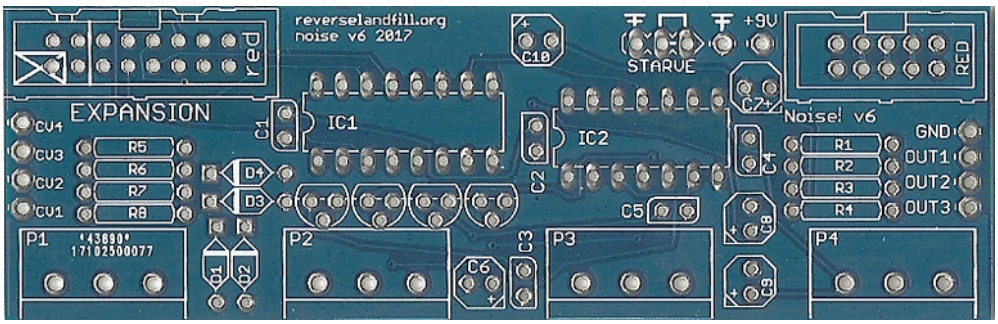
Noise Oscillator Build Document. V6 Eurorack



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.

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

The one **10R** resistor has the color code: 'brown-black-black-gold-brown'.
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!

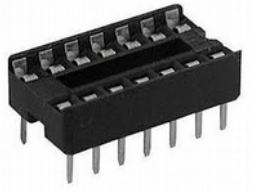
Starve is a modification option.
Look at the end of this document for more info!

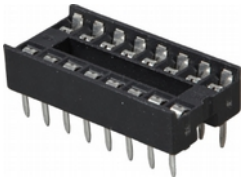
Connect the middle and right hole of Starve together to bypass this option.
Use a snipped-off leg of a resistor. Bend the leg in a U shape and solder.

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 *two* IC sockets and the IC's. There is *one* with 16 pins and *one* with 14 pins!





These IC-sockets are to make the placement (and possible removal) of the IC's easier.
Take out the *two* 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 socket in **IC1** and use the same method as before to solder it in.
Solder all remaining legs.

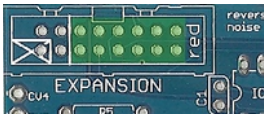
Transistors:
Q1 to Q4 are the 2n3904 transistors. They act as cv input buffers. Carefully bend the legs in the right shape solder them in.

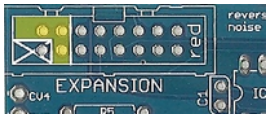
Capacitors!
There are a lot of capacitors in the kit.
They determine the frequency range of the oscillators and stabilise the power and outputs.
We start with the *three* orange disk-shaped capacitors.
C1, C2, C4 are 100nF (104)
The 100pF goes in **C3**. This is a slightly smaller orange disk with the code "101".
C5 = 1uF . This part is a blue blob with long legs.

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 **C7.** Long leg goes into the PLUS!!
Now we do the four **4.7uF**. These go in **C6**, **C8, C9** and **C10**.

Expansion header:



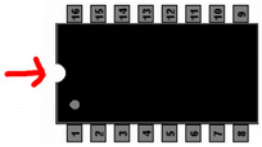


For this expansion bay I've included a 16pin shrouded header.
There are 12 "green" outputs that can be patched into the 3 "yellow" inputs.
The hole with the cross over it is a GND connection, so don't patch there!
This patch will define the sound of OUTPUT3. Use the female pin cable to make a connection.
I'm designing a expansion module that will allow for flexible automated switching of these patchpoints.
This module will be connected to this expansion bay with a ribbon cable.

The Potentiometers:
These parts are variable resistors. With these you can adjust the frequency of the oscillators.
You have four of these.
P1 = B100K
P2 = B100K
P3 = B100K
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 *two* IC's.
CD4040 (clock divider) en **CD4093 (quad NAND**)



The IC's are the heart of the noise synthesizer.
IC2: **CD4040** divides the pitch of the oscillators
IC3: **CD4093** makes the four oscillators

CD4040 has 16 legs, **CD4093** has 14 legs.

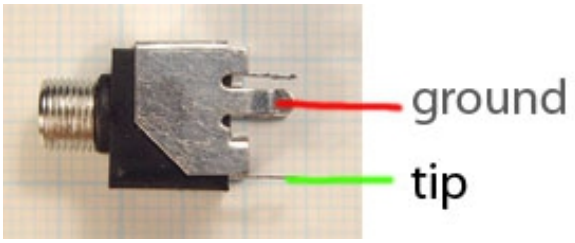
Bend the legs so that they are 90 degrees downward. (use your fingers or a flat surface to bend them all at once)
Take care that the semi-circle gap corresponds with the marking on the PCB. (and the sockets)
Fit the IC's carefully in the IC holders.
Push them in carefully but firmly.

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 seven jack sockets.

Now the OUTPUTS:



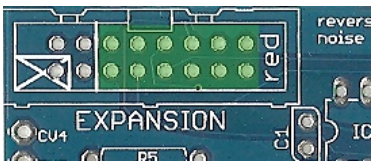
Cut 7 wires of about 10 cm and strip the ends.
Connect OUT1 to the TIP of the jack socket, connect the GND to the GROUND of the socket.
Connect the TIP of the second jack socket to OUT2 , and the TIP of the third jack to OUT3.
Now connect CV1 to CV4 to the four CV input jacks (the first jack at the top of the panel is CV1)
Use smaller wires or cut off pins of the resistors to interconnect the GROUNDS of the jack sockets.

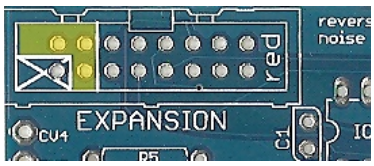
Knobs:
Turn the four potmeters all the way to the left (CCW) and fit the knobs on.
Push them firmly in, while supporting the back of the potmeter.

Now you can test if it works!

First test OUTPUT1. Do you hear Noise? Great!!
Now test OUTPUT2. This output is more "bleepy"; it bypasses the clock divider.

To hear noise at OUT3, you have to take some extra steps:





The EXPANSION has 12 outputs.
Patch the included female pin wire from the right side of the white stripe, marked "green",
to one of the 3 inputs, marked "yellow".
Listen to OUT3 to hear the effect.
You can make all kinds of interesting sounds with different combinations in the patchbays!
The 12 outputs come from the clock divider, they divide the audio by 2, 4, 8, 16 and so on.

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 12 outputs to the 3 inputs.

S1 = Starve connection.
Connect the three holes with a 10k potentiometer.
Now you can adjust the amount of voltage flowing in the circuit.
This has an interesting effect on the audio!

Capacitor values = noise ranges.
Experiment with other capacitor values for C3,C4, C5 and C6 for other noise ranges / timbres.
For C3, try 10pf to 1nF, for C4 & C5, try 100nf to 1uF. For C6, try 1uF to 10 uF.

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