nonlinearcircuits

Beat Freq build & BOM

The idea for this module came from a schematic that has been floating around the web for years - 'beat frequency indicator'

The idea is to feed the circuit two signals and depending upon which one had the higher frequency the ring of 4 LEDs would light up in a clockwise or anti-clockwise direction. The speed of rotation would indicate how close or disparate the frequencies are. If the signals have the same frequency then just one LED is lit.

The original circuit used 74xxx series ICs for the logic, so it was simple enough to find the CMOS equivalents (sort of), then add gates corresponding to the LEDs and use the spare outputs of one chip to feed pots to make sequences. Then for good measure a discrete XNOR circuit was added to give a pseudo ring-modulator output based on the 2 incoming signals.

In operation this module is quite unique; the CV signals return to 0 between each step, the length of each step can vary depending on the incoming signals. Gates come in spurts. The circular LED display jerks around, sometimes it completes several revolutions confidently and then stutters between two stages, sometimes it shimmers on one spot.

At both audio rates and clock rates, this module is quite unpredictable but always seems to be putting out useful signals.

Please note the pots go on the side of the PCB that has the pot symbol screenprinted, this is different to older NLC PCBS.

Version 4 PCB (the 1st run) has a missing trace and needs a wire added, see section on pg 3.

BOM – The Tayda part numbers are given as examples, feel free to buy from your favorite retailer if you prefer.

VALUE	QUANTITY	DETAILS
220pF	2	0805 - must be 220pF
100nF or 104	3	0805
10uF	3	0805 25V or higher voltage rating
220R	2	0805
1k	2	0805
2k2	8	0805
10k	5	0805
47k	4	0805
100k	15	0805
470k	1	0805
2M2	2	0805
RL	4	0805 see notes
4555	1	soic Mouser: 595-CD4555BNSR
40193	1	Soic Mouser: 595-CD40193BNSR
4070	1	Soic Mouser: 595-CD4070BM96
TL072 or TL082	3	Soic Tayda: A-1139
BC847	6	Tayda: A-1339
LL4148	2	Tayda: A-1213
3mm LED	4	
100k (B) pot	4	Tayda: A-1848
Eurorack 10 pin power connector	1	Tayda: A-198 cut to size
Schottky, power rectifier or 10R, optional - for reverse voltage protection...or not	2	SMD SEE NOTES #1. dot on PCB indicates CATHODE (stripe on component). My current fave is BAT54GWX, Mouser: 841-BAT54GWX
3.5MM SOCKET Kobiconn style	8	Tayda: A-2563 or Thonkiconn Jacks (PJ301M-12) from Thonk, Synthcube or Modular Addict

Additional notes:

1. , Schottky (best option) **or** standard power rectifier diode 50-600V 1A or more, **or** use a resettable fuse **or** just a 10R. Examples: BAT54GWX, PMEG2005EGWX, AEC-Q101, 20V, SOD-123, PMEG2005EH DIODE, SCHOTTKY, 0.5A, 20V, 1N400x or S1JL or similar.

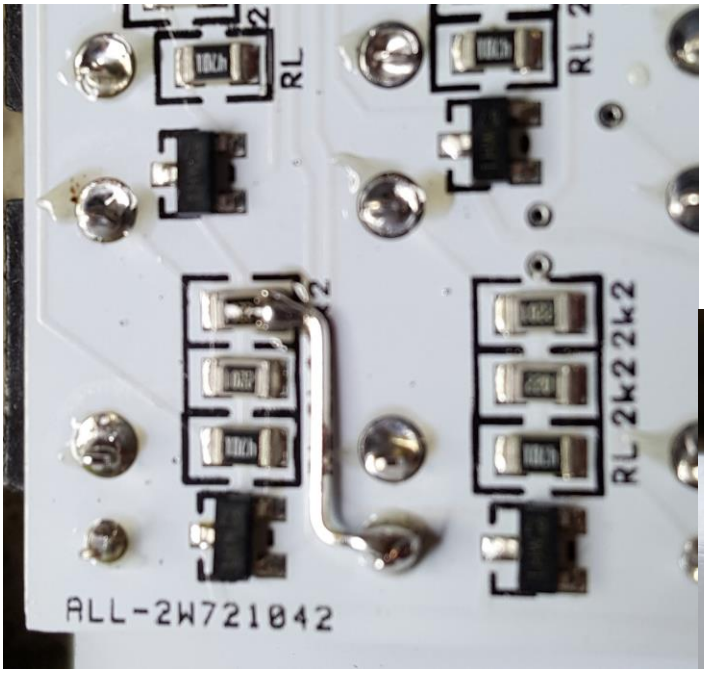
2. Most of the chips, resistors, caps are cheapest from Tayda. 10uF 25V 0805 caps from Mouser/E14/Farnell/etc. There are variations of the Mouser ICs, get what you like and is in stock, so long as it is soic and suits 15-18V power supply.

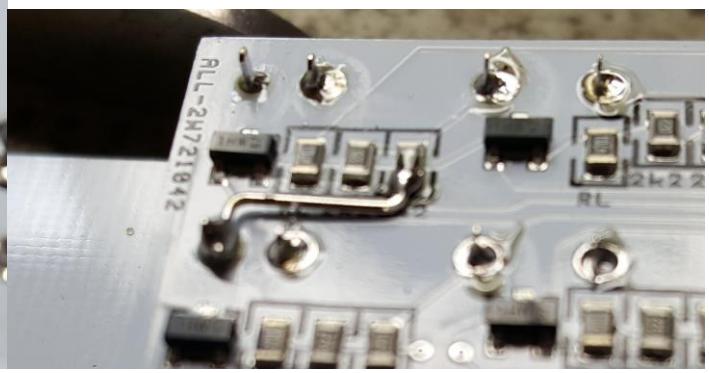
3. Join the Nonlinearcircuits Builders Guild on FB: https://www.facebook.com/groups/174583056349286/ and ask questions there if you have any. If you prefer not to FB then email is fine.

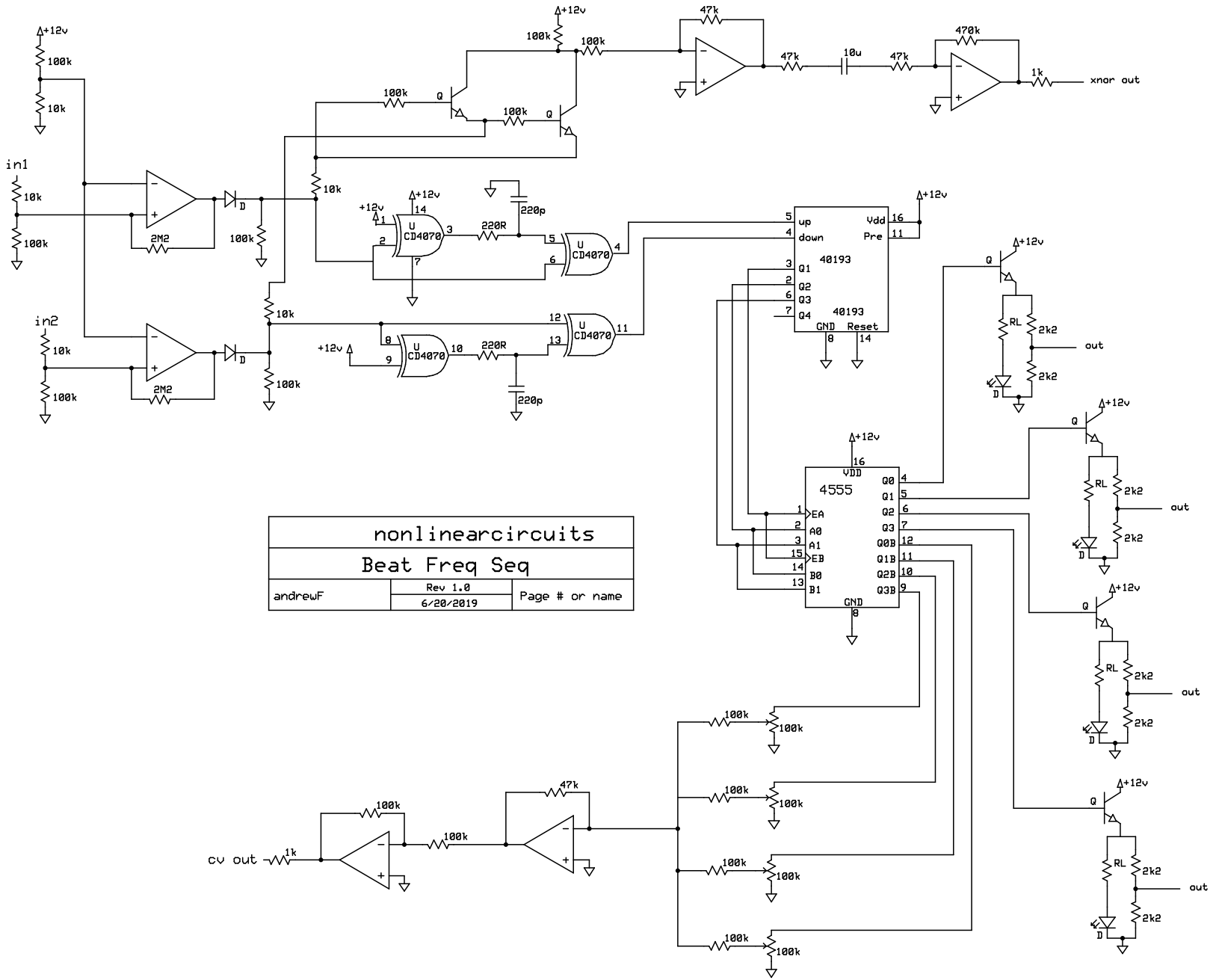
4. **RL:** These are the resistors for driving the LEDs. As the resistors are shining thru the window on the panel, you want them brighter than usual. For example, if I normally use 10k for RL for a particular LED, I would use 4k7 for the same LED in this module. If using diffused LEDs, it is maybe best to have them pressed against the back of the panel. This is fine for clear lens, narrow focus LEDs too, but this type you could also get a good lightshow by mounting them flat on the PCB.

Vers. 4 kludge

Vers.4 PCB is missing a trace in the bottom corner, it can be replaced with a piece of wire as shown. If you can’t be bothered it just means one of your gate out signals will be 10V rather than 5V, no biggie.






+12v
100k
10k
in1
2M2
D
220p
220R
U CD4070
40193
up
down
Q1
Q2
Q3
Q4
Vdd
Pre
GND
Reset
in2
4555
VDD
EA
A0
A1
EB
B0
B1
Q0
Q1
Q2
Q3
Q0B
Q1B
Q2B
Q3B
47k
10u
470k
1k
xnor out
RL
2k2
out
cv out
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Beat Freq Seq
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Rev 1.0
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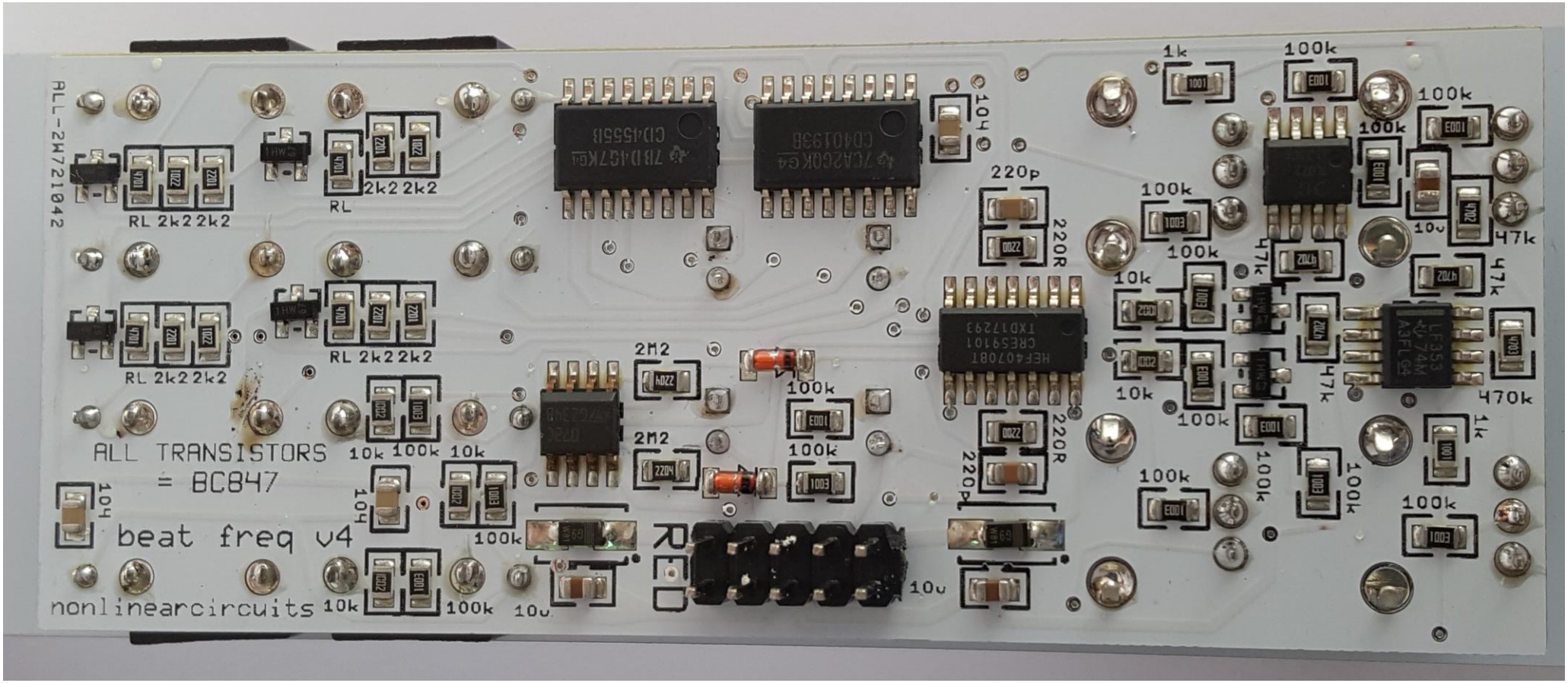
ALL-2M721042
RL 2k2 2k2
RL
2k2 2k2
RL 2k2 2k2
RL 2k2 2k2
ALL TRANSISTORS
= BC847
beat freq v4
nonlinearcircuits
RED
2M2
2M2
220p
220R
220R
220p
100k
10k
1k
47k
470k
10u
104