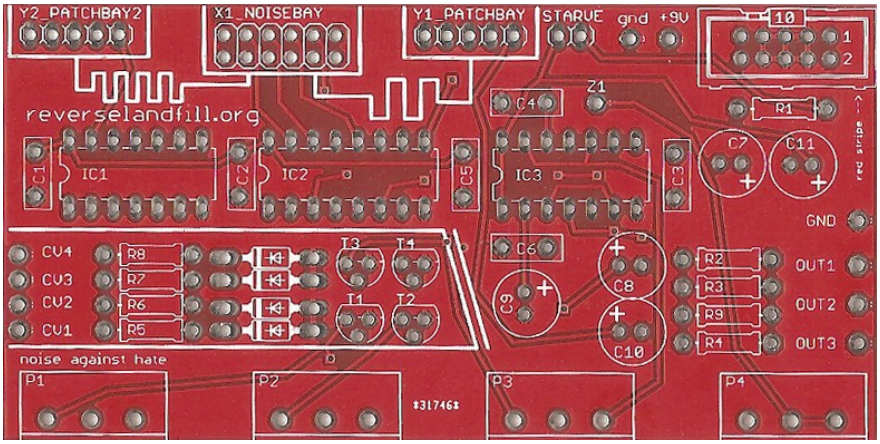
# Noise Oscillator Build Document. V.5d  - 9v - English




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.

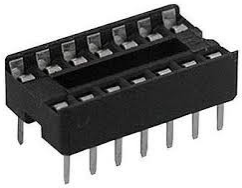
**R5 to R9** can be skipped, these are for the eurorack modular build with cv inputs.

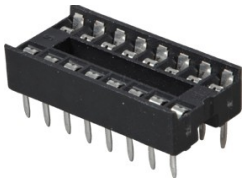
**Starve is a modification option.**
**Look at the end of this document for more info!**

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!!**

*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 *two* IC-sockets. Attention! These sockets have a direction. See the half moon-shaped 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 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 it in.
Solder all remaining legs.

Capacitors!

There are a lot of capacitors in the kit.
They determine the frequency range of the oscillators, stabilise the power and outputs.
We start with the *four* small light yellow capacitors.
**C1, C2, C5 en C6** are 100nF (.1K63)
**C3** = 680pF (you can also use a 100pF)
**C4** = 220nF / 100nF (.22J63)

Now for the bigger capacitors:



These parts have a **polarity**. The long leg is the PLUS, The short leg is MINUS.
There is also a MINUS symbol printed on the side.
The value of these components is printed on the side as well.

Start with the *one* **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 three **4.7uF**. These go in **C7**, **C8, C9** and **C10**.

The Potentiometers.

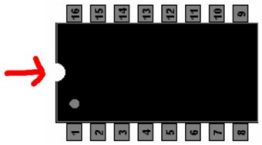
These parts are variable resistors. With these you can adjust the frequencies.

You have four of these. One of these has a different value, **so pay attention!**
The value is printed on top.
**P1 =** B100K
**P2 =** B50K
**P3 =** A100K
**P4 =** B100K

Solder one leg, check if the potmeter is straight in, 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.
The **CD4093** makes the four oscillators, the **CD4040** divides the pitch of the oscillators
The **CD4070** is a pseudo ringmodulator and gives OUTPUT2 a metalic character.
**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 half-moon gap corresponds with the marking on the PCB. (and the sockets)
Fit the IC's carefully in the IC holders. The **CD4070** goes in **IC1**, the **CD4040** in **IC2 and CD4093 in IC3**
Push them in firmly.

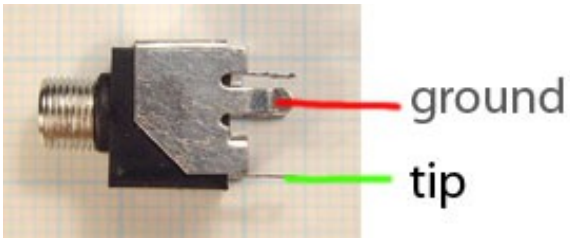
*Power*

9v battery

Take the 9v battery cable.

Connect the RED wire with the **+9v**, the BLACK wire with **GND**.

Now the OUTPUT!
Take the three jack sockets.




Cut 4 wires of about 15 cm and strip the ends. Also cut 2 smaller wires.
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.
Use the smaller wires to interconnect the GROUNDS of the jack sockets.

**Now you can (partially) test if it works!**

Connect the 9v battery to the cable and plug the jack socket into some powered speakers.
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:

Solder a 12pin header on the X1_noisebay and 5pin headers on the Y1 and the Y2 patchbays.
Patch a few pincables from the X1_noisebay to the Y2_patchbay. Now you will have noise coming out of OUT2
The Y2 patchbay goes to the CD4070 'pseudo ringmod' IC. This noise has a different character.
Patch some wires to Y1 as well. Y1 goes to OUT3
The Y1 patchbay goes directly to the OUT3. by patching to this output, you can make noise pitch changes and also route it as a random modulation output (use the large divisions)

The X1_noisebay has 12 outputs.
**Output scale / divided by 4096, 2048, 1024, 512, 256, 128, 64, 32, 16, 8, 4, 2**
The Y1_patchbay is connected internally, so it does not matter where you patch the pincables.

**Troubleshooting:**
Check all solderconnections, reflow if neccesary.
Check the orientation of the capacitors and IC's.
The red battery cable must be connected to the +9v!
Did you connect the **S1**? (else the module gets no voltage!!)

**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 X1_patchbay outputs to the Y1 and Y2_patchbay inputs.

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

**Z1 = bypassed output.**
This extra output comes directly from the 4 oscillators, bypassing the rest
You can connect this output to the Y1_Patchbay, but only if nothing else is plugged in.
Use OUTPUT3 to hear the results
(else no audio will come through)

**Eurorack adaption.**
The module works fine on the 12v eurorack power.
Solder in a 10pin euorack power connector and you are ready to go!

**CV inputs.**
With some extra parts you can control all four pitches with CV signal (example: from a modular synth)
4x 2N3904, 4x 9.1v zener diodes, 4x 1M resistors, 4x jacks sockets
The potmeters act as attenuators. Fully CCW = no cv input, CW = full input.
Use CV4 to gate the noise signal for ritmic percussion sounds

Have fun with your Noise! Synthesizer!!! :)
Martijn Verhallen
reverse.landfill@gmail.com
www.reverselandfill.org