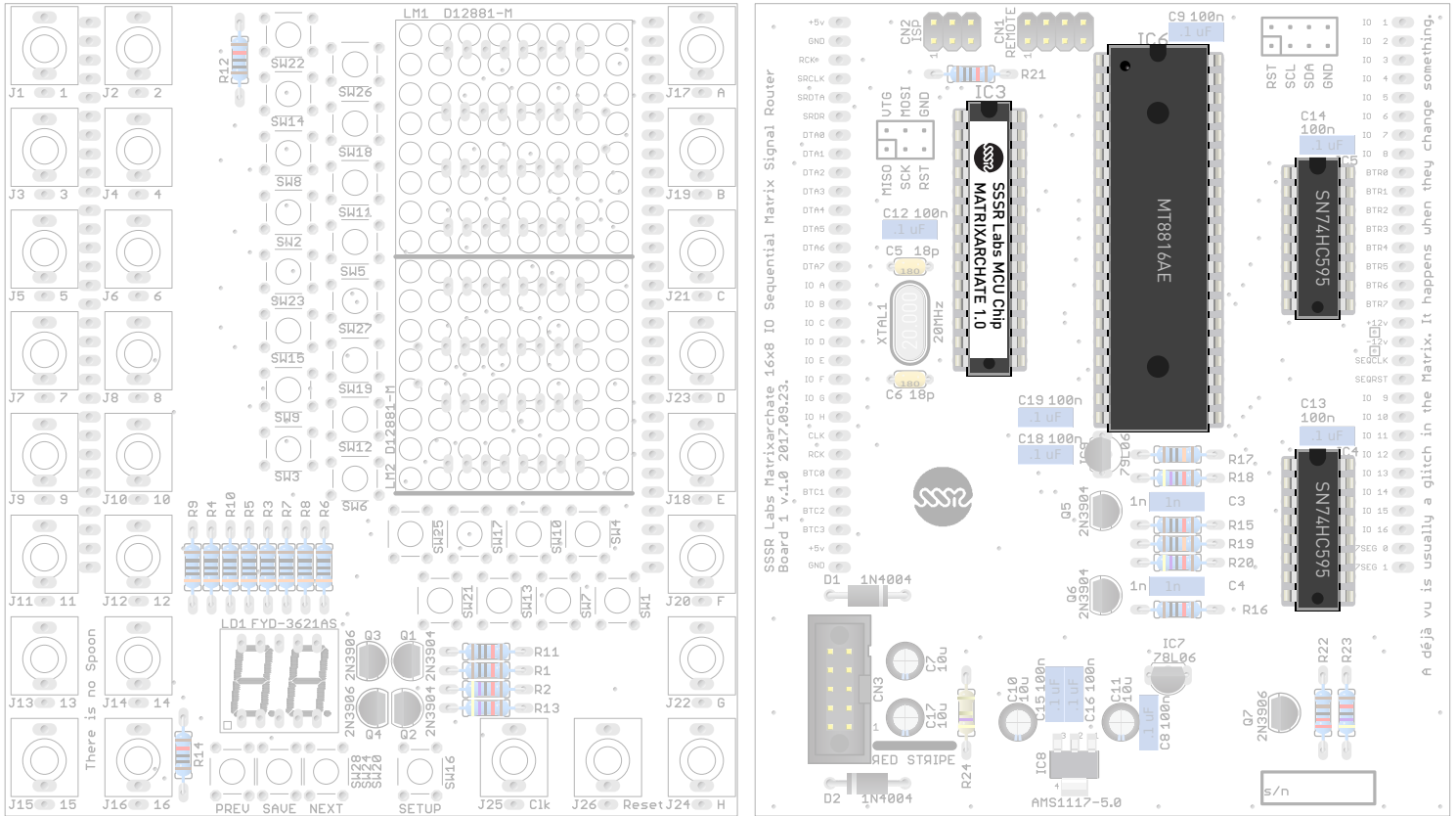


Step 15: Power Header and Electrolytic Capacitors

Install the power pin-header. Notice the orientation! It's recommended to solder two pins in the opposite corners, then solder the rest of pins. The six central pins are connected to the ground plane and require extra heating. It is also recommended to plug the Eurorack power cable to prevent pins from bending if the plastic case has started melting due to extensive heating.

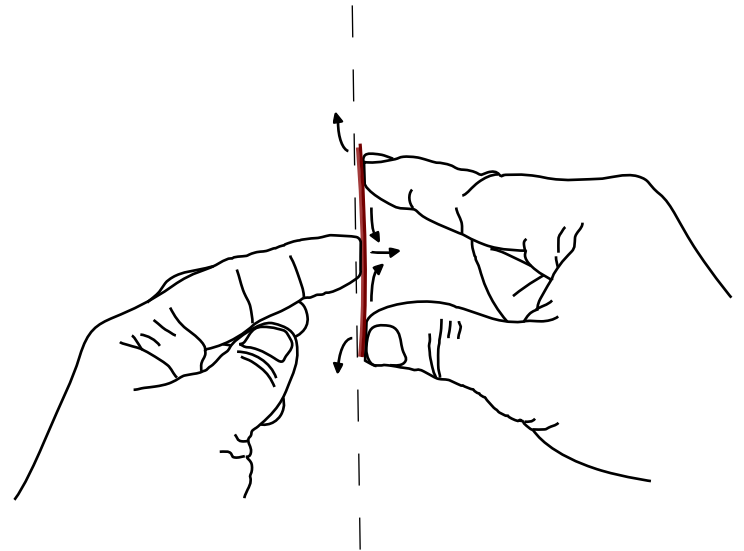
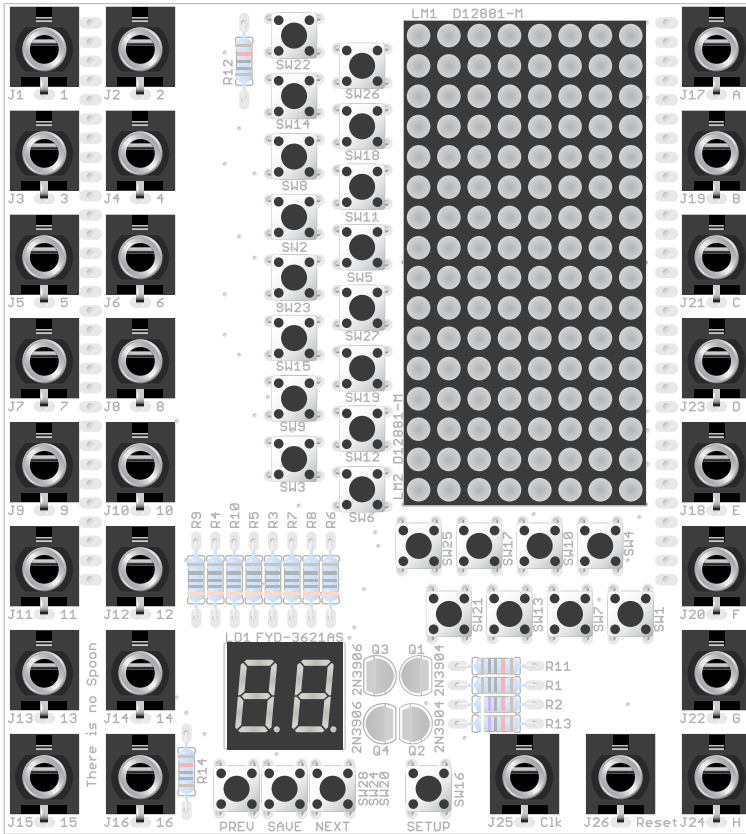
Install other pin-headers using a similar technique.

Solder the 10 μ F electrolytic capacitors. They are polar components and must be oriented the right way according to the illustration. The blue or white stripe with the Minus markings shows the negative pin, and the holes for the positive pins are marked on the PCB with the Plus signs. Also, the positive lead is longer than negative.



Step 16: ICs

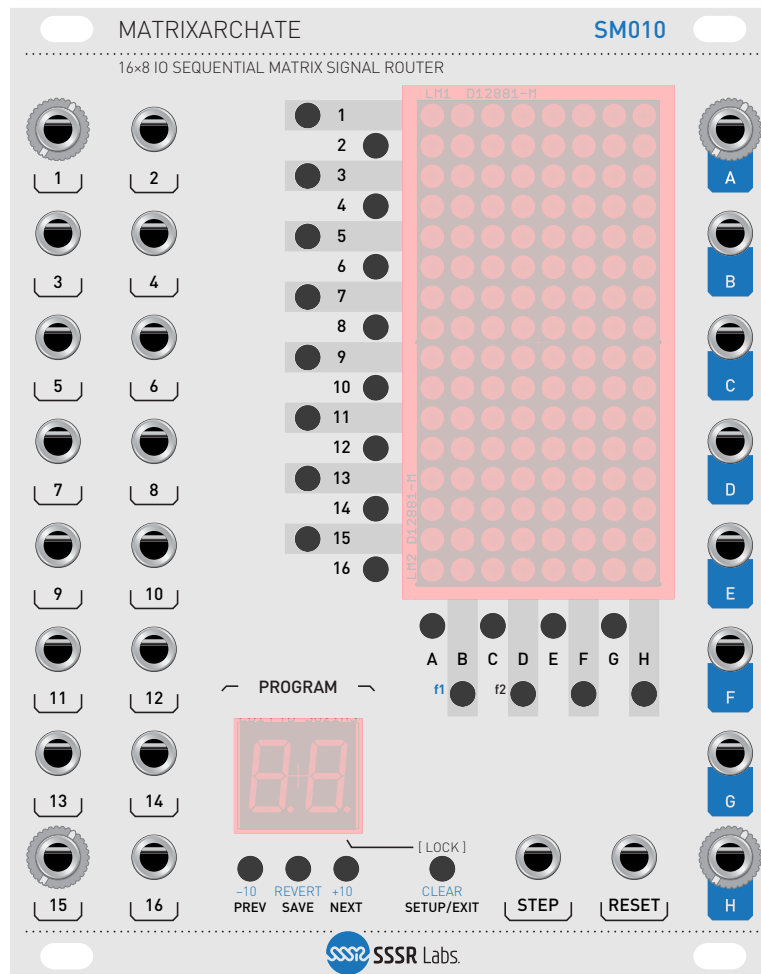
Insert all chips into its sockets. Please pay attention to the orientation. You can additionally clean the top sides of the PCB now, before installing the controls and the front panel.



Step 17: Inserting Controls and LED Windows

Insert all jack sockets, all pushbuttons, and displays. The LED matrices have one side labeled with the part number. This side must be oriented down as indicated by the thick lines on footprints. The orientation and placement of other components are obvious. DO NOT solder anything before installing the front panel!

You need to insert plastic transparent windows into holes in the front panel if they are not initially inserted. Some windows may have little barbs. You have to cut them out with an Exacto knife. Also, the larger window may be a bit too tall for its hole. You're allowed to bend it and press to fit it into. Once the window has been inserted it will not deform and will just fit very tightly. Don't forget to remove the protective film on the rear side of both windows!

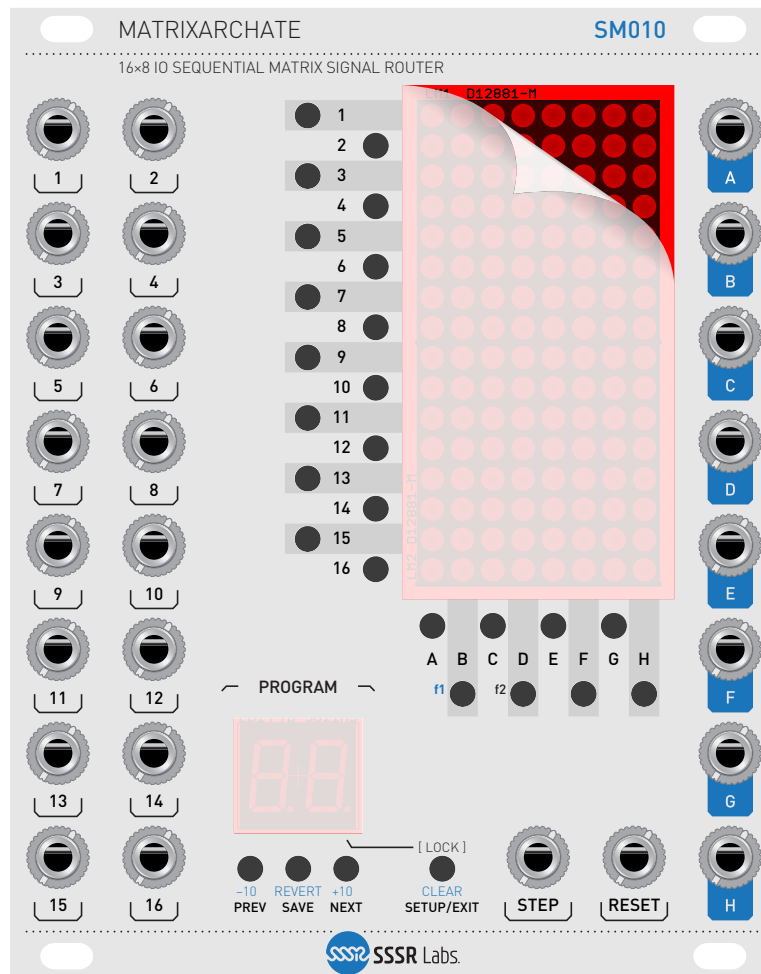


Step 18: Soldering Controls

Put the front panel on the installed jacks. Fasten four nuts at the corners just to keep the panel in its place. Pay attention to keep jack sockets being pressed tightly against the PCB with no gaps! Solder all sockets.

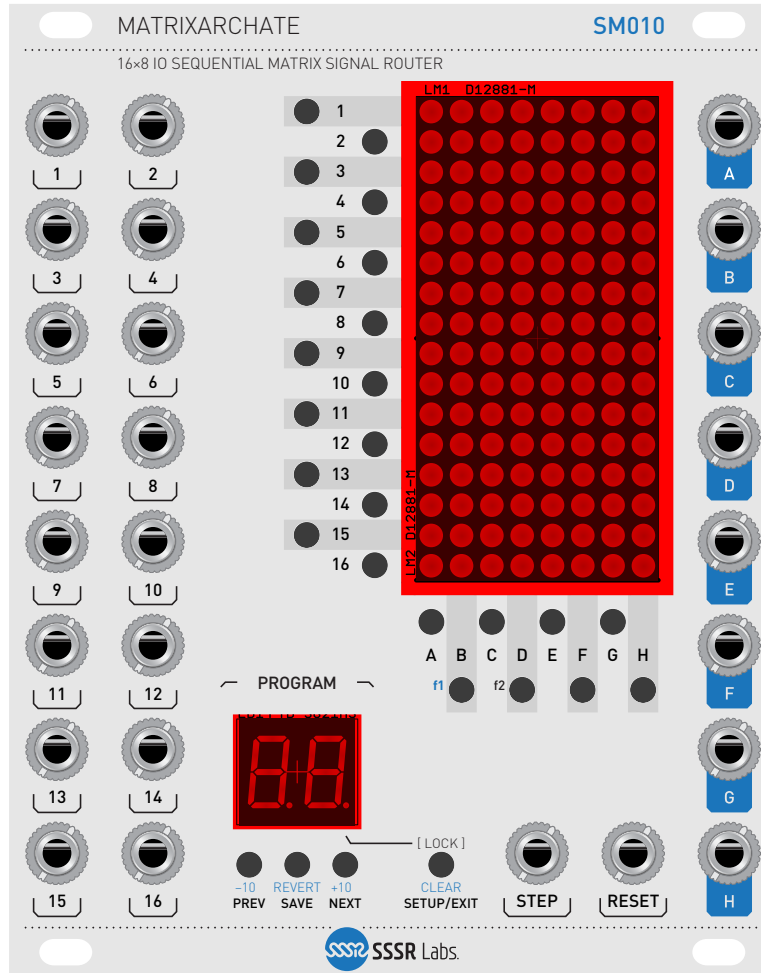
Solder each pushbutton, two diagonally opposite pins at once, then correct their positions if needed, and solder the rest of pins.

You must tightly press LED displays against their windows and solder diagonally opposite leads of each component to the PCB. There will be a gap between the bottom of the matrices and the surface of the PCB. It's OK. Adjust the position if needed. Once it's correct, solder the rest of leads.



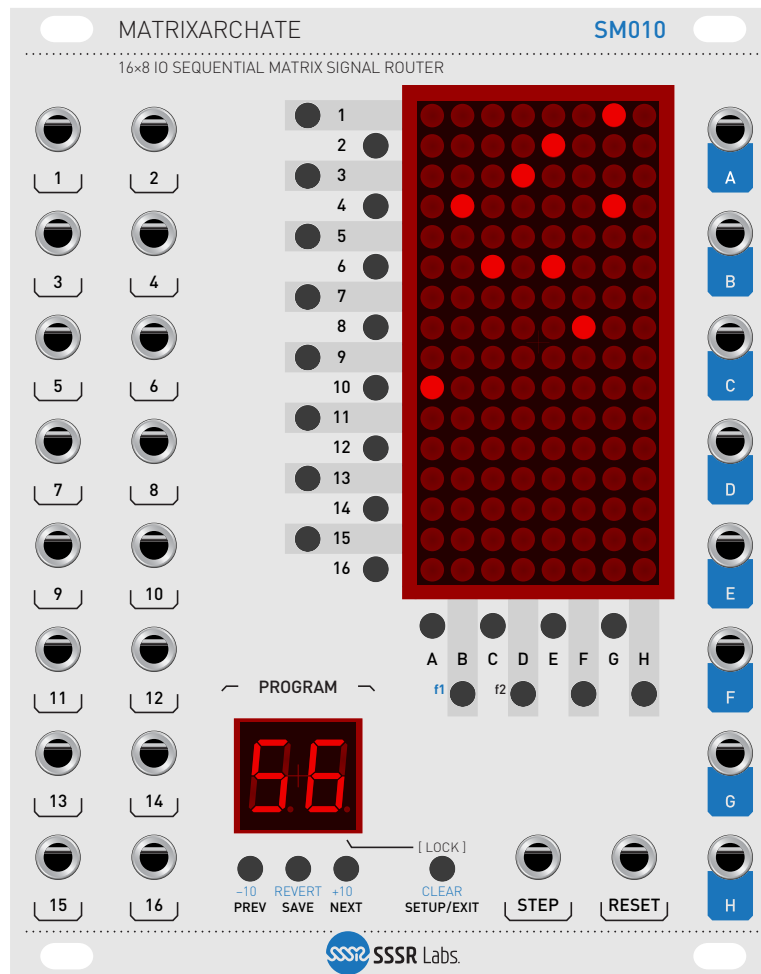
Step 19: Finishing the assembly

Clean the PCB if needed. Install and tighten the rest of nuts. Remove the protective film from the front side of LED windows. Connect boards 1 and 2 together.



Step 20: ... PROFIT!

Congratulations! You've just assembled the Matrixarchate!



The Matrixarchate module does not require any adjustment since it's completely digital except for the analog switch IC. So, it is ready to be installed in your Eurorack system or to be updated via ISP.

If everything is correct, after power-on it should display the program number and some pattern on the LED matrix, depending on contents of the default firmware.