nonlinearcircuits

DISPERSION DELAY build & BOM

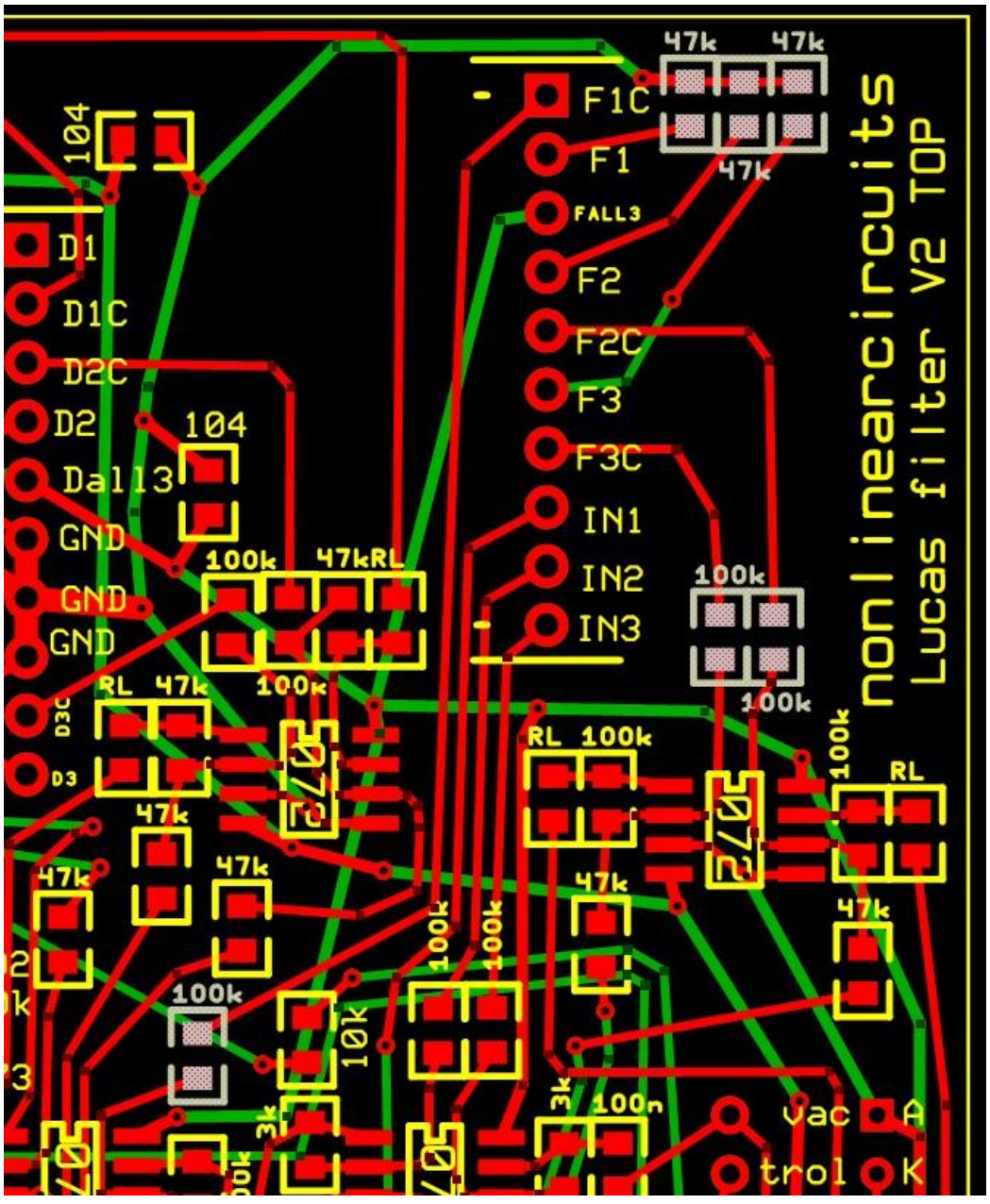
This module is based on ideas suggested by Lucas Abela.

It is three vactrol based bandpass filters in parallel; each filter is fed into a voltage controlled delay stage. The outputs are available individually or there is an OUT ALL where all 3 signals are mixed.

Me being me designed the delays to go into stutter/zipper/breakdown territory to create the usual noise I love. If desired the delays can be built to remain in their normal operating regions.

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

Also three 100k and three 47k resistors should be replaced with 220k. This is listed in the BOM, see image below. This improves the operating range of the Freq pots. See notes #8



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

VALUE	QUANTITY	DETAILS
1n or 102	6	0805
10nF	3	0805
47n or 473	6	0805
100nF or 104	17	0805
10uF	17	0805 25V or higher voltage rating
470R*	3	0805 see notes
1k	7	0805
3k	3	0805
10k	15	0805
47k	15	0805
100k	16	0805
220k	6	0805 replaces three 100k & three 47k, see pg1
RL	6	0805 see notes
$ (optional resistors)	3	0805 see notes
TL074 or TL084	1	soic Tayda: A-1137
PT2399	3	Soic Tayda: A-1526
TL072 or TL082	6	Soic Tayda: A-1139
LM78L05	3	soic Tayda: A-629
Single vactrol	9	See notes
100k (B) pot	12	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	13	Tayda: A-865 or Thonkiconn Jacks (PJ301M-12) from Thonk, Synthcube or Modular Addict
10 Pin 2.54mm Single Row Pin Header Strip	4	Tayda: A-197 (cut to size)
10 Pin 2.54mm Single Row Female Pin Header	4	Tayda: A-1306

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. The chips, resistors, caps are cheapest from Tayda. Schottky diodes & 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. **470R*:** the PT2399 need to see a minimum resistance of 1kΩ at power up. It is rare to see a vactrol LDR get under 470Ω, so it should be quite safe to install 470R here and carry on. If you find your PT2399s are locked up then replace the 470R* with 1k. If the datasheet for your chosen vactrol or LDR shows the minimum resistance as more than 1kΩ, then you can replace the 470R* on the PCB with a link or much lower valued resistor, say 10Ω. *If none of this makes any sense, just install 470R.* (R = Ω)

5. **RL:** These are the resistors for driving the LEDs in the vactrols. If you are using commercial vactrols then you should use the recommended resistors, probably 470R. If you are DIY-ing your vactrols and using your own LEDs, I suggest choosing resistor values lower than you normally would for the LEDs.

For example, I use red LEDs in my DIY vactrols with RL = 1k or 2k2. If I installed these same LEDs on the panel of some module, I would use 4k7 resistors for RL so they are not too bright.

6. **Vactrols:** My suggestion is buy a bag of a hundred GL5516 LDRs on ebay for $4 and make your own with red/green/orange/yellow LEDs and heatshrink/black tape/3D-printed cases or FIMO. Otherwise buy 9 vactrols from Synthcube, Modular Addict or Thonk. Try to choose ones with low on & off resistances.

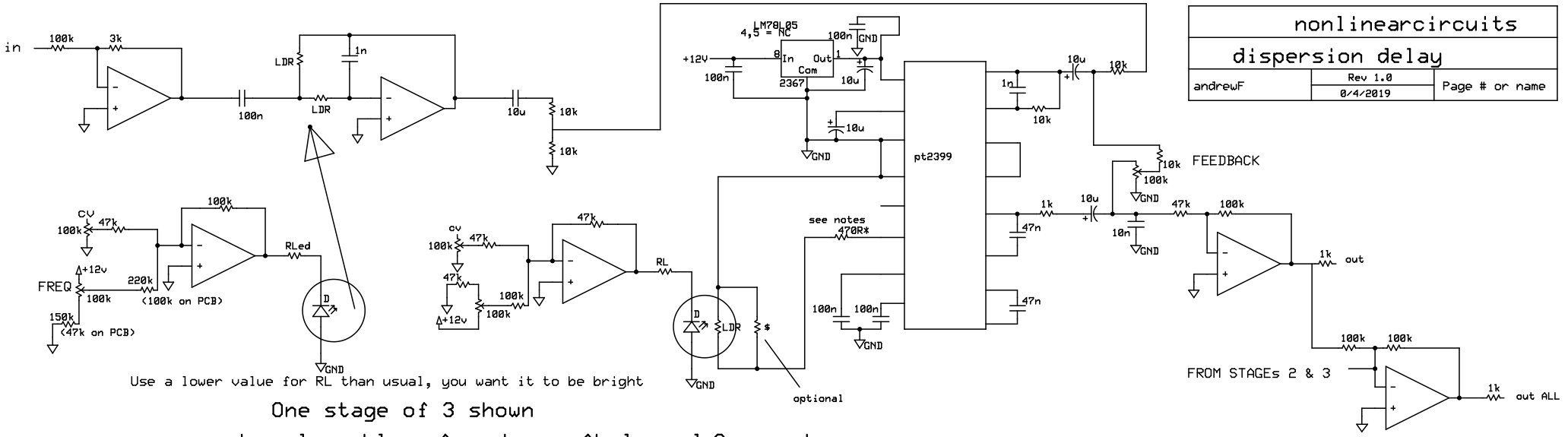
7. **$:** These three sets of pads are for installing 0805 resistors to limit the range of the three vactrols controlling the delay times.

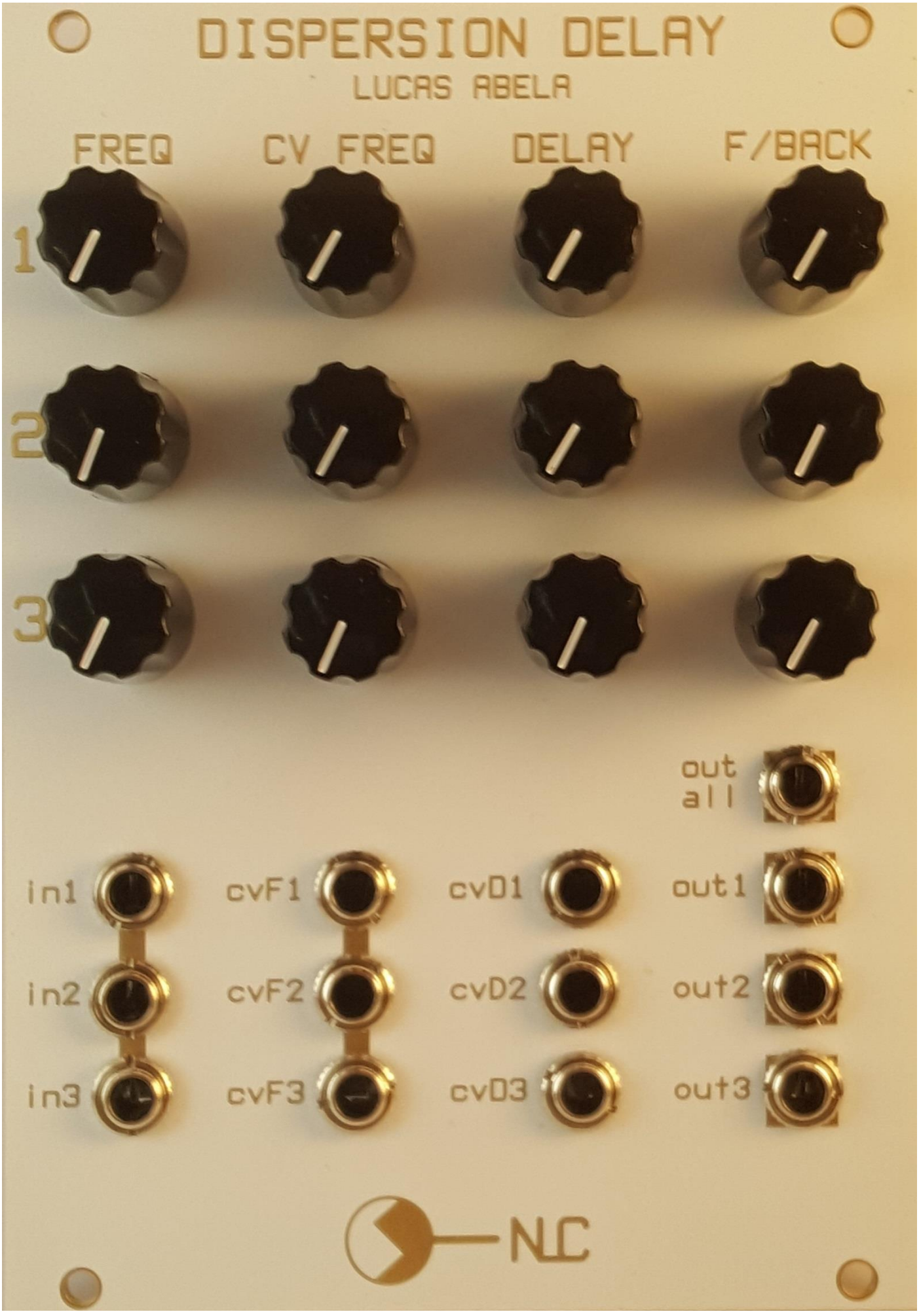
Normally the PT2399 wants to see less than 50kΩ on pin6. If using DIY vactrols and GL5516 LDRs (as suggested above), you will deliver up to 500kΩ on pin6. This makes the chip output all sorts of random k'chunks and zipper noises, I love it and have nothing installed on the $ pads.

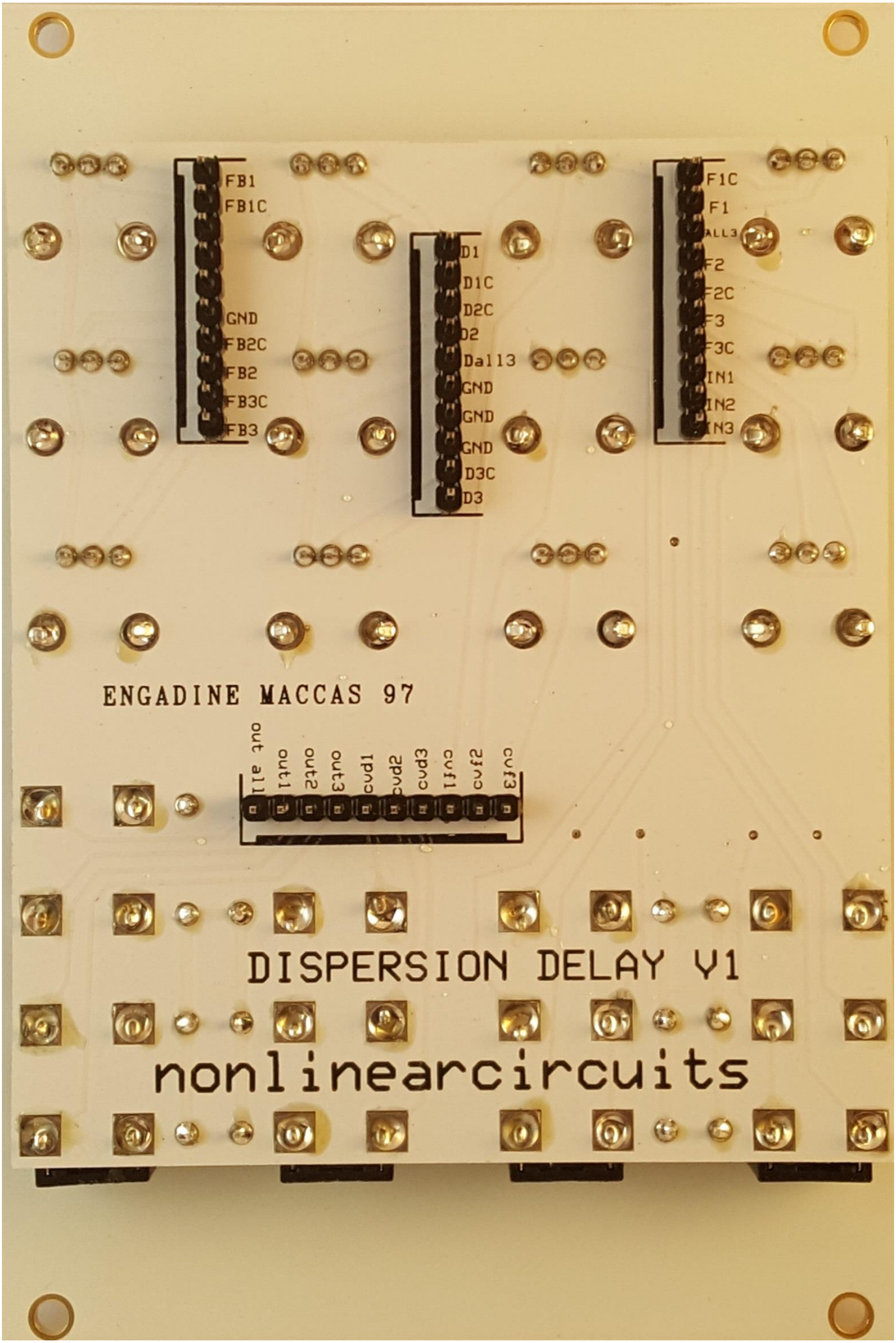
Commercial vactrols may have an off resistance of 1MΩ, or even much higher. I have measured over 20MΩ on some types. This may or may not be interesting to you, possibly the chips will stall for a minute or several, then deliver a few stuttering shhgggrerker-whizzit noises then go quiet again.

If you have installed a high off-resistance vactrol and want to keep the action reasonably steady then install resistors on the $ pads. 470k is a good middle of the road, but if you want to keep the PT2399 acting as designed and have no fun at all, install 51k.

8. Regarding the mods shown on PG1. The point of these is to get a good usable range from the FREQ pots. The three resistors marked 47k on the PCB adjust the point where the LED starts to turn on. The three resistors marked 100k adjust the gain of the LED driving op amp. The resistors marked RL set the current limit for the LED. Some tweaking of these resistors may be required to get the best useful range from the FREQ pots, as in, it is good to have the LED off when the pot is at 0 and fully lit at 10 (or 11). Currently I am happy with replacing the 47k and 100k with 220k and using 2k2 for RL.


nonlinearcircuits
dispersion delay
andrewF
Rev 1.0
0/4/2019
Page # or name
in
100k
3k
100n
LDR
1n
10u
10k
LM78L05
4,5 = NC
+12v
100n
GND
In
Out
Com
2367
pt2399
see notes
470R*
FEEDBACK
1k
47n
out
out ALL
FROM STAGEs 2 & 3
CV
47k
FREQ
220k
(100k on PCB)
150k
(47k on PCB)
RLed
RL
LDR
optional
Use a lower value for RL than usual, you want it to be bright
One stage of 3 shown
based on ideas from Lucas Abela and George L.


DISPERSION DELAY
LUCAS ABELA
FREQ
CV FREQ
DELAY
F/BACK
1
2
3
out all
in1
in2
in3
cvF1
cvF2
cvF3
cvD1
cvD2
cvD3
out1
out2
out3
NLC


FB1
FB1C
GND
FB2C
FB2
FB3C
FB3
D1
D1C
D2C
D2
Dall3
GND
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GND
D3C
D3
F1C
F1
ALL3
F2
F2C
F3
F3C
IN1
IN2
IN3
ENGADINE MACCAS 97
out all
out1
out2
out3
cvd1
cvd2
cvd3
cvf1
cvf2
cvf3
DISPERSION DELAY V1
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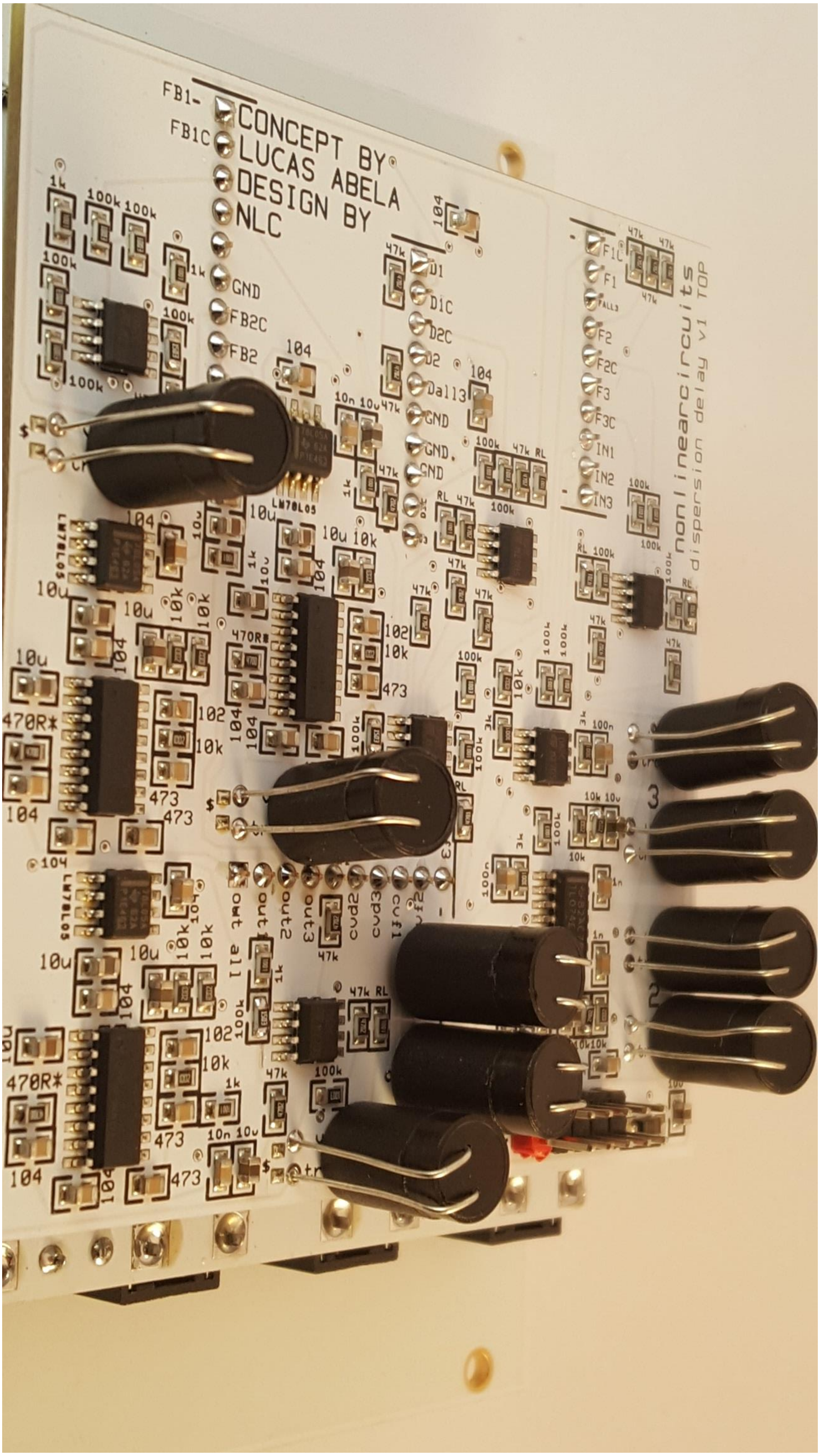
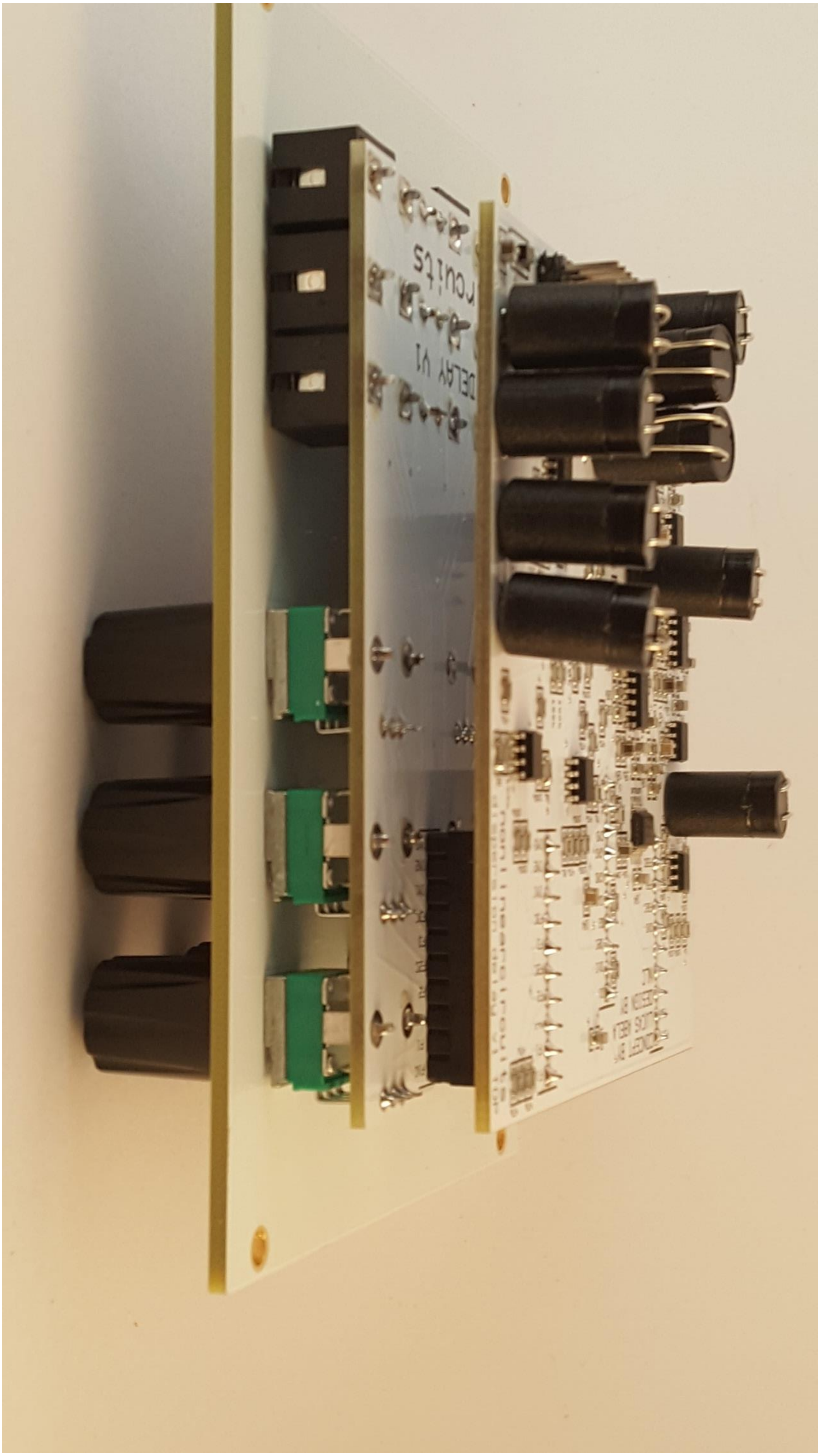

CONCEPT BY
LUCAS ABELA
DESIGN BY
NLC
nonlinearcircuits
dispersion delay v1 TOP


DELAY V1
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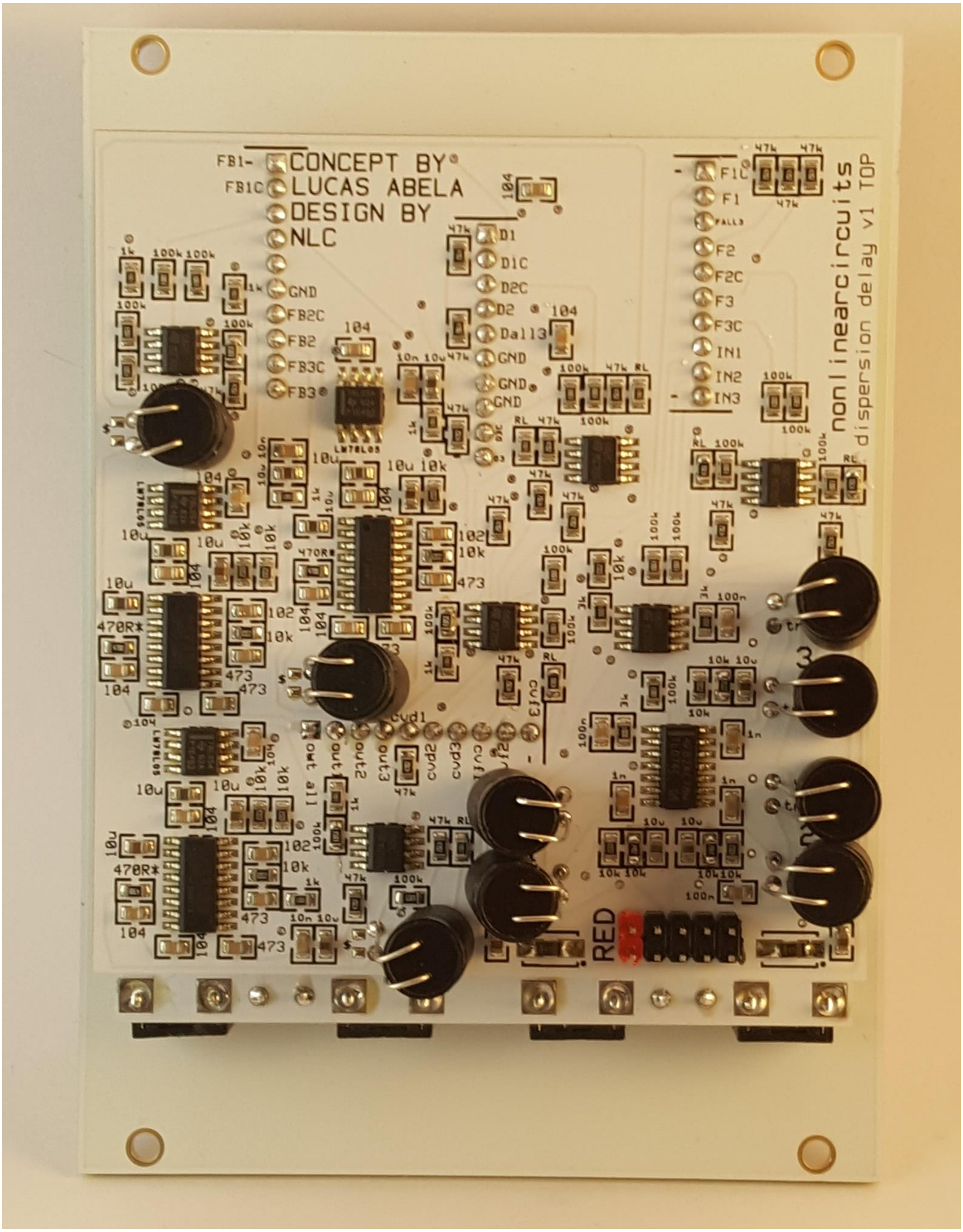
CONCEPT BY
LUCAS ABELA
DESIGN BY
NLC
nonlinearcircuits
dispersion delay v1 TOP
RED