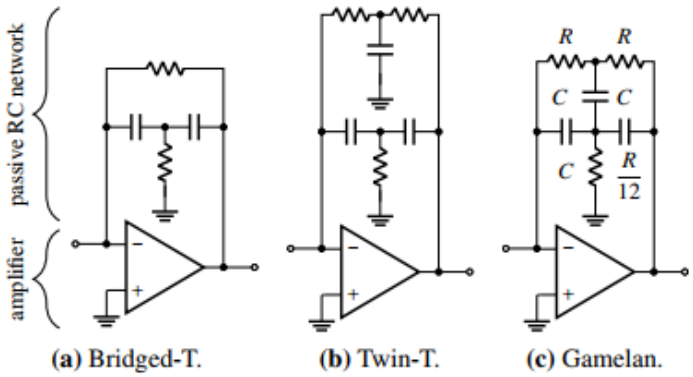
nonlinearcircuits

TINKLE build & BOM

This module is based on the "Pygmy Gamelan" developed by Paul DeMarinis and discussed in Analysis of a Unique Pingable Circuit: The Gamelan Resonator (open access). This version retains the core features of the Gamelan Resonator; using the LM3900 Norton op amp and the three capacitors of the twin-t sub-circuit are connected together, instead of one of them going to ground (image below is from the paper). A rather nice feature of this circuit is the way it responds to bursts of gates or triggers, the sounds start loud and get softer.



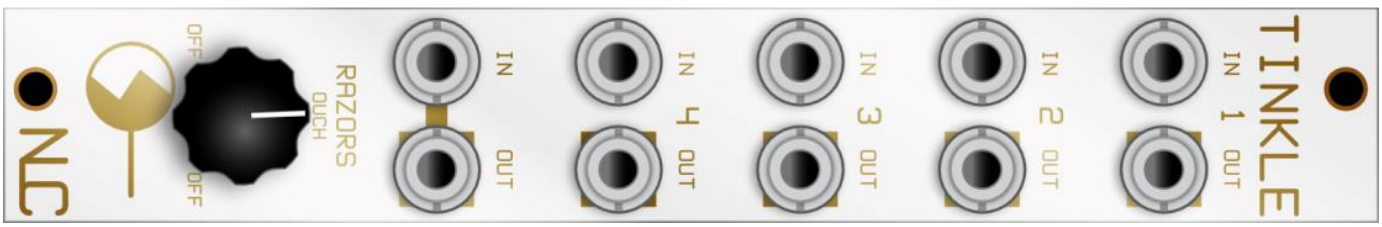
I ended up with a completely different set of resistor values from the original circuit, changed the input circuit so it only triggers on rising edges and added output gain stages.

When building you can select capacitors to suit the pitches you want, also need to select a resistor value to vary the gain. Some suggested values are listed in this build guide, but feel free to experiment.

Each drum sound has an output. The 4 sounds are summed together and passed through the Razor circuit for a mixed output. Turn the pot to minimum or max to turn off the Razor and get a clean summed signal.

Despite indicating two 10k resistors on the schematic, I somehow managed to label them 33k on the PCB. Please install 10k resistors rather than 33k. It will work with either but the 10k resistors will reduce the chance of glitches when using the Razors output as a mixed out for the drums and you want a clean signal…….hope that makes sense? Installing 10k will decrease the active range of the Razors pot, if you prefer to keep this range install 33k and expect a few clips.

Feel free to leave off the 5V1 zeners as well if you don't mind signals stepping outside of 10Vp-p, just leave the pads empty.



Razor can be used as a separate module, patching a signal into the input disconnects the summed Tinkle signal.

Razors is an unusual distortion circuit employing unbalanced comparators to produce pulses that are mixed with the original signal. I was originally just developing a circuit to add some harmonics but ended up in a nasty place and felt quite happy.

The PCB is very tightly packed; despite being a relatively simple design this is not a suitable build for beginners, see pic on pg5.

BOM – The Tayda & Mouser part numbers are given as examples

VALUE	QUANTITY	DETAILS
C1	3	0805 SEE NOTES
C2	3	0805 SEE NOTES
C3	3	0805 SEE NOTES
C4	3	0805 SEE NOTES
1n	4	0805
100n	5	0805
10uF	2	0805 25V or higher voltage rating Mouser:963-TMK212BBJ106MG-T or similar
1k	7	0805
10k	12	0805
22k	1	0805
~~33k~~ INSTALL 10K	0	0805
47k	1	0805
100k	13	0805
120k **(marked 'R' on PCB)**	12	0805
1M	4	0805
R1	1	0805 SEE NOTES
R2	1	0805 SEE NOTES
R3	1	0805 SEE NOTES
R4	1	0805 SEE NOTES
TL072 or TL082	4	Soic Tayda: A-1139
LM3900	1	Soic Mouser Part No: 595-LM3900DR
LL4148	6	sod-80 Tayda: A-1213
5V1 zeners	2	optional SEE NOTES
100k pot	1	
Eurorack 10 pin power connector	1	Tayda: A-198 cut to size
S1JL, Schottky, power rectifier or 10R	2	SMD SEE NOTES #1. **dot on PCB indicates CATHODE (stripe on component).**
3.5MM SOCKET	10	Tayda: A-865 or Thonkiconn Jacks (PJ301M-12) from Thonk, Synthcube or Modular Addict
3 pin header	5	get 40 pin strips and cut off as needed Tayda: A-197
3 Pin 2.54mm Single Row Female Pin Header	5	Tayda: A-1306 OPTIONAL – I just solder the board to the pins, high enough to access the jacks if necessary.

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 (worst option). Examples: BAT54GWX, PMEG2005EGWX, AEC-Q101, 20V, SOD-123, PMEG2005EH DIODE, SCHOTTKY, 0.5A, 20V, 1N400x or S1JL or similar.

2. The chips, resistors, caps are cheapest from Tayda. Schottky diodes, CMOS & 1uF, 10uF 25V 0805 caps from Mouser/E14/Farnell/etc.

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. The 5V1 zeners limit the output of Razors to +/-5V, they do not have to be installed.

Mouser have a lot of 5V1 zeners in stock, some numbers are

78-BZT55C5V1-GS18 or 78-BZT55C5V1 or 78-TZMC5.1

Tayda have a sod-80 5V6 zener which is close enough - A-6014

Suggested values for Cx and Rx

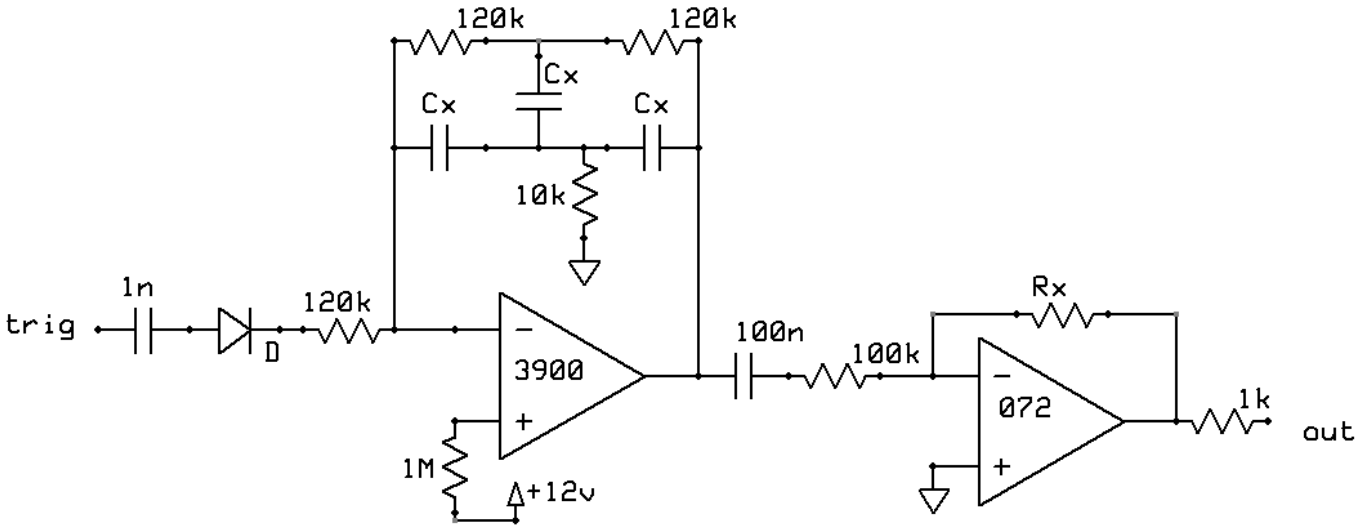
Ideally you want to see approx 8Vp-p on the outputs for the 1st trigger. If you do not have a scope to measure, use the summed out via Razors with the pot turned to the OFF position. If the sound is loud enough and clean, then good, if there is some distortion or clipping, then reduce the value of R (an easy way is to solder a large value resistor on top of it, say 1M).

All the capacitors should be the same value for each Cx and Rx sets the gain for that section.

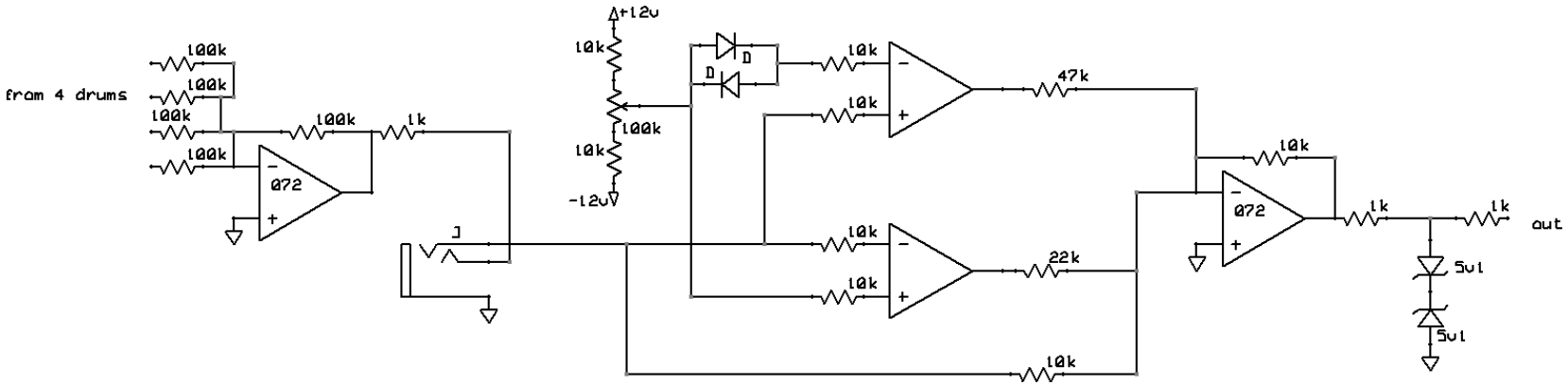
For example, use three 2n2 cpacitors for the three C1 pads and solder 200k into R1.

Feel free to experiment with these values

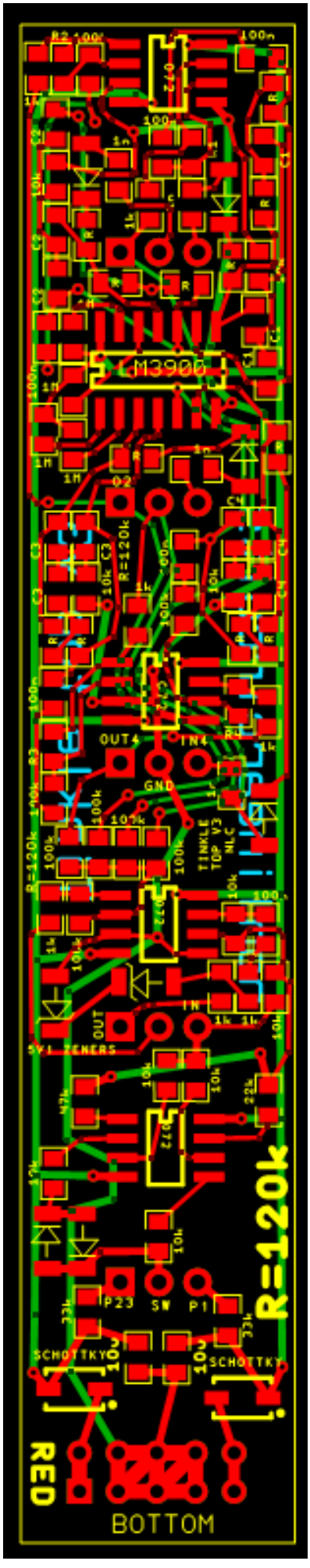
C	R	
1n5	180k	higher tone
2n2	200k	
3n3	220k	
4n7	220k	
10n	200k	
15n	390k	
22n	510k	
33n	680k	lower tone

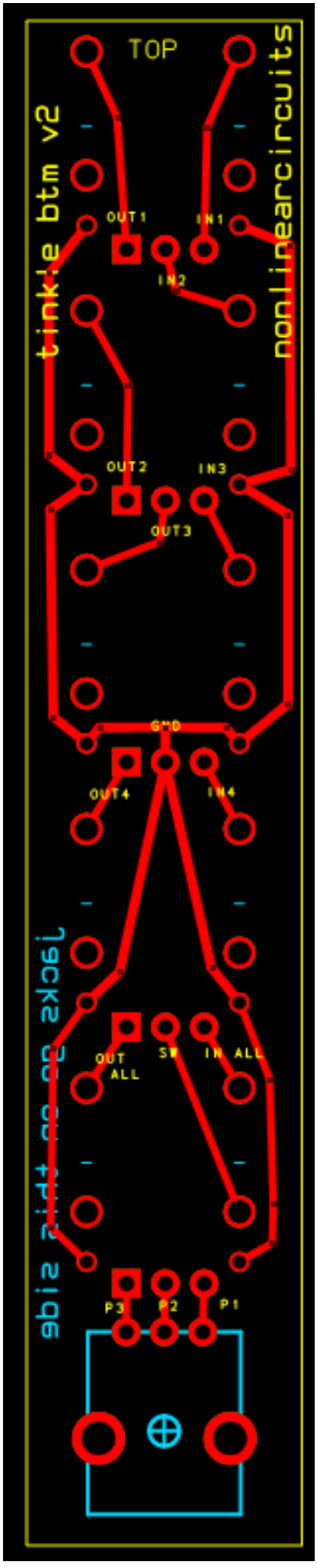


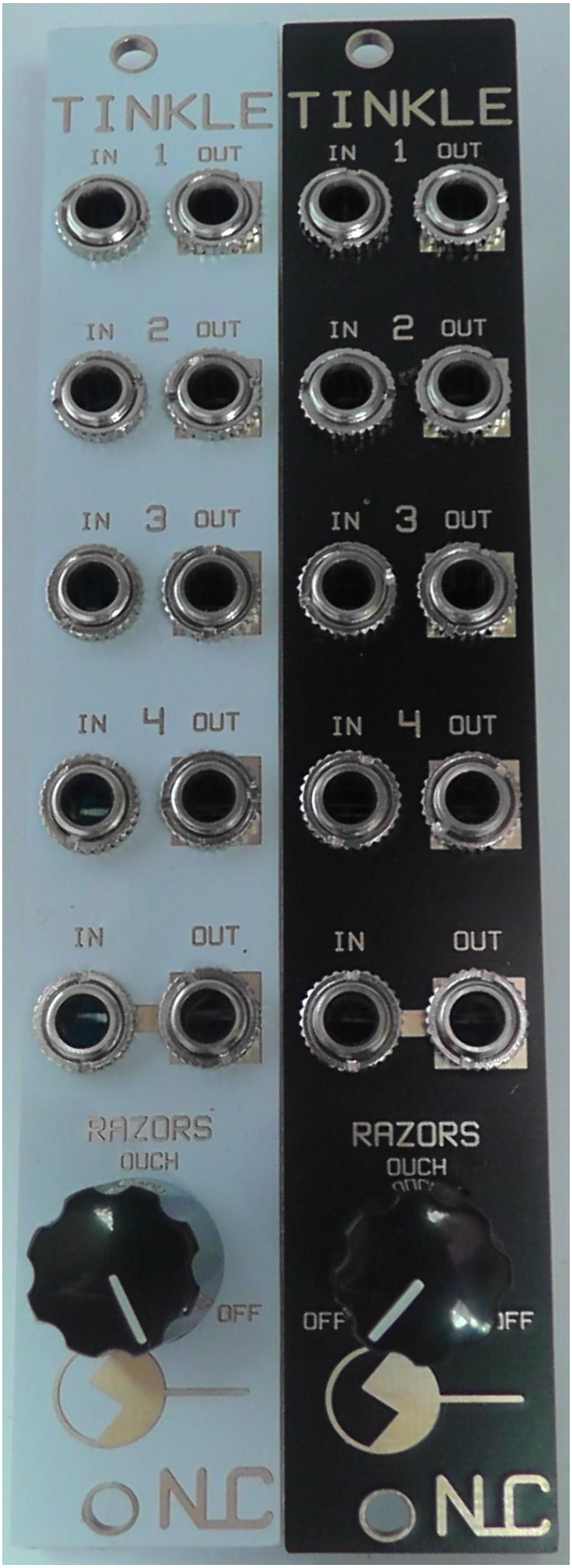
Drum section - 4 circuits on PCB

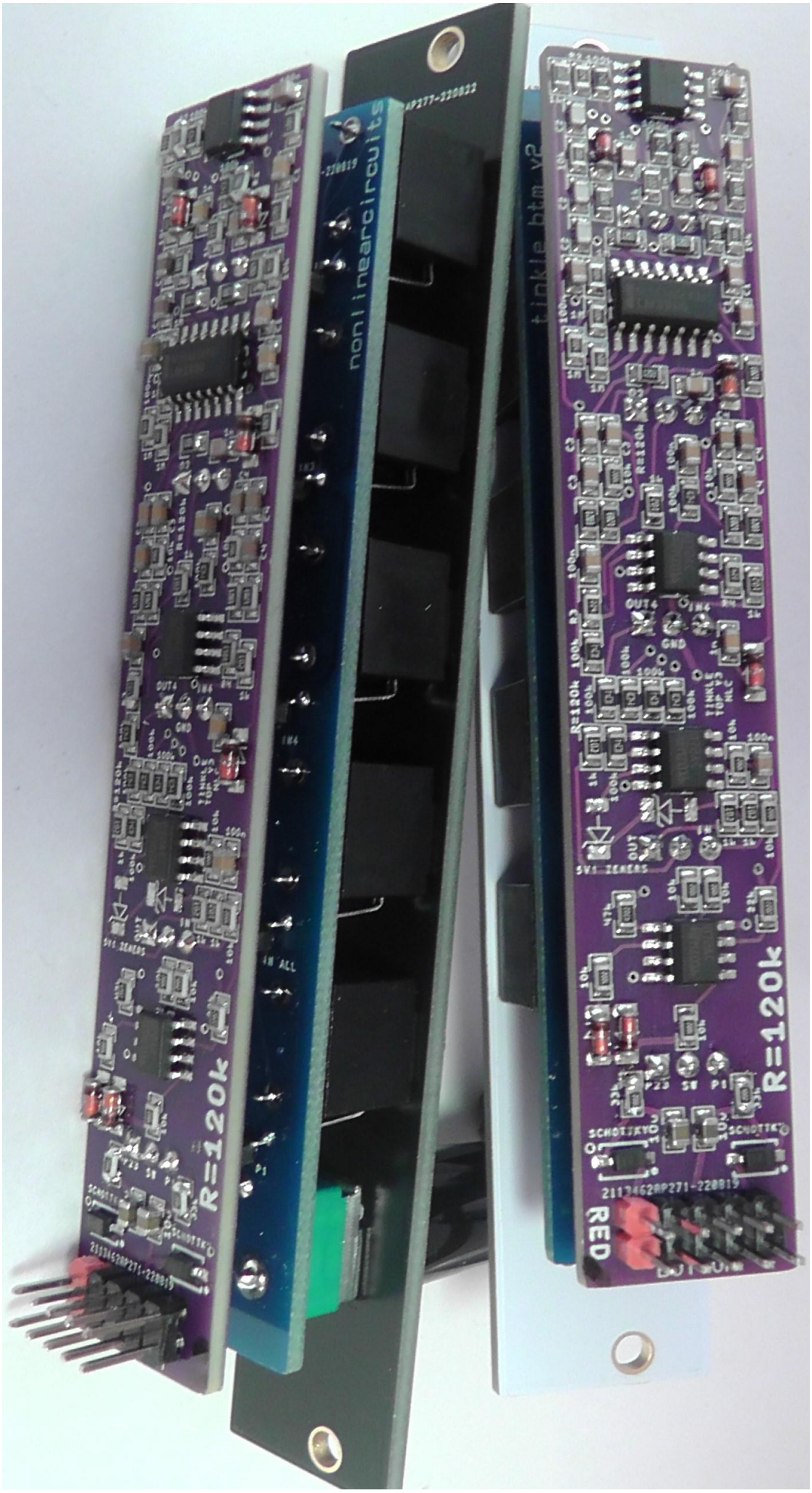

fram 4 drums
100k
100k
100k
100k
100k
1k
072
J
+12v
10k
100k
10k
-12v
D
D
10k
10k
47k
10k
10k
22k
10k
072
10k
1k
1k
out
5v1
5v1

RAZORS


M3900
R=120k
TINKLE TOP V3 NLC
5V1 ZENERS
SCHOTTKY
SCHOTTKY
P23
SW
P1
RED
BOTTOM


TOP
tinkle btm v2
nonlinearcircuits
OUT1
IN1
IN2
OUT2
IN3
OUT3
GND
OUT4
IN4
OUT ALL
SW
IN ALL
P3
P2
P1


TINKLE
IN 1 OUT
IN 2 OUT
IN 3 OUT
IN 4 OUT
IN OUT
RAZORS
OUCH
OFF
NLC
TINKLE
IN 1 OUT
IN 2 OUT
IN 3 OUT
IN 4 OUT
IN OUT
RAZORS
OUCH
OFF
OFF
NLC


nonlinearcircuits
tinkle btm v2
R=120k
R=120k
RED