nonlinearcircuits

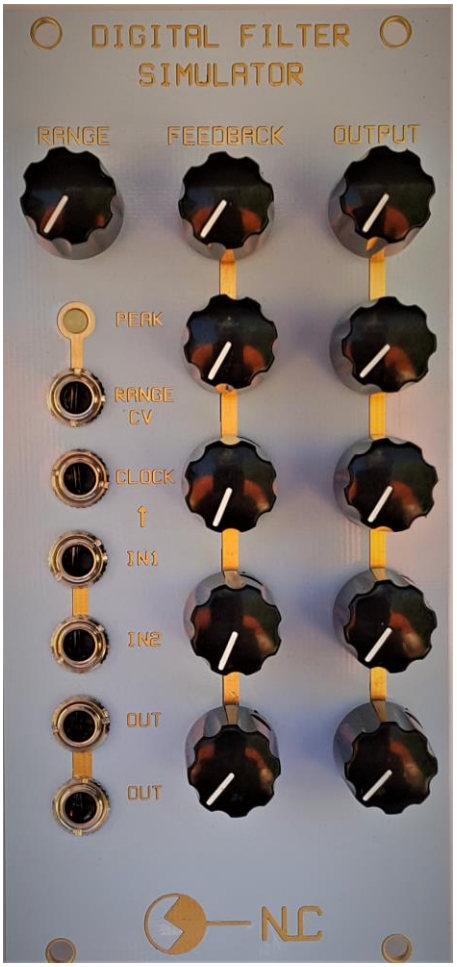
(BAD) DIGITAL FILTER SIMULATOR build & BOM

This module is based on ideas presented in a 1969 IEEE paper titled - Hybrid Implementation for Sampled-data controllers. The paper presents the canonical form of a generalised digital filter made using analogue elements.....yes this is an analogue circuit; all CMOS and op amps. I played around with various versions for a few years and, as usual, settled on the simplest and cheapest version.

Incoming audio signals (or CV if you want to use it as a pattern generator) are fed to a 4 bit A/D stage, these 4 bits then go thru a 4 stage delay (shift registers). Each delayed bit is re-united with its siblings via four D/A stages and the stepped signals are then fed back to the input via an attenuator/inverter stage and are fed to the summed output, again via an attenuator/inverter stage.

The circuit is controlled by the clock input that ticks over the shift registers. CV controlling the VCO that supplies the clock signal will in turn control the filter. The Range pot needs to be set to a suitable level; I like it when the peak LED is flickering. Range can also be controlled by CV which will allow you to shift from a 1 bit signal to a 4 bit or overdrive the crap out of it and lock everything up. It is interesting to supply clock signals that are multiples or divisions of the audio signal, but like all NLC modules, feel free to do whatever you like. As mentioned, supplied with a gate and a CV it will perform as a complex pattern generator as well.

Also, please note the pots go on the side of the PCB that has the pot symbol screenprinted, this is different to previous NLC PCBs……just look at the pictures, if you have time and it isn't too much trouble.

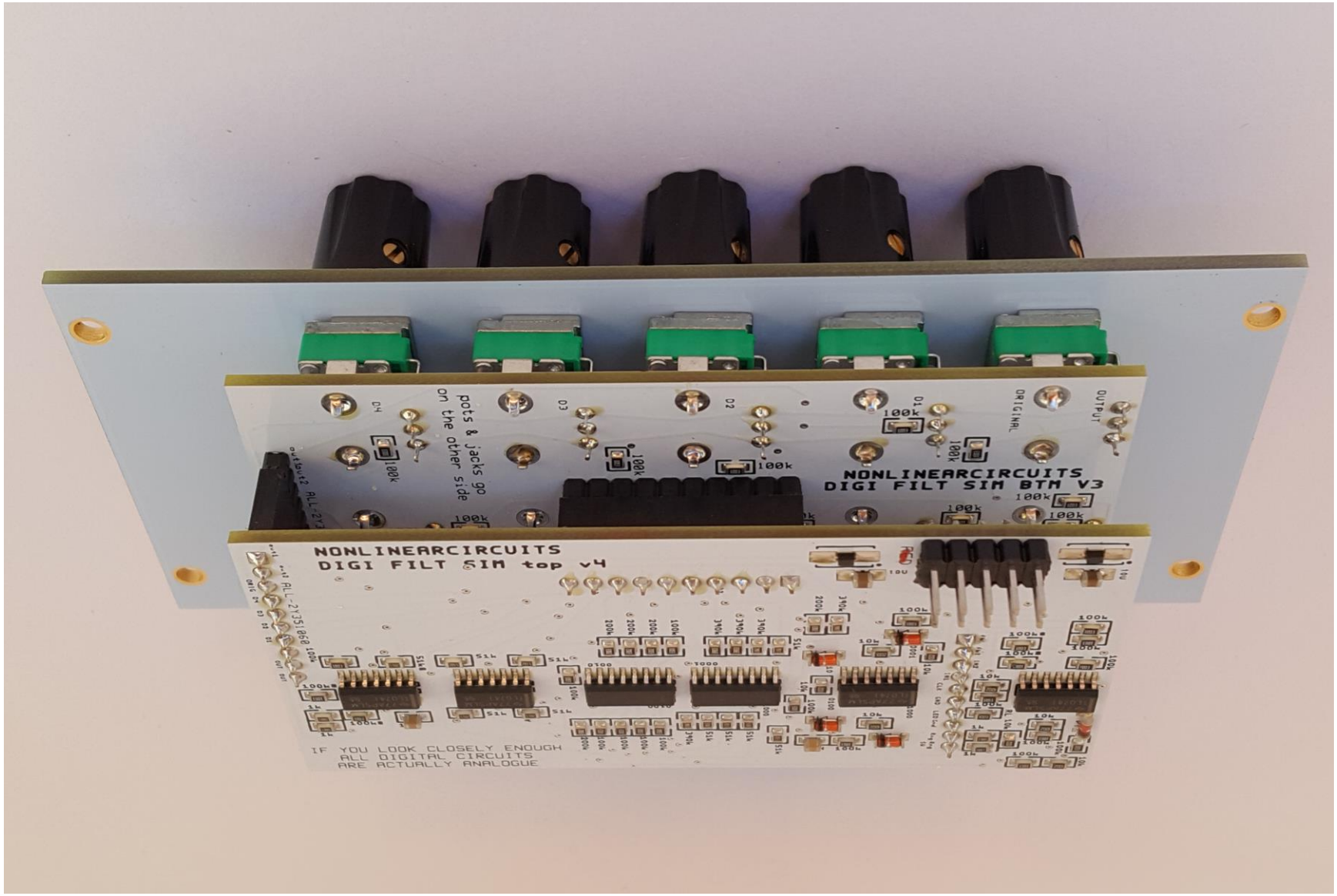


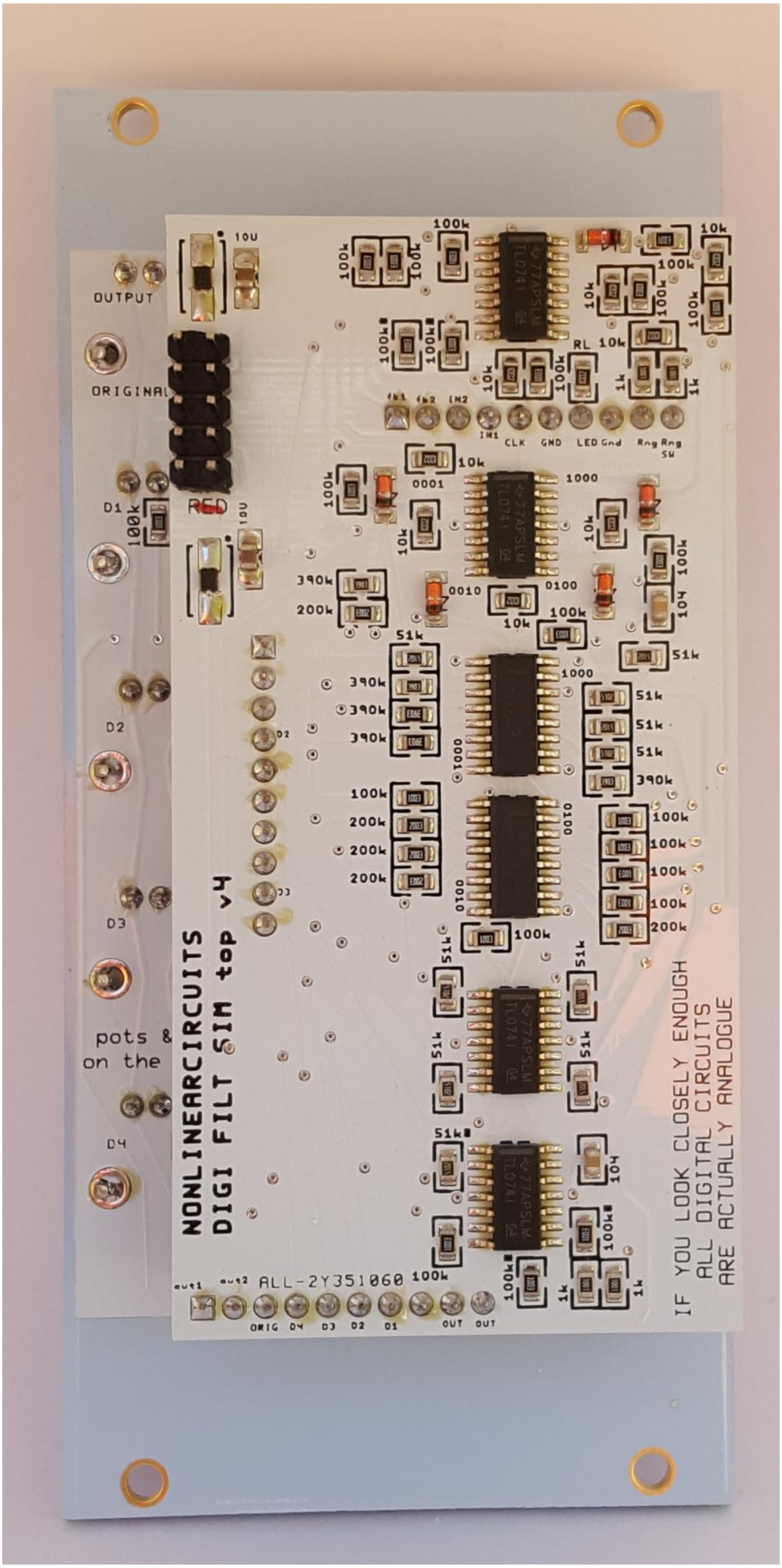
BOM – The Tayda part numbers are given as examples, feel free to buy from your favorite retailer if you prefer.

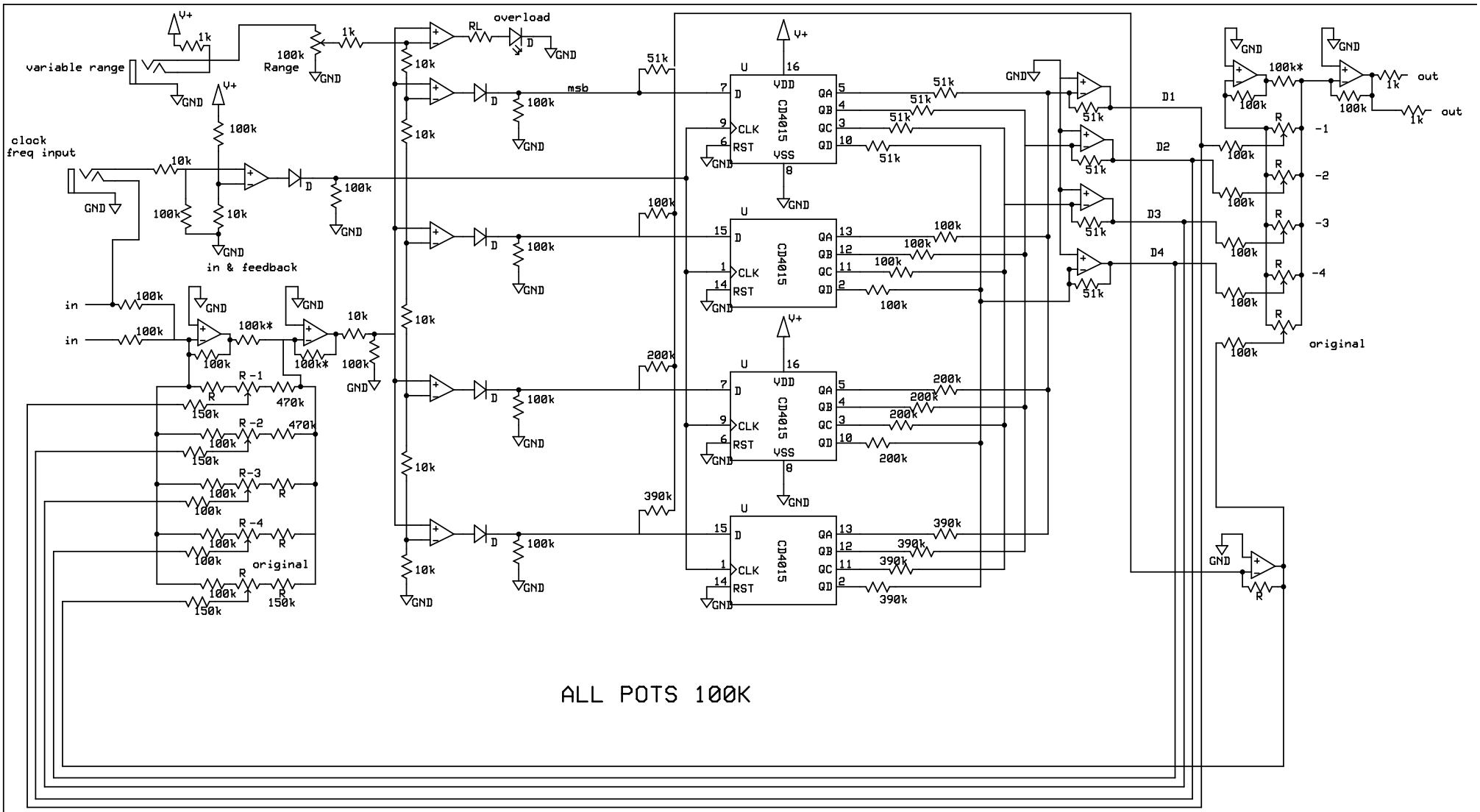
VALUE	QUANTITY	DETAILS
100nF (104)	2	0805
10µF	2	0805 OR 1206 25V rating or higher
RL	1	0805 resistor for panel LED, select to suit brightness (best to use a superbright LED and 4k7 to 10k)
1k	4	0805
10k	8	0805
51k	10	0805
100k	36	0805
150k	3	0805
200k	5	0805
390k	5	0805
470k	2	0805
TL074 or TL084	4	soic Tayda: A-1137
LL4148 diodes	5	
4015	2	Soic Mouser - 863-MC14015BDR2G
3mm LED for panel	1	3mm – superbright or similar
100k (B) pot	11	Tayda: A-1848
Eurorack 10 pin power connector	1	Tayda: A-198
Schottky, power rectifier or 10R, optional - for reverse voltage protection...or not	2	SMD, Schottky (best option) or standard power rectifier diode 50-600V 1A or more, dot on PCB indicates CATHODE (stripe on component) Or use a resettable fuse or just a 10R. SEE NOTES #1
3.5MM SOCKET Kobiconn style	6	Tayda: A-865 or preferably get Thonkiconn Jacks (PJ301M-12) from Thonk or Modular Addict
10 Pin 2.54mm Single Row Pin Header Strip	3	Tayda: A-197 (cut to size)
10 Pin 2.54mm Single Row Female Pin Header	3	Tayda: A-1306

Additional notes:

1. Some power diodes: PMEG2005EGWX SCHOTTKY RECT, AEC-Q101, 20V, SOD-123, PMEG2005EH DIODE, SCHOTTKY, 0.5A, 20V, 1N400x or S1JL or similar
2. The resistors, caps and transistors are cheapest from Tayda. Diodes 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. Resistors marked 100k* on the input and output stages can be adjusted for better balance between inverted and non-inverted signals, try 51k.
5. The two 470k* on the bottom PCB can also be adjusted to a lower value to get these stages hotter in the mix. They will cause the module to lock up at some settings and you will need to adjust the Range pot to suit, no biggie, nothing gets hurt.


pots & jacks go
on the other side
NONLINEARCIRCUITS
DIGI FILT SIM BTM V3
NONLINEARCIRCUITS
DIGI FILT SIM top v4
IF YOU LOOK CLOSELY ENOUGH
ALL DIGITAL CIRCUITS
ARE ACTUALLY ANALOGUE


NONLINEARCIRCUITS
DIGI FILT SIM top v4
IF YOU LOOK CLOSELY ENOUGH
ALL DIGITAL CIRCUITS
ARE ACTUALLY ANALOGUE
ALL-2Y351060
OUTPUT
ORIGINAL
D1
D2
D3
D4
pots &
on the
RED
CLK
GND
LED
ORIG
OUT
OUT



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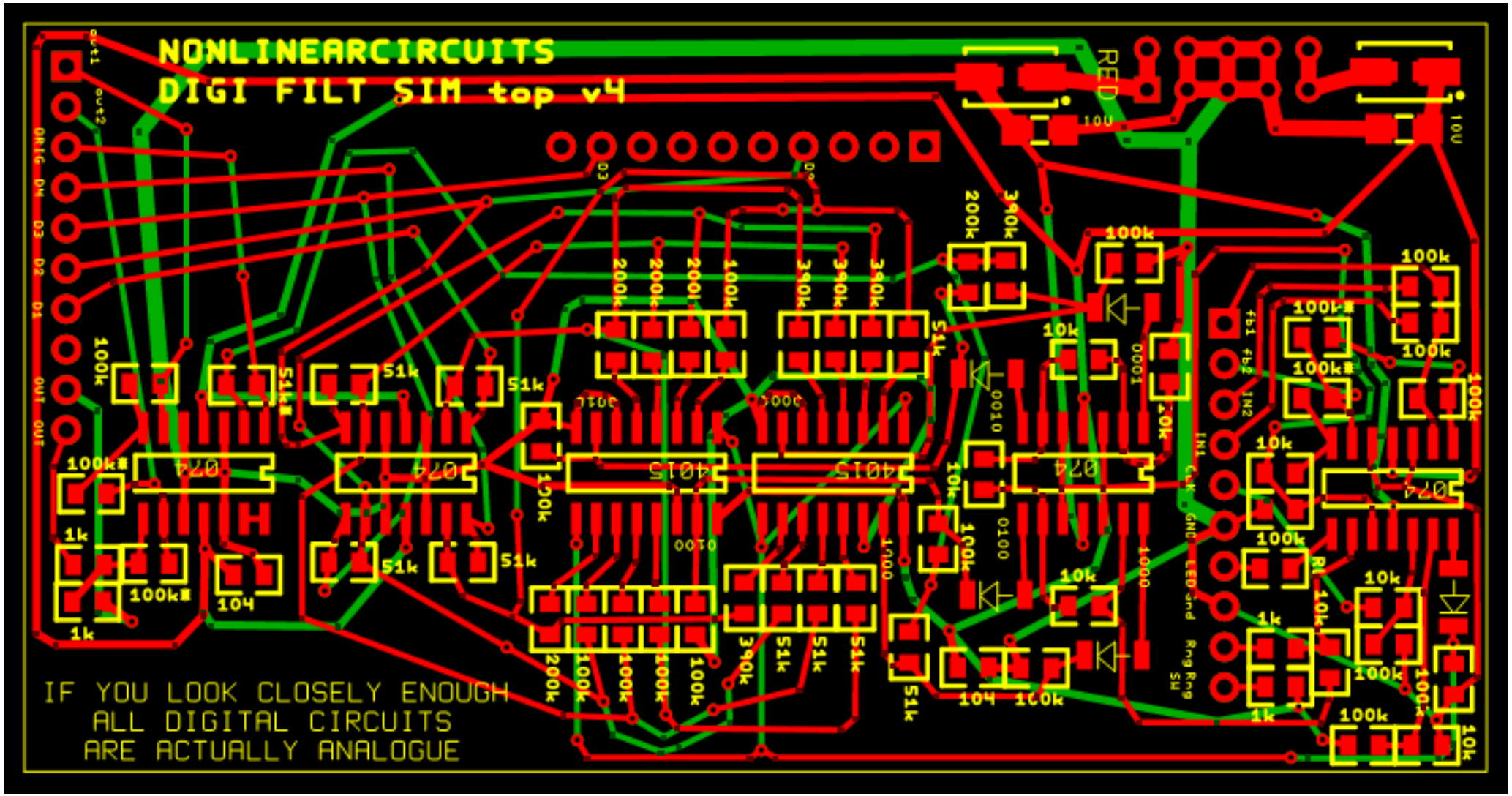
andrewF	Rev 1.0 19-Sep-16	Page # or name


NONLINEARCIRCUITS
DIGI FILT SIM top v4
RED
IF YOU LOOK CLOSELY ENOUGH
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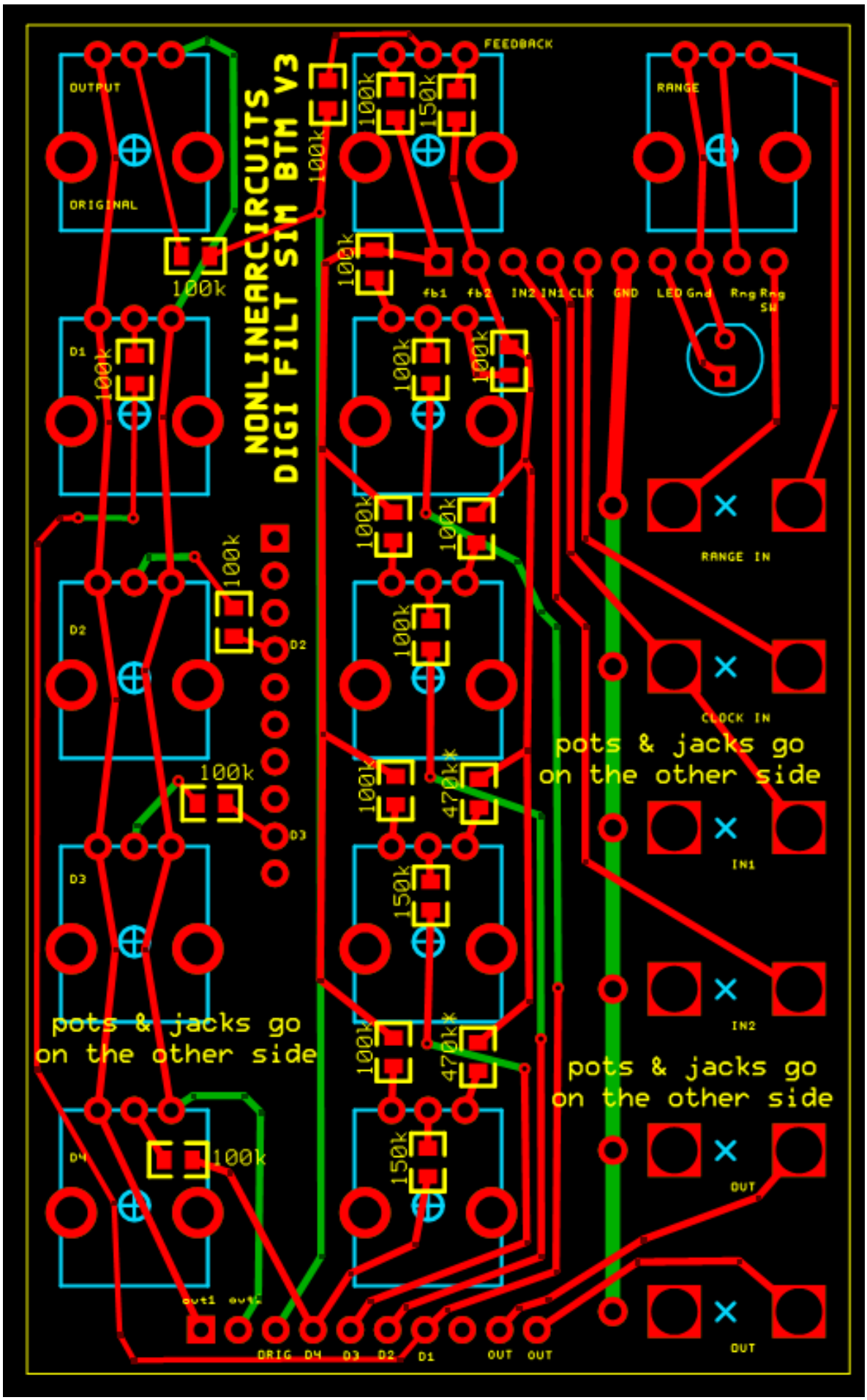
NONLINEARCIRCUITS
DIGI FILT SIM BTM V3
OUTPUT
ORIGINAL
FEEDBACK
RANGE
fb1 fb2 IN2 IN1 CLK GND LED Gnd Rng Rng SW
RANGE IN
CLOCK IN
IN1
IN2
OUT
OUT
D1
D2
D3
D4
100k
150k
470k
pots & jacks go on the other side
pots & jacks go on the other side
pots & jacks go on the other side
out1 out2
ORIG D4 D3 D2 D1 OUT OUT