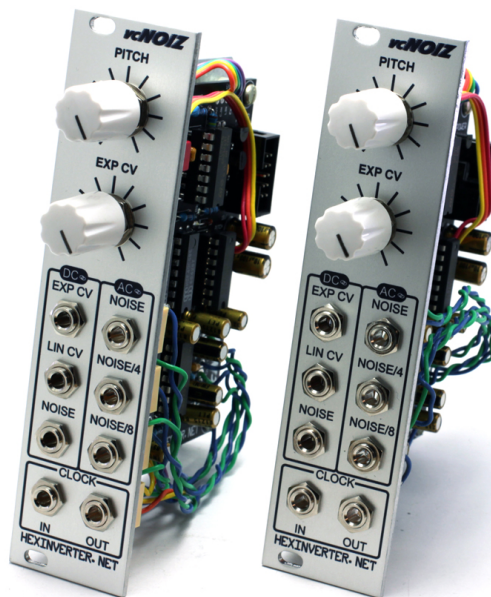# HEXINVERTER. NET

presents

vcNOIZ

voltage controlled noise oscillator

UNIVERSAL PCB Assembly Manual v1.0

This assembly manual applies ONLY
to the UNIVERSAL through hole

style of PCBs (NOT surface mount!)

Introduction

This manual exists to help guide the able-minded do-it-yourselfer on the journey of creating a vcNOIZ module from the PCBs offered at hexinverter.net

This guide is only for the through hole "UNIVERSAL" PCB sets. While I show photos of the eurorack assembly process, the ideas can be applied to any format you so choose.

If you are wondering what vcNOIZ is and what features it has, I suggest reading the User Manual over at the hexinverter.net project site (click), as these things are detailed in that manual.

High quality panels are/will be available at Re:Synthesis (click) for this project.

Technical Notes

vcNOIZ consumes approximately +35/-30mA of current at 12V. vcNOIZ is un-tested at 15V but should work fine without any changes!

vcNOIZ is based on the white noise generator from the Roland TR-909 drum synthesis circuitry. I recognised that it was a clocked noise generator and so immediately began to research methods for voltage controlling the clock and turning it into a noise VCO. A huge mention must go out to the great Thomas Henry (http://www.birthofasynth.com) -- it is the voltage controlled clock from his X-4046 VCO which I humbly learned from to create the heart of vcNOIZ. Thank you for all your excellent work, Thomas!

Part Substitutions

The only slightly uncommon components used in this design are the two CD4006 integrated circuits. These were discontinued a number of years ago but can still be found in many shops around the world! Possible substitutions if you cannot find the CD4006 are:

> NTE4006 (available at Mouser Electronics. Part number: NTE4006)
> HEF4006 (can be found in surplus shops, eBay, etc.)

Control/Panel Descriptions

Pitch Control -- This controls the base frequency of the noise VCO, just like any other VCO. Express yourself using this control while playing live for some awesome crunchy pitch sweeps! Turning the pitch all the way up will produce white noise at the AC NOISE output. Turning it all the way down will produce sub-audio clicks and pops which are suitable for use as random gates and to trigger events in your system.

EXP CV Control -- This controls how much the signal present at the EXP CV input

EXP CV input -- Input a control voltage to modulate the pitch of vcNOIZ exponentially (ie: musical response)

LIN CV input -- Input a control voltage to modulate the pitch linearly. In this way, you can use linear FM with the oscillator for interesting effects.

Clock input -- Input a positive logic clock anywhere around 3V in amplitude, and get a random noise signal generated from your clock signal through vcNOIZ. This is a great way to get a random gate signal at the DC noise output of vcNOIZ. NOTE: this replaces vcNOIZ's internal clock -- this means that vcNOIZ's CV inputs and pitch control no longer affects the noise present at the vcNOIZ outputs.

Clock output -- vcNOIZ's internal voltage controlled clock is present at this output. NOTE: the clock is actually rather unstable so is great for complex, evolving patches. No temperature compensation was used in the circuit, as I feel that the instability adds an element of randomness to the otherwise pseudo-random algorithm used in the module to create the noise.

AC Noise output -- This is the main, highest frequency noise output on vcNOIZ. When the pitch control is all the way up, white noise will be present at this output.
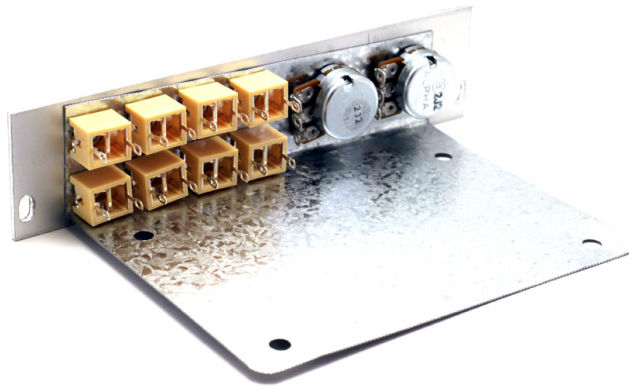
DC Noise output -- Running at the same frequency as the AC NOISE output, this DC-coupled noise output provides random gates and event triggers for use triggering events and driving clocks into other modules in your system. Try running this into a clock divider module and using the clock divisions to trigger percussive elements for some cool rhythmic patterns!

AC Noise /4 output -- This is a lower frequency (frequency / 4) version of the main AC NOISE output. This allows for simultaneous different frequencies of noise to be used and explored in your system at once. This output has a special disturbing sound character to it compared to the main AC NOISE output! This is a great output to use to generate different sounding percussive elements alongside the other outputs.
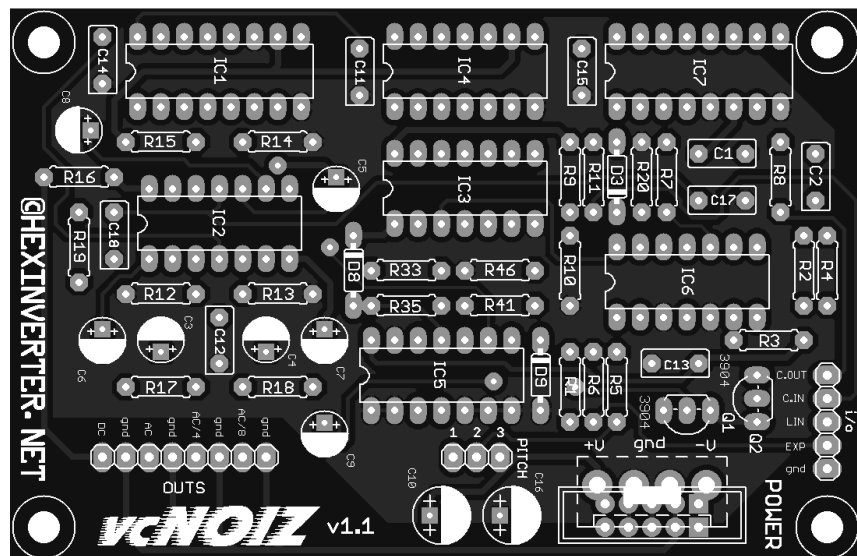
AC Noise /8 output -- This is a lower frequency (frequency / 8) version of the main AC NOISE output. This allows for simultaneous different frequencies of noise to be used and explored in your system at once. This output has a special disturbing sound character to it compared to the main AC NOISE output! This is a great output to use to generate different sounding percussive elements alongside the other outputs.

Assembly

You will need to find a way of mounting the PCB to the panel. Here are a couple of photos that illustrate the method I use:

PCB Overlay

POTENTIOMETERS VIEWED FROM FRONT

Clock Out

Clock In

Lin. CV

Exp. CV Amount
B100k
1 2 3

Exp. CV

switched

GND signal

GND SIG

GND signal

GND signal

Pitch
B100k
1 2 3

R1
R2
C2
i/o
R8
C-OUT C-IN LIN EXP gnd
POWER
R3
C1 C17
IC7
Q2
IC6
3904
Q1
-V
C13
3904
gnd
R7
R20
+V
D3
R11
R5
R6
R1
C15
R9
R10
D9
C16
PITCH
1 2 3
R46 R41
AC Noise
IC4 IC3
2 3
IC5
C10
GND signal
R33 R35
C11
D8
C5
AC Noise /8
R14
R13
R1B
C4
signal
gnd
gnd
DC Noise
GND signal
IC1 IC2
C12
gnd
OUTS
GND signal
AC Noise /4
R15
R12
R17
C3
gnd
AC
gnd
GND signal
C14
R16
C18
R19
DC
C8
C6

ZVOIZ v1.1

©HEXINVERTER·NET