Decaying Analog Noise Documentation REV2

Last Updated February 26 2022

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REVISION NOTES

1.DIP package LM13700 replaced with SOIC LM13700
2.1K LED current limiting resistor replaced with 10K

Previous revision document here.

I.Using The Module

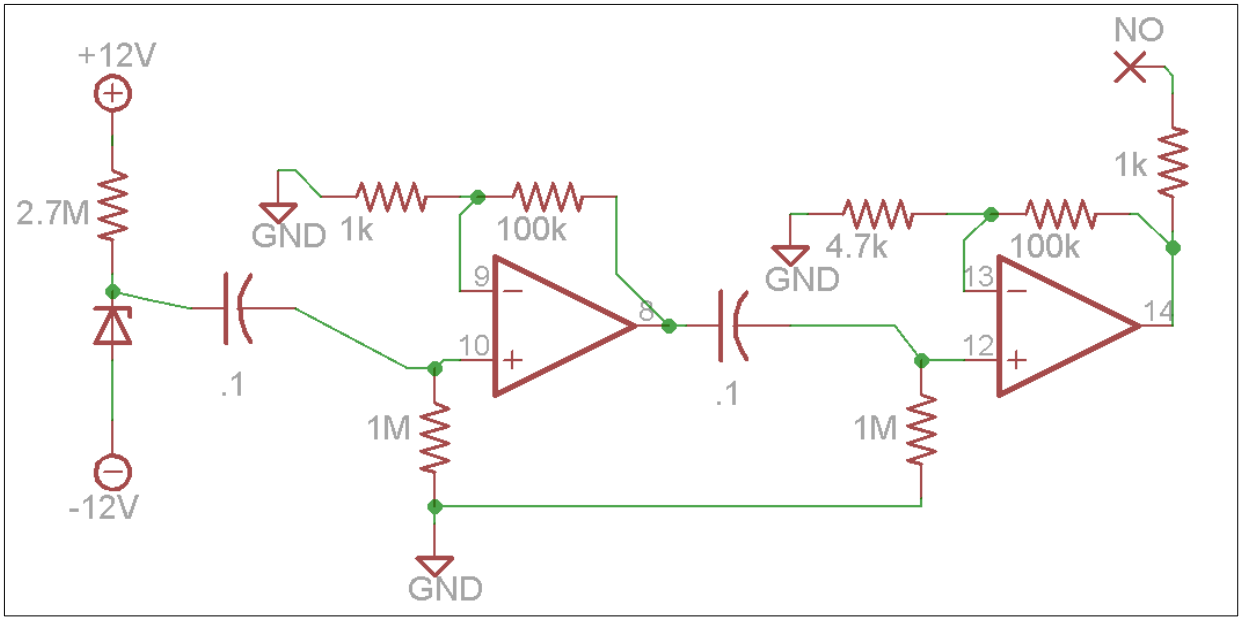
A. What is DAN?

The Decaying Analog Noise (or "DAN") module is used to percussive synthesizer sounds. It is best suited for hi-hat, cymbal or snare sounds. It features an onboard bandpass filter with adjustable center frequency and resonance.

B. Controls/Inputs/Outputs

Controls
1. Decay - This control sets the decay time for the module. An LED helps visualize this time.
2. Resonance - This sets the resonance of the filter, or how much it emphasizes the center frequency.
3. Frequency - This sets the center frequency of the fiilter.

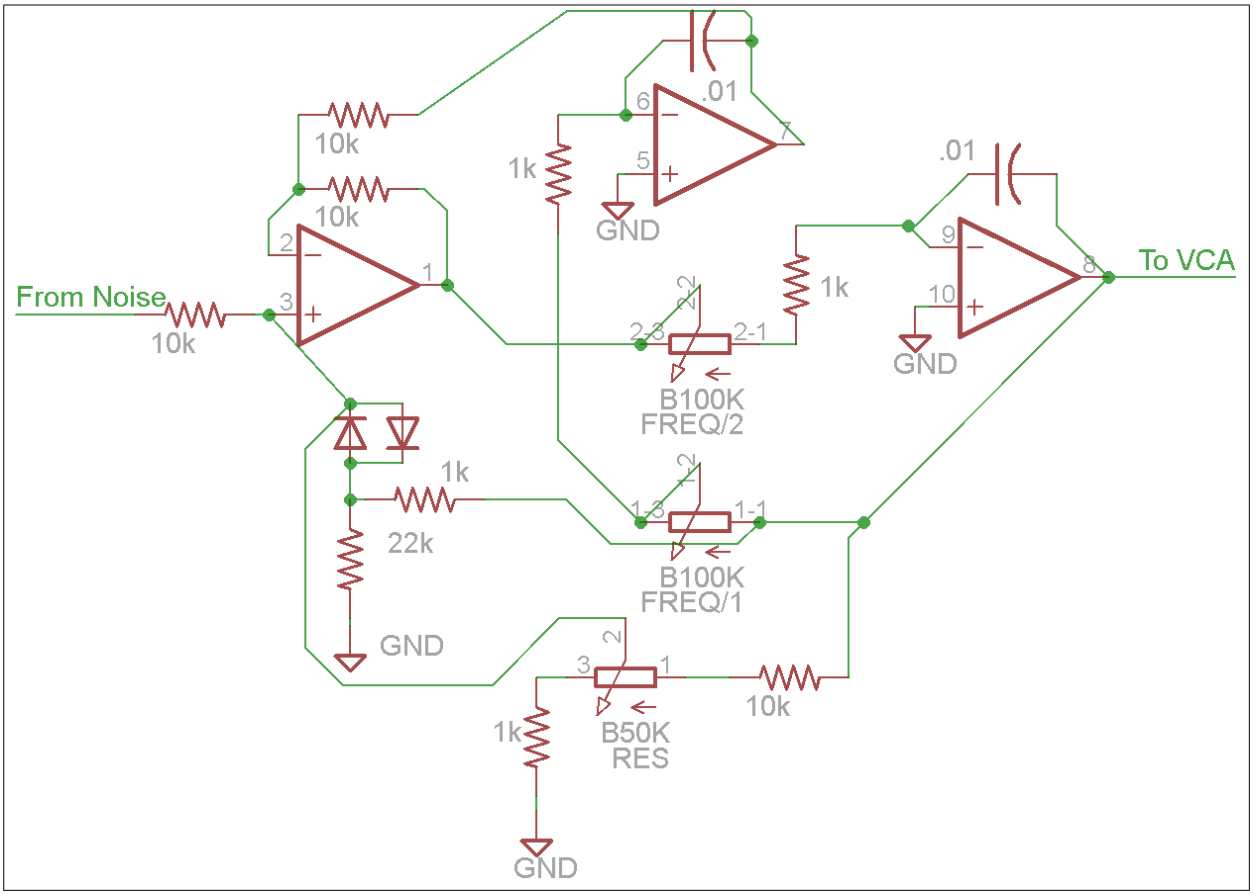
Inputs/Outputs
1.Trigger In - This turns the VCA on and begins the decay. Any trigger, gate or oscillator signal can be used with this input.
2.Noise Out - This is a dedicated noise output bypassing the filter and VCA.
3.Output - This is the filtered and VCA'd output.



II. Schematics

A. Noise Source

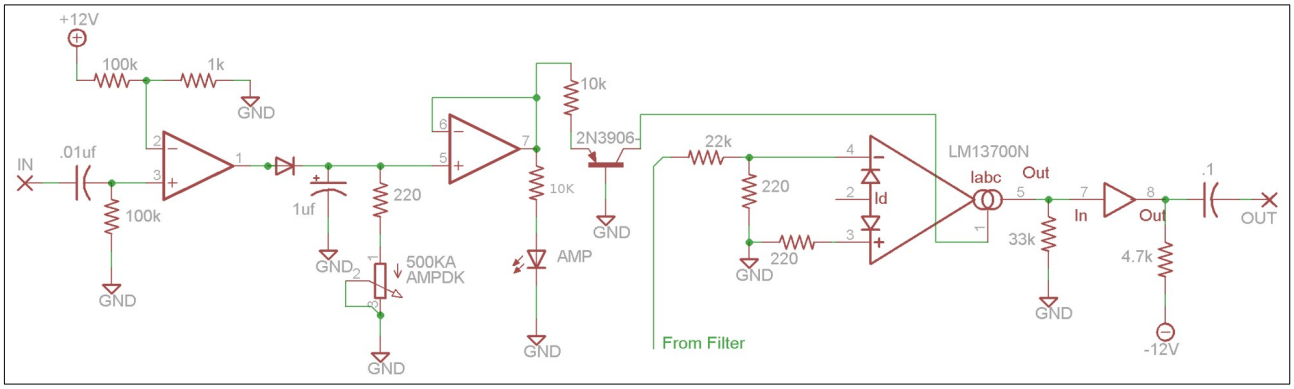
Above we see the noise source. On the far left is a zener diode in series with a large 2.7M resistor. This is our raw noise source. The .1uf capacitor next to it filters out just the AC signal which is then amplified by a pair of non-inverting AC coupled amplifiers. The second amplifier is then connected to the noise output through a 1K resistor.



B.Filter

I first became aware of this filter topology from Ken Stone's website. He's designed some great modules, and has an excellent site.

The filter is composed of three op amps and two potentiometers. The op amp on the far left is a differential amplifier which mixes our input signal with positive and negative feedback from our output. The differential amplifier feeds into one of two integrators, each integrataor has a dual ganged pot on it's input. The first integrator's output is sent on to the filter and then splits off into a negative feedback path on the bottom part of the diagram and into a second integrator to form a positive feedback path on the top.



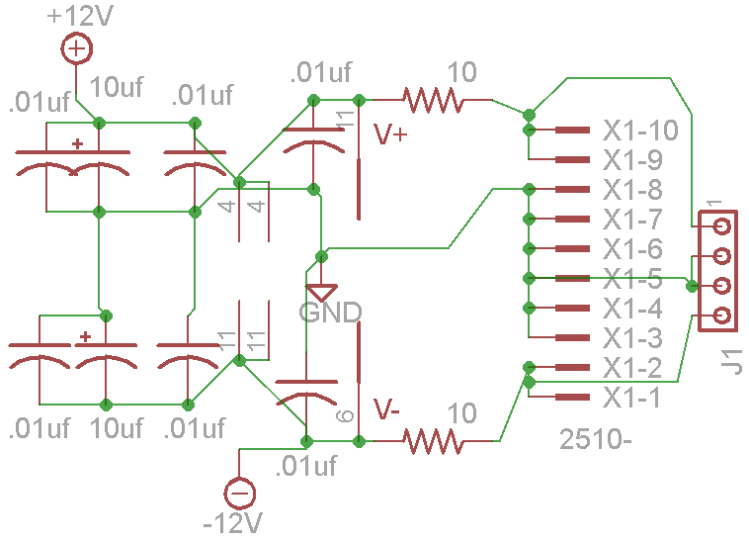
C. VCA

Above is the schematic for the Envelope Generator and VCA. On the far left is the trigger input. This input is conditioned by the capacitor/resistor/comparator/diode network it feeds into to produce the exact same pulse no matter what signal is used on the input. This pulse charges a 1uf capacitor connected to a unity gain buffer with a 500K pot in series with a 220 ohm resistor to ground. The pot controls the rate at which current will flow out of the capacitor. The buffer then

lights up an LED and feeds into the current source for the LM13700. The inverting input of the LM13700 is fed from the filter through a 22k/220 ohm potential divider and the non-inverting input is connected to ground through a 220 ohm resistor. The output of the OTA section is fed into a buffer which is biased by a 33K resistor to ground and a 4.7K resistor to the negative voltage supply, this is all then AC coupled through a .1uf capacitor to output.

D.Power Supply

Below, we see the power supply for the module. On the right we see the two types of power connecters. The power rails are filtered by a pair of 10 ohm resistors and 10uf capacitors. Each of the ICs power pins are then filtered by .01uf bypass capacitors.



III. Construction

A.Parts List

Semiconductors

Value	Qty	Notes
LM13700	1	16pin SMT package
TL074	2	14pin DIP, any quad op amp should work
1n4148	3	
1N4742	1	12V Zener; BZX85C12 is a tested alternative that's easier to find for European customers
LED	1	3mm size
2N3906	1	

Resistors

Value	Qty	Notes
10 ohm	2	7.5mm lead spacing. 1/4w Metal Film unless otherwise noted on all resistors
220 ohm	3	
1K ohm	6	
4.7K	2	
10K ohm	6	

22K ohm	2	
33k	1	
100K ohm	4	
1M ohm	2	
2.7M	1	
A500K pot	1	Alpha 16mm or similar
B50K pot	1	Alpha 16mm or similar
B100K dual pot	1	Alpha 16mm or similar

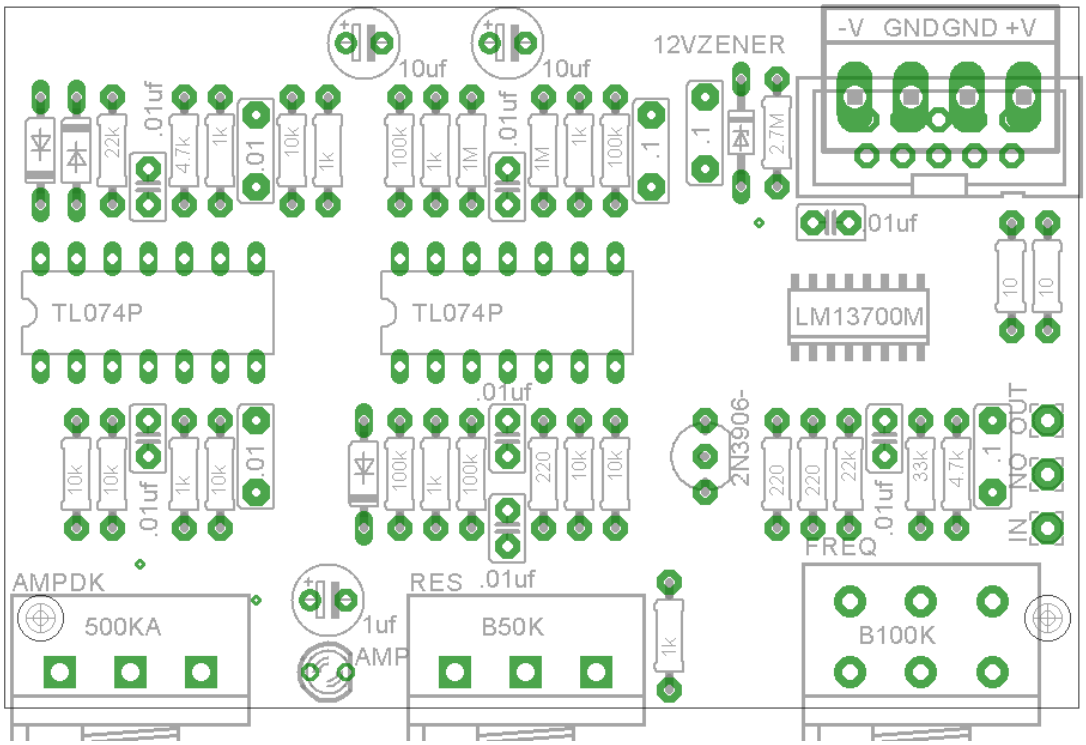
Capacitors

Value	Qty	Notes
.01uf	7	2.5mm lead spacing, use cheap ceramics
.01 uf	2	5mm lead spacing film box type
.1uf	3	5mm lead spacing film box type
1uf	1	2.5mm lead spacing Electrolytic
10uf	2	2.5mm lead spacing Electrolytic

Other

Value	Qty	Notes
14 pin DIP socket	2	
Power Connecter	1	either Eurorack or MOTM style
Jack	3	

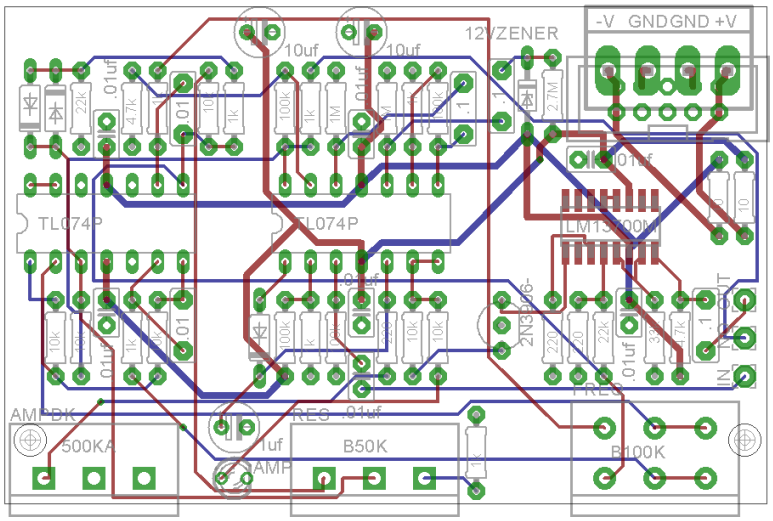
B.Wiring/PCB Information



Above is the PCB. It is 76mm x 50mm. The mounting holes are spaced 71mm and the pots are spaced 28mm apart.The wiring pads should be connected as follows:

IN - Input, wire to the tip of the input jack
NO - Noise output, wire to the tip of the noise output
OUT - Output, wire to the output jack tip

To the right is an image of the PCB with traces shown, to aid in troubleshooting.



To wire the LEDs onto the board, just follow this sequence on the left.