nonlinearcircuits

Divine CMOS (Eurorack version) 07/06/17

This circuit takes two input signals and divides them down by /2, /4, /8 & /16. It then XORs these divisions (XOR = Exclusive OR). All of these signals can then be mixed to create the output waveform. If this is done at audio rates the output is very thick and full of shifting harmonics. If it is done at LFO rates, the output is a complex pattern that can be used as a CV source. The gates generated by the CMOS logic stages are also available on the panel.

The slew pot and output can be used to obtain a slewed version of the CV signal. At audio rates, this output is pretty much a flat line, but if the audio signal is turned on/off by a VCA (or two VCAs for two audio signals), then the Slew section can be used as an Envelope Follower. It works very nicely.

Using just one input, you can use the module as frequency divider, for either gates or audio rate signals. If 2 incoming clock signals are patched in, you can generate a series of gates that are related to the original clock signals but are different, very useful for complex percussion patches.

To sum up, it is a sub-oscillator, harmonic ring-modulator, envelope follower, clock divider and gate and CV pattern generator….with slew.

The best effect at audio rates is to get signals from 2 VCOs that are beating – running at almost the same frequency…but not quite. This gives a continuously shifting and active sound. As the input signals are divided down to /16, it is best to run the VCOs at higher frequencies than usual to be able to exploit all the available divisions.

To use as a pattern generator, connect two gate/trigger/LFO signals to the inputs (or just one – it will still work, but 2 is more interesting). Connect the output to a VCO and adjust the pots to find patterns that will be somewhat unpredictable but quite fun to use.

There is an error on the PCB, the 47k resistor circled in green should be changed to 100k. The two 100k resistors circled in blue should be changed to 47k

CHANGE TO 47k

CHANGE TO 100k
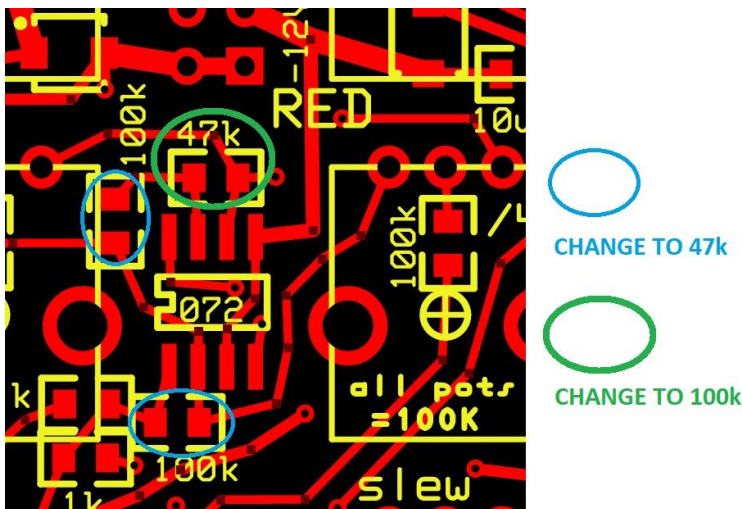
Another important point is choice of logic chip, you can install
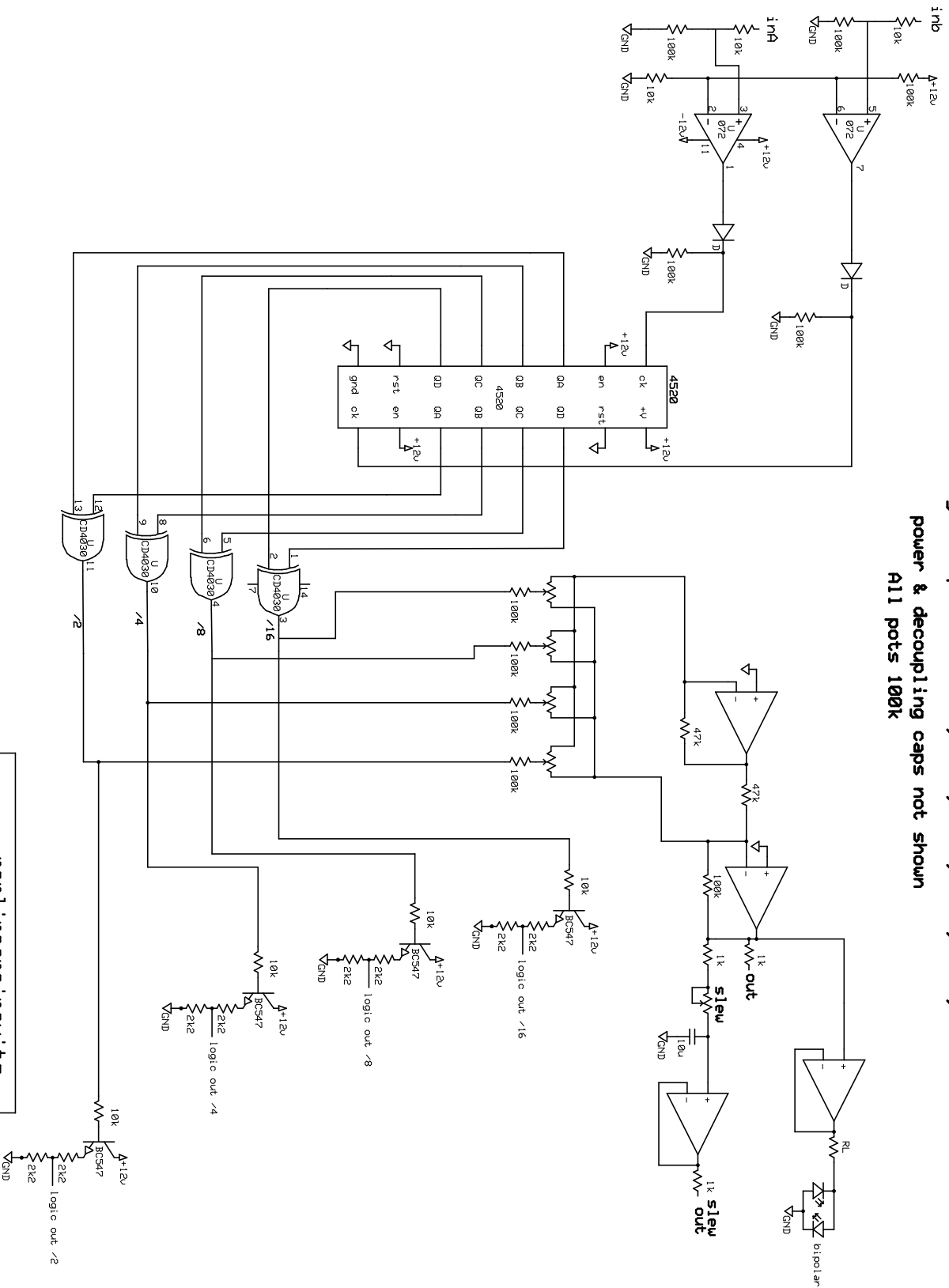
4001 OR	4070 XOR	4077 XNOR
4011 NAND	4071 OR	4081 AND

I prefer the 4070 which gives a pseudo ring modulation function, so the PCB is marked '4070'. Feel free to install the IC of your choice or just build one of each type.

BOM

Component	Quantity	Notes
100k pot	5	Tayda: A-1848
3.5mm jack	8	Kobiconn style. Tayda: A-865 or Modular Addict: PJ301M-12
3mm LED	1	2 pin bipolar. Mouser: 604-WP937EYW (or use a regular 3mm LED)
S1JL	2	Mouser: 821-S1JL
LL4148	2	Mouser: 512-LL4148
BC847	4	Sot-23. Tayda: A-1339
TL072	3	soic. Tayda: A-1136
4520	1	soic. Mouser: 595-CD4520BM96
4070	1	soic. Mouser: 595-CD4070BM96
10uF	4	0805 must be rated for 25V or 35V. Mouser: 963-TMK212BBJ106MG-T
RL	1	0805 – select to suit LED brightness (I use 10k with superbright LEDs)
1k	3	0805
2k2	8	0805
10k	7	0805
47k	2	0805
100k	10	0805
Eurorack 10 pin power connector	1	Tayda: A-198

logic chip can be 4070, 4030, 4081, 4077, 4001, 4011
power & decoupling caps not shown
All pots 100k

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divine CMOS
andrewF
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Page # or name

inb
inA
+12v
-12v
GND
100k
10k
10k
100k
4520
gnd
ck
rst
en
QD
QA
QC
QB
QB
QC
QA
QD
en
rst
ck
+v
+12v

CD4030
/16
/8
/4
/2

100k
47k
47k
100k
1k
slew
out
1k
out
10u
GND
slew
out
1k
bipolar
RL

BC547
2k2
2k2
10k
+12v
GND
logic out /16
logic out /8
logic out /4
logic out /2