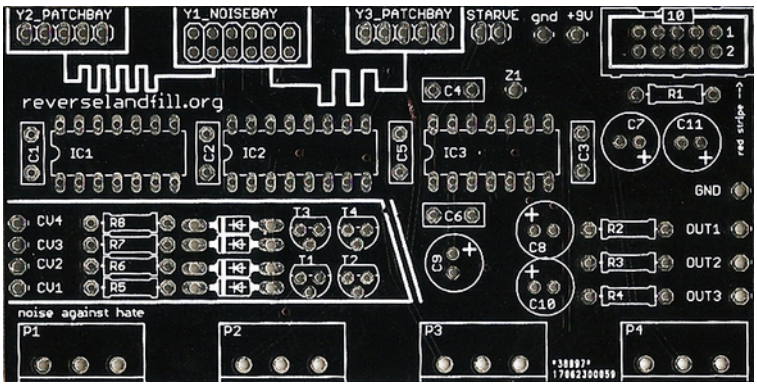
Noise Oscillator Build Document. V0.5f Eurorack



The Noise! Synthesizer is a CMOS IC based instrument.
The synth has 4 squarewave oscillators that modulate each other and go throught a clock divider.
After that, the separate divider outputs are mixed and shaped together.
Then the signal is routed through a pseudo ringmod.

Start with the ***Resistors*****:**

The one **10R** resistor has the color code: 'brown-black-black'.
It is used at the power input as a fuse.
Bend the legs of the resistor 90 degrees and place the **10R** resistor at the **R1** location on the PCB.
Solder the resistor and cut off the legs with a sidecutter.

The three **1K** resistors have the color code: 'brown-black-red'.
These parts act as output protectors.
Place the resistors at **R2, R3** and **R4**
Solder and cut the legs.

R5 to R8 are the four small greenish **1M** resistors. Again; solder them in place!

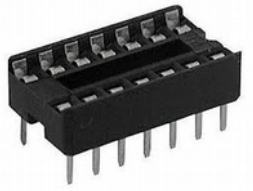
Starve is a modification option.
Look at the end of this document for more info!

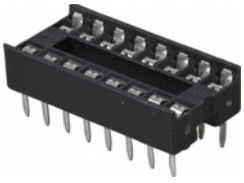
Connect the two holes of Starve together to bypass this option.
Use a snipped-off leg of a resistor. Bend the leg in a U shape and solder.

If you skip this step, the module will receive no power!!

Diodes:
d1 to d4 are 9.1v zener diodes. The white mark on the pcb must correspond with the black mark on the diodes.

IC sockets:
Take the tube or foam with the *three* IC sockets and the IC's. There is *one* with 16 pins and *two* with 14 pins!



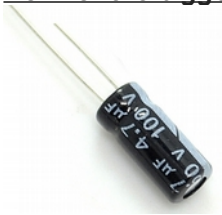


These IC-sockets are to make the placement (and possible removal) of the IC's easier.
Take out the *three* IC-sockets. Attention! These sockets have a direction. See the semi-circle gap?
On the PCB you can see this marking as well. Place the 16-pin IC socket in **IC2**.
Flip over the PCB and solder two legs, on in the upper row, one in the lower row, diagonally from each other.
Flip the PCB back to the other side to check if the IC-socket is flat to the PCB.
If not, push the socket lightly to the PCB and reheat the two solderd legs. It should click to the PCB.
Place the 14 pin IC sockets in **IC1** and **IC3** and use the same method as before to solder them in.
Solder all remaining legs.

Transistors:
Q1 to Q4 are the 2n3904 transistors. They act as cv input buffers. Carefully solder them in.

Capacitors!
There are a lot of capacitors in the kit.
They determine the frequency range of the oscillators and stabilise the power and outputs.
We start with the *four* small light orange capacitors.
C1, C2, C5 en C6 are 100nF (104)
The 680pF goes in **C3**. This is a slightly larger orange blob with the code "681".
C4 = 220nF (.22J63). This part is a light yellow block.

Now for the bigger capacitors:



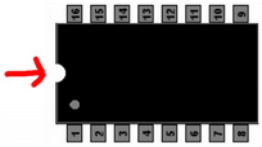
These parts have a **polarity**. The long leg is the PLUS, The short leg is MINUS.
The value of these components is printed on the side as well.
Start with the *one* larger **47uF.**
(take care to get the right one, there are also *four* **4.7uF** capacitors!)
Place the *one* **47uF** capacitors in **C11.** Long leg goes into the PLUS!!
Now we do the four **4.7uF**. These go in **C7**, **C8, C9** and **C10**.

Pinheaders:
There are three pinheaders; two singles with 5 pins, one double rowed with 12 pins.
The 5 pin singles go in the Y2_patchbay and the Y3_patchbay locations.
The 12 pin double goes in the Y1_noisebay.
First solder one pin of each and then check if they are aligned correctly.
Reheat the solder and carefully align them. Then solder the rest of the pins.

The Potentiometers:

Snip off the anti-rotation nib with a sidecutter.
These parts are variable resistors. With these you can adjust the frequencies.
You have four of these. They have different values, **so pay attention!** The value is printed on top.
P1 = B100K
P2 = B50K
P3 = A100K
P4 = B100K
Solder one leg, check if the potmeters are straight in.Reheat to aligned them correctly, then solder the rest.

IC's:
Take the small piece of foam with the *three* IC's.
CD4070 (XOR), **CD4040 (clock divider)** en **CD4093 (quad NAND**)



The IC's are the heart of the noise synthesizer.
IC1: **CD4070** is a pseudo ringmodulator and gives OUTPUT3 a metalic character.
IC2: **CD4040** divides the pitch of the oscillators
IC3: **CD4093** makes the four oscillators

CD4040 has 16 legs, **CD4070** and **CD4093** have 14 legs!

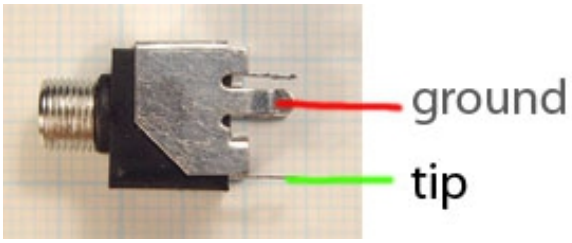
Bend the legs so that they are 90 degrees downward. (use your fingers or a flat surface to bend them all at once)
Take care that the semi-circle gap corresponds with the marking on the PCB. (and the sockets)
Fit the IC's carefully in the IC holders.
Push them in carefully but firmly.

Power:

Take the 10pin shrouded header and solder first one pin. Check is the header is flat to the pcb.
Reheat if necessary. Then solder all pins.

Front panel:
Attach the PCB to the frontpanel with the potmeters. Use the rings + nuts. Fasten the nuts.
Also attach all the jack sockets.

Now the OUTPUTS:



Cut 7 wires of about 15 cm and strip the ends.
Connect OUT1 to the TIP of the jack socket, connect the GND to the GROUND of the socket.
Connect the TIP of the second jack socket to OUT2 , and the TIP of the third jack to OUT3.
Now connect CV1 to CV4 to the four CV input jacks (the first jack at the top of the panel is CV1)
Use smaller wires or cut off pins of the resistors to interconnect the GROUNDS of the jack sockets.

Knobs:
Turn the four potmeters all the way to the left (CCW) and fit the knobs on.
Push them firmly in, while supporting the back of the potmeter.

Now you can test if it works!
Connect the 9v battery to the cable and plug the middle jack socket into some powered speakers.
First test OUTPUT1. Do you hear Noise? Great!!
Note: The potentiometers are LEFT orientated. (noise against hate!)
To hear noise at OUT2 and OUT3, you have to take some extra steps:

The middle X1_noisebay has 12 outputs.
Patch a pin wire from the X1_noisebay to the left Y2_patchbay.
Listen to OUT2 to hear the effect. Now patch in another wire.
The Y2_patchbay is connected internally, so it does not matter where you patch the pincables.

Do the same with the right Y3_patchbay. Listen to OUT3 and adjust the potmeters.
You can make all kinds of interesting sounds with different combinations in the patchbays!

Troubleshooting:
If the synth does not work, DON'T PANIC!
Check all solder connections, reflow if neccesary. Check the orientation of the capacitors and IC's.
Did you bridge the **Starve holes**? (else the module gets no power!!)

Modifications:

Patchbay Panel:
To make the patchbays accessable , you can make a 'patchbay panel'.
Use the pincables or any other cool way (such as banana plugs, touch points, switches) to connect the Y1_noisebay outputs to the Y1 and Y2_patchbay inputs.

S1 = Starve connection.
Connect the two holes with 2 legs of a 10k potentiometer.
(use the right and middle pins of the potentiometer)
Connect the left pin to GND.
Now you can adjust the amount of voltage flowing in the circuit.
This has an interesting effect on the audio!

Z1 = bypassed output.
This extra output comes directly from the 4 oscillators, bypassing the rest of the circuit.
You can connect this output to the Y1_Patchbay, but only if nothing else is plugged in.
(or no audio will come through)
Use OUTPUT2 to hear the results.

Capacitor values = noise ranges.
Experiment with other capacitor values for C3,C4, C6 and C9 for other noise ranges / timbres.
For C3, try 10pf to 1nF, for C4 & C6, try 100nf to 680nF. For C9, try 1uF to 10 uF.

Have fun with your Noise! Synthesizer!!! :)
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