nonlinearcircuits

BOOLs Build guide & BOM

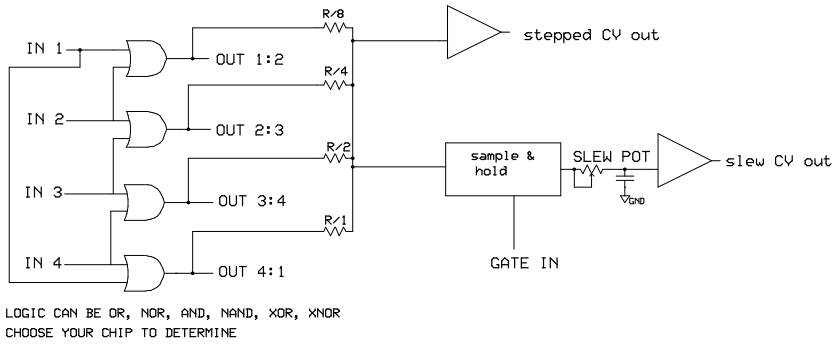
vers1 (29/7/2015)

This is a multi-purpose module that can be used in a number of ways. It can be used for basic logic functions to generate complex gates. Using multiple inputs allows the creation of a variety of different but related gates which can be used to create complex but nicely sync'd patches. There is a R2R ladder to create a stepped CV signal that corresponds to the gate outputs, this is also fed thru a gate (or CV) controlled sample & hold/Slew circuit to create a smooth output.

Some tricks (depends on your choice of logic):

Use the module to process audio signals and feed the outputs back into other inputs.

The BOOLs can be used as an envelope generator. Choose an input to determine the height (1 = low, 4 = high), set the slope with the Slew pot, feed the S&H input with various signals to vary the envelope shape.



Suitable chips are
4001 NOR
4011 NAND
4071 OR
4081 AND
4077 XNOR
4030 or 4070 XOR

For me, the OR, XNOR & XOR chips are the most interesting. What makes this circuit a little different is the way the inputs and outputs are related.
There are four inputs, call them A, B, C & D, say we have an XOR chip installed and signals on all four inputs
Output 1 will be A xor B
Output 2 will be B xor C
Output 3 will be C xor D
Output 4 will be D xor A
The input signals can be pretty much anything that crosses 1.1V. Outputs will be 5V.
Audio rate signals are fine; XOR chips give a crude but useful ring modulation effect.

BOM

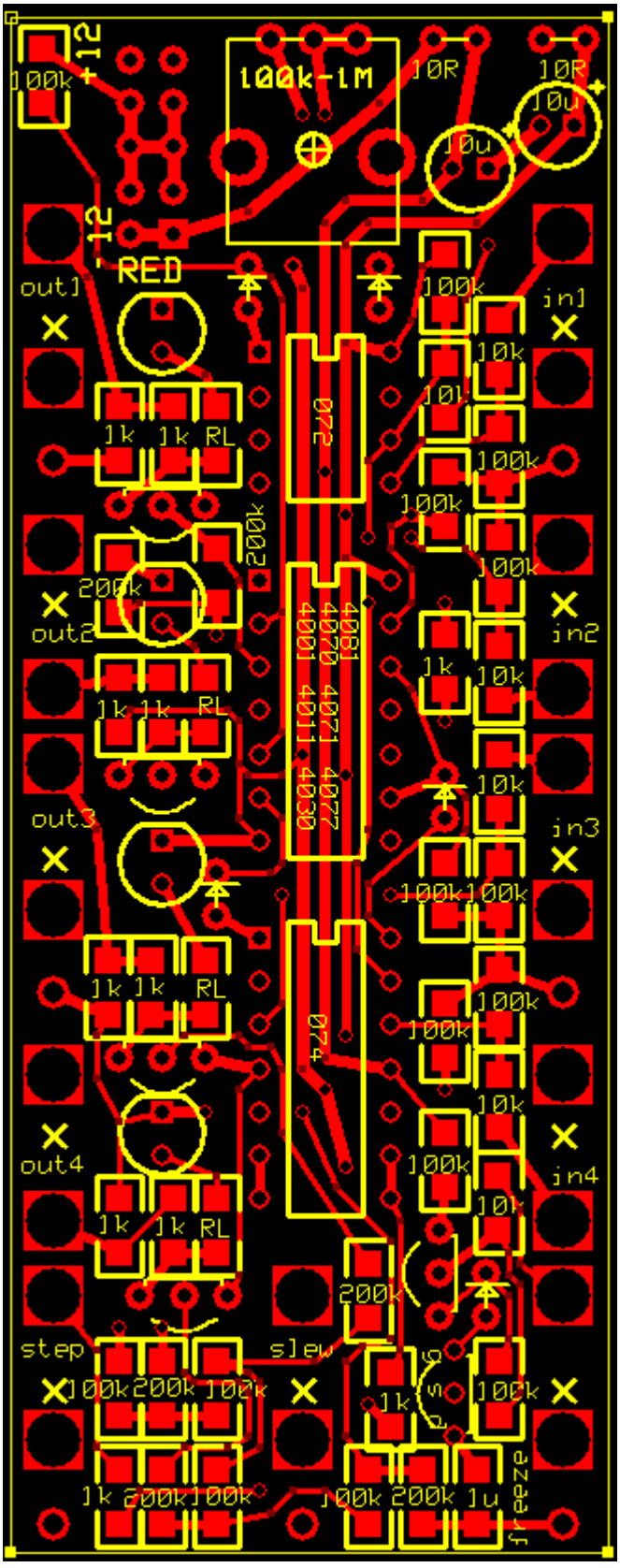
component	quantity	remarks
4001/4011/4030/4070/4071/4077/4081	1	DIP CMOS to suit the logic function you want
TL074	1	DIP
TL072	1	DIP
BC547	5	NPN thru-hole
J112 or J108 FET	1	thru-hole
1N4148	5	thru-hole
LED	4	**NOTE: 3mm size for NLC panel**
jacks	11	Kobiconn style 
1M pot	1	 see notes
100nF capacitor (or larger) ('104' on PCB)	2	1206 or 0805, for decoupling (on bottom of PCB)
1uF capacitor	1	1206 or 0805 – see notes
10uF electro	2	thru-hole, minimum 25V rating, 2mm lead spacing
10R	2	thru-hole
1k	11	1206 or 0805
10k	7	1206 or 0805 (one is on the bottom)
100k	15	1206 or 0805
200k	6	1206 or 0805
RL (LED resistor)	4	1206 or 0805, select value to suit LED brightness
14 pin IC socket	2	
8 pin IC socket	1	
eurorack power connector (10 pins)	1	

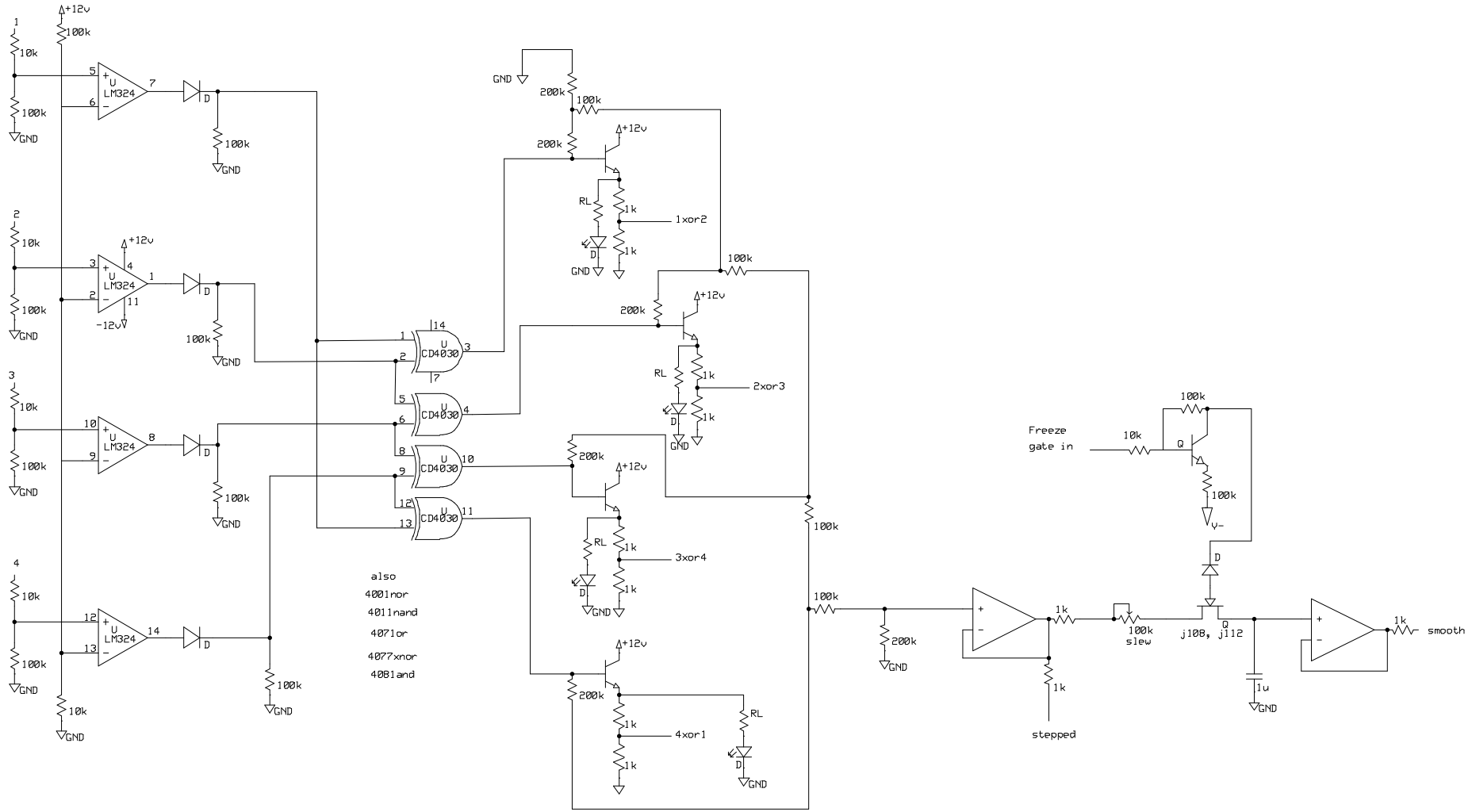
NOTES:
The pot and the 1uF capacitor combine to create and control the slew rate in the smooth CV output. You can try other combinations such as 10uf and 100k pot or for very slow 10uF and 1M pot. 47uF was too much but 22uF was okay if you like it really slow and gooey.

Building

1. It is best to install the 1206 or 0805 components on the back of the PCB first, and then install the 1206 or 0805 components on the top of the PCB. After this install the sockets, power pins and thru-hole components.
2. Connect the pots and LEDs to the back of the PCB, but do not solder them.
3. Regarding the LEDs; the long lead goes into the round hole, short lead in the square hole.
4. Attach the jacks to the panel, so the ground tabs are oriented correctly.
5. Mate the panel to the PCB, ensure everything lines up properly, place the nuts on the pots, and then solder everything on.
6. Use some wire clippings to connect the jack ground tabs to the PCB.

For the LEDs, you need to choose the value of the current limiting resistors so your LEDs are at the desired brightness; these are all marked as RL on the PCB. If using the NLC PCB, please note that the LEDs are 3mm rather than the regular 5mm size.


100k
+12
100k-LM
10R
10R
10u
10u
-12
RED
out1
in1
100k
10k
10k
1k
1k
RL
072
100k
100k
100k
200k
200k
out2
in2
4001
4070
4071
4011
4030
4077
1k
10k
1k
1k
RL
10k
out3
in3
100k
100k
1k
1k
RL
100k
100k
074
10k
out4
in4
100k
10k
1k
1k
RL
200k
step
slew
100k
200k
100k
1k
100k
100k
200k
1u
freeze



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