nonlinearcircuits

MUN build & BOM

This module is a 22HP 10 channel vocoder based on the Syntovox 222. I own a 222 and have always been impressed with the sound and elegant design, so it was an easy choice.

The initial design for this module was 42HP with all the fruit - variable envelope lengths, envelope outputs and inputs, filter outputs and inputs, pause stuffing, external noise input, separate carriers for odd/even channels, etc. and it sucked; way too finicky to use.

So I stripped it back to a more minimal version and am much happier with it.

MUN comes from the short story "Shall We Have a Little Talk?" by Robert Sheckley. The story describes an alien culture that naturally refines its language to the point where only one word is needed to communicate - mun.

Voice inputs:

The 6.35mm input can accept a mono line level signal from a microphone or guitar or a TRS signal (tbh - I have no TRS gear, so let me know if you discover issues, should be fine it is basically unchanged from the 222 design).

The stereo/mono 3.5mm input is for line level signals, such as your phone or from your CD/tape player (retro!!)

The 3.5mm Synth Input is for +/-5V signals from other synth modules.

Carrier input:

The Carrier input expects a +/-5V synth level signal. One tip - the vocoder output is only as good as the carrier signal, so mix a few signals together via phasers, filters or wave-folders to get interesting sounds……or drum hits are fun too.

Noise:

This is a transistor based noise source with pots for level and colour (white/pink). The noise signal is mixed with the carrier signal on channels 9 and 10. The level pot determines how dominant it is. This is simpler than voiced/unvoiced switching seen on some vocoders but I found it sounds good and like having the option of patching the envelope inputs so the noise turns on a lot more frequently than it should. Of course, you can turn the level pot down to 0 and have no noise too. See build notes about setting up noise levels.

Outputs:

The filter and envelope outputs can be used without affecting the main vocoder operations. Patching into Envelope In, disconnects the internally generated envelope. A 0-5V signal is expected.

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

Get spares – you might drop something or my counting might be a bit off!

VALUE	QUANTITY	DETAILS
10p	2	0805
15p	1	0805
18p	1	0805
33p	6	0805
1n	8	0805
3n9	8	0805
5n6	8	0805
8n2	8	0805
10n	1	0805
12n	8	0805
18n	8	0805
22n	1	0805
27n	12	0805
33n	4	0805
39n	8	0805
56n	10	0805
68n	9	0805
100n	29	0805
120n	1	0805
150n	9	0805
220n	4	0805
330n	1	0805
10u	9	0805 25V or higher voltage rating Mouser Part No 187-CL21A106KAYNNNG or similar
150R	20	0805
470R	16	0805
560R	16	0805
1k	44	0805
4k7	2	0805 aka 4.7k
10k	7	0805
12k	21	0805
15k	29	0805
18k	16	0805
22k	10	0805 see notes
27k	8	0805
33k	4	0805
39k	14	0805
47k	19	0805
56k	3	0805
68k	21	0805
100k	45	0805
120k	2	0805
150k	5	0805
180k	20	0805
220k	22	0805
270k	1	0805
470k	5	0805
1M	1	0805
1M2	10	0805
4M7 – 10M	1	0805 select for noise level – see notes
RL	12	0805 LED resistor, select to suit LED brightness. Not sure? Try 4k7 to start.
LED	12	3mm
TL072 or TL082	16	Soic Tayda: A-1139
TL074 or TL084	15	tayda A-1137 or A-1140
BC857	10	tayda A-1345
BC847	3	Tayda A-1339
LL4148	24	sod-80 Tayda: A-1213
LM13700M or V13700M	5	Mouser Part No 926-LM13700MX/NOPB or V13700M at synthcube (cheaper)
5V1 zener	20	Tayda A-6014 (5V6 but ok)

Eurorack 10 pin power connector	1	Tayda: A-198 cut to size
S1JL, Schottky, power rectifier	2	SMD SEE NOTES #1. **dot on PCB indicates CATHODE (stripe on component).**
3.5MM mono SOCKET	33	Tayda: A-2563
3.5mm stereo socket	1	You might fit in Tayda A-6115 by trimming the pins a bit or ask me when you order PCBs and I will add one in (while stocks last) or Synthcube usually have them Qingpu 3.5mm Jack Stereo PCB Mount - WQP-WQP419GR or WQP-PJ366ST (old name)
6.35mm ¼"stereo socket	1	something like Tayda A-6728 see notes
25k trimpot	1	Tayda A-2515 (it is 30k but will be ok)
100k pot	6	Log pots preferred - Tayda A-5624. If using linear pots, install 22k* otherwise leave off.
10 Pin 2.54mm Single Row Female Pin Header	6	Tayda A-1306
40 Pin 2.54mm Single Row Pin Header Strip	2	Tayda A-5773 cut to six 10 pin sections

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. More examples (Mouser numbers) - 621-B1100-F, 511-STPST1H100AF, 511-STPST1H100ZF, 511-STPST1H100AFY, 771-PMEG10010ELR-QX

2. The chips, resistors, caps are cheapest from Tayda. Synthcube is also a good source of many parts. 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.

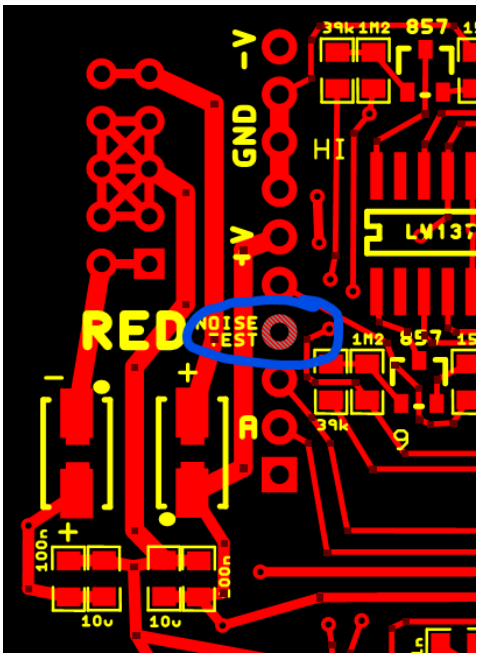
4. The trim-pot is there to prevent carrier bleed-thru. Turn the voice pots to 0. Patch a good VCO square wave into Carrier, turn it up. Listen to the output; adjust the trim-pot so you cannot hear anything. You may not hear anything at any setting, assuming it is all working, this is fine.

5. Noise levels. There are 2 ways to set the noise level. One is the install a gain resistor (4M7-10M on the PCB) to suit; the other is the level going into the summing circuit for Channels 9 & 10. The correct gain resistor is the best option.

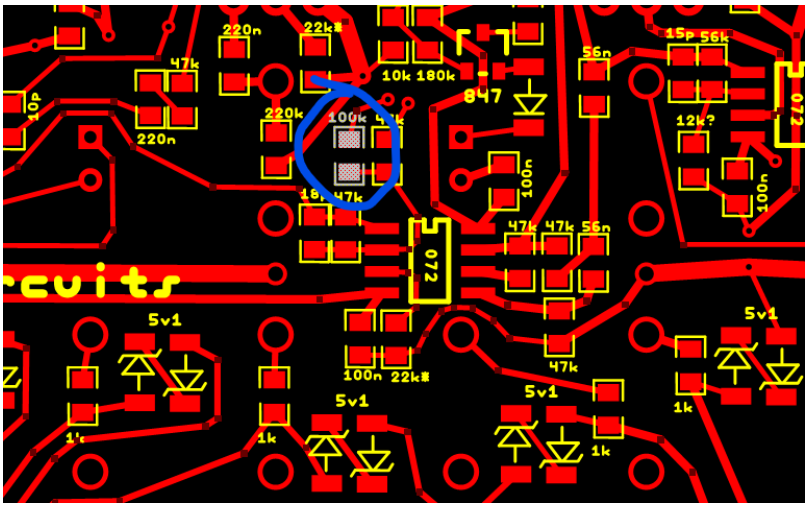
Noise is created by the BC847, some are noisier than others although these days they seem pretty well matched.

Start by installing 4M7 (on the bottom PCB), test the noise level by probing the pin marked 'NOISE TEST' (try not to slip and short the probe!). It is best with an oscilloscope and ideally you want to see a signal between 5V and 10V peak to peak. If you do not have an oscilloscope, you could just listen to it by probing this pin with a jack patched into a mixer, it should be about as loud as a typical signal from a VCO.

If it is too quiet, or the trace shows it is very small, change the 4M7 to a larger value. 10M will roughly double the size of it. In most cases you should be fine with 4M7.

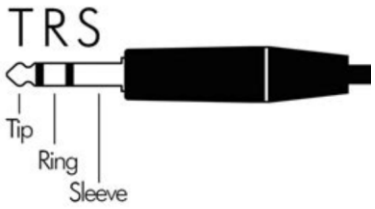


If the signal is still too quiet/small after installing 10M (but noise **IS** actually working), you can change the gain of the signal going into the summing amp. Find the 100k circled (bottom PCB) and change it to a lower value, say 47k.



6. The 6.35mm socket needs to be wired to the bottom PCB. There is space for a 3 pin connector or you can just solder the wires in directly. The TRS is for tip-ring-sleeve, so the pin (on the socket) closest to the panel will be S, the middle one gets wired to R and the upper one (furthest from the panel) gets wired to T.

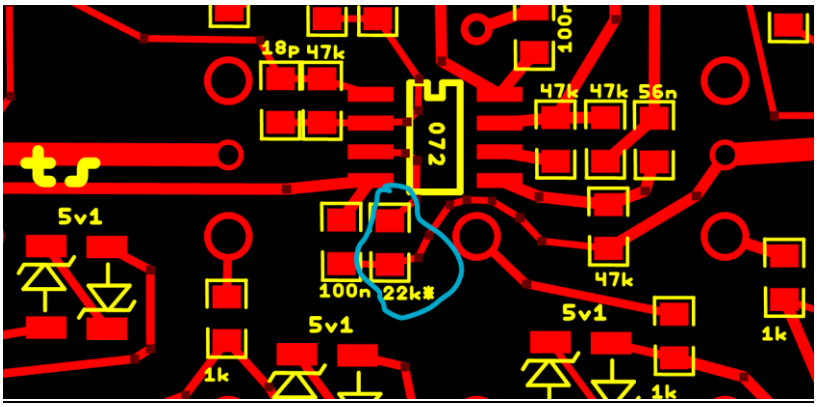
When installing the 6.35mm socket and the PCBs onto the panel, you may need to spin it one way or another to fit everything together, so do not tighten it too much at first.



7. Pots – ideally use log/audio pots. I just used regular linear pots as there are 1000s in my shed but I installed the 22k* resistors on the bottom PCB which converts them to log/audio taper. The pot for Noise Colour can be log or linear, doesn't really matter……ok prob linear is best.

<u>If using log/audio taper pots (100kA), do not install the nearby 22k* resistors.</u>

<u>Except for this one in the picture below, near the op amp on the bottom PCB, it must be installed (I should have removed the *)</u>

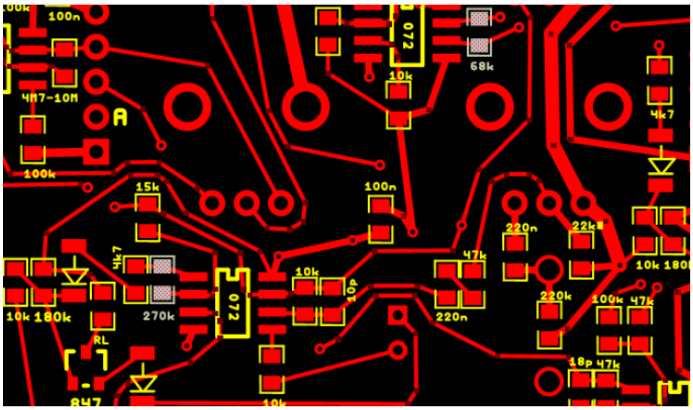


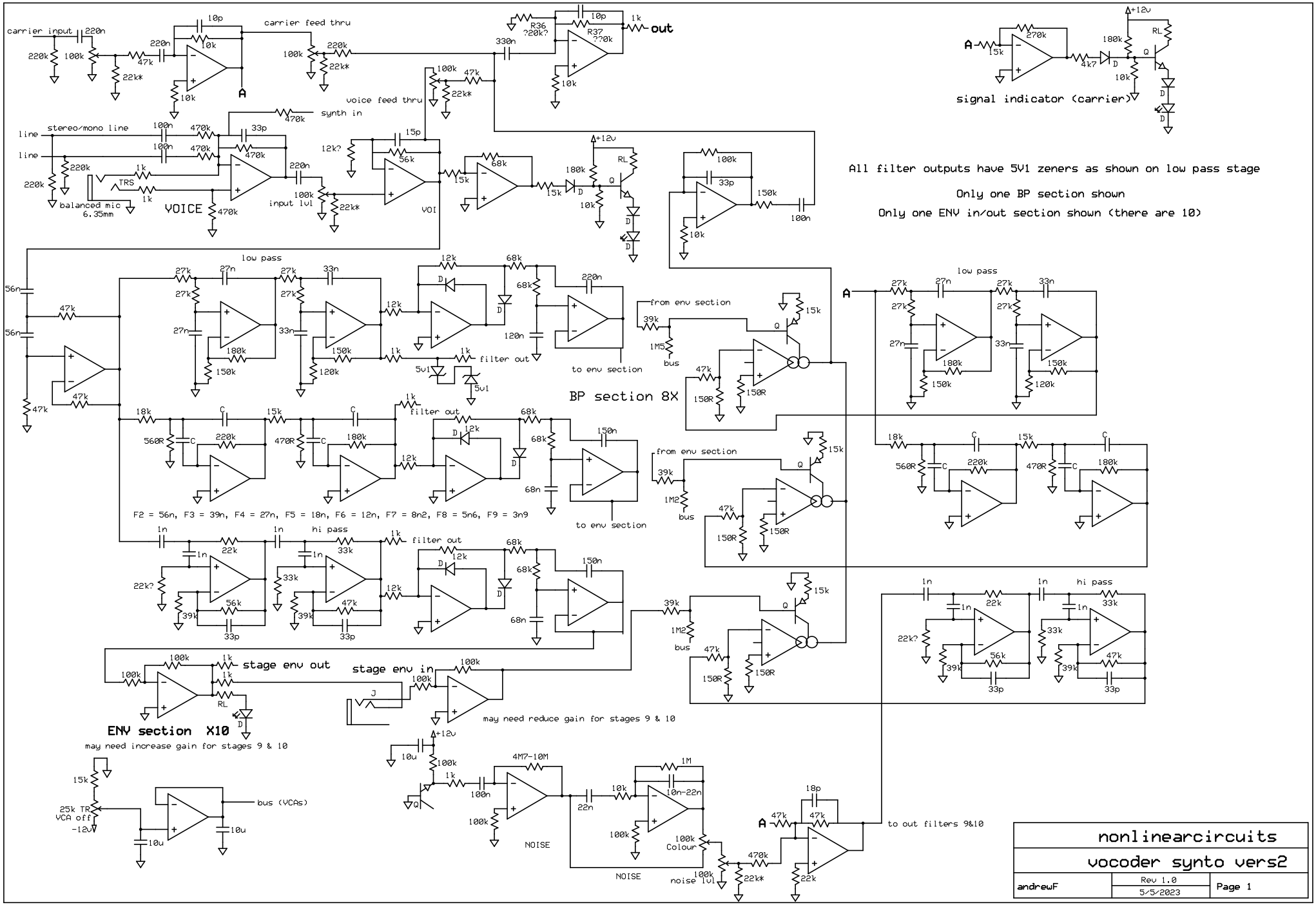
8. Caps – try to buy nice C0G or NP0 caps with 5% tolerance. Spending an extra few dollars for these is worth it.

For the 10uF, most of the 100n, 150n and 68n, doesn't matter too much; these are for decoupling or envelopes.

9. DON'T FORGET TO INSTALL THE STEREO 3.5MM SOCKET!

10. The input indicator LEDs may stay on all the time if using superbrights, changing RL won't fix this. Reduce the gain stages for the LED drivers to get them to behave as expected (or use dimmer LEDs). The resistors to change are the 68k and 270k indicated below. Feel free to try 33k and 150k (respectively) or similar.




carrier input
carrier feed thru
out
A
voice feed thru
synth in
stereo/mono line
line
line
VOICE
balanced mic
6.35mm
input lvl
VOI
signal indicator (carrier)
All filter outputs have 5V1 zeners as shown on low pass stage
Only one BP section shown
Only one ENV in/out section shown (there are 10)
low pass
filter out
to env section
BP section 8X
from env section
bus
F2 = 56n, F3 = 39n, F4 = 27n, F5 = 18n, F6 = 12n, F7 = 8n2, F8 = 5n6, F9 = 3n9
hi pass
stage env out
stage env in
may need reduce gain for stages 9 & 10
ENV section X10
may need increase gain for stages 9 & 10
bus (VCAs)
NOISE
Colour
noise lvl
to out filters 9&10
nonlinearcircuits
vocoder synto vers2
andrewF
Rev 1.0
5/5/2023
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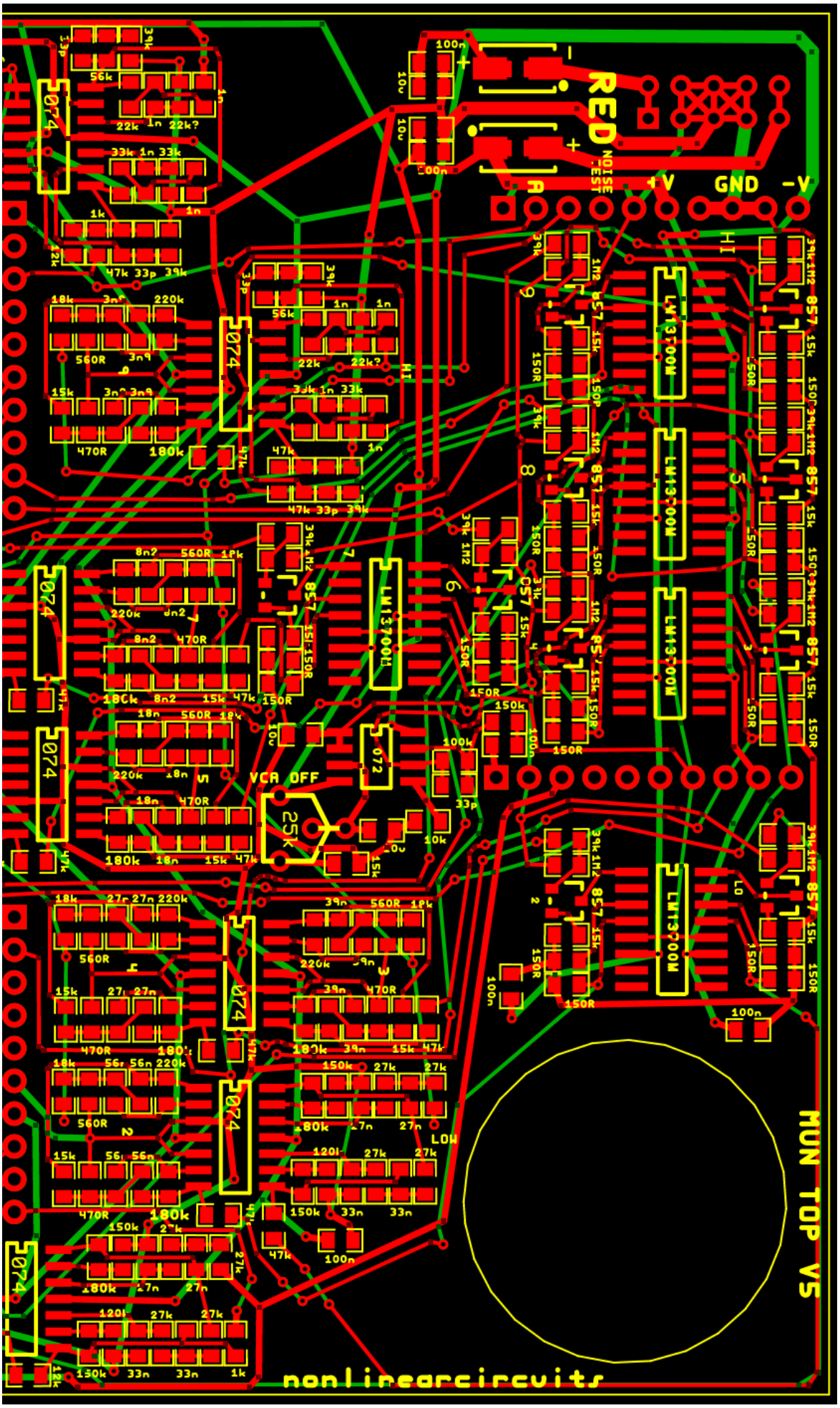
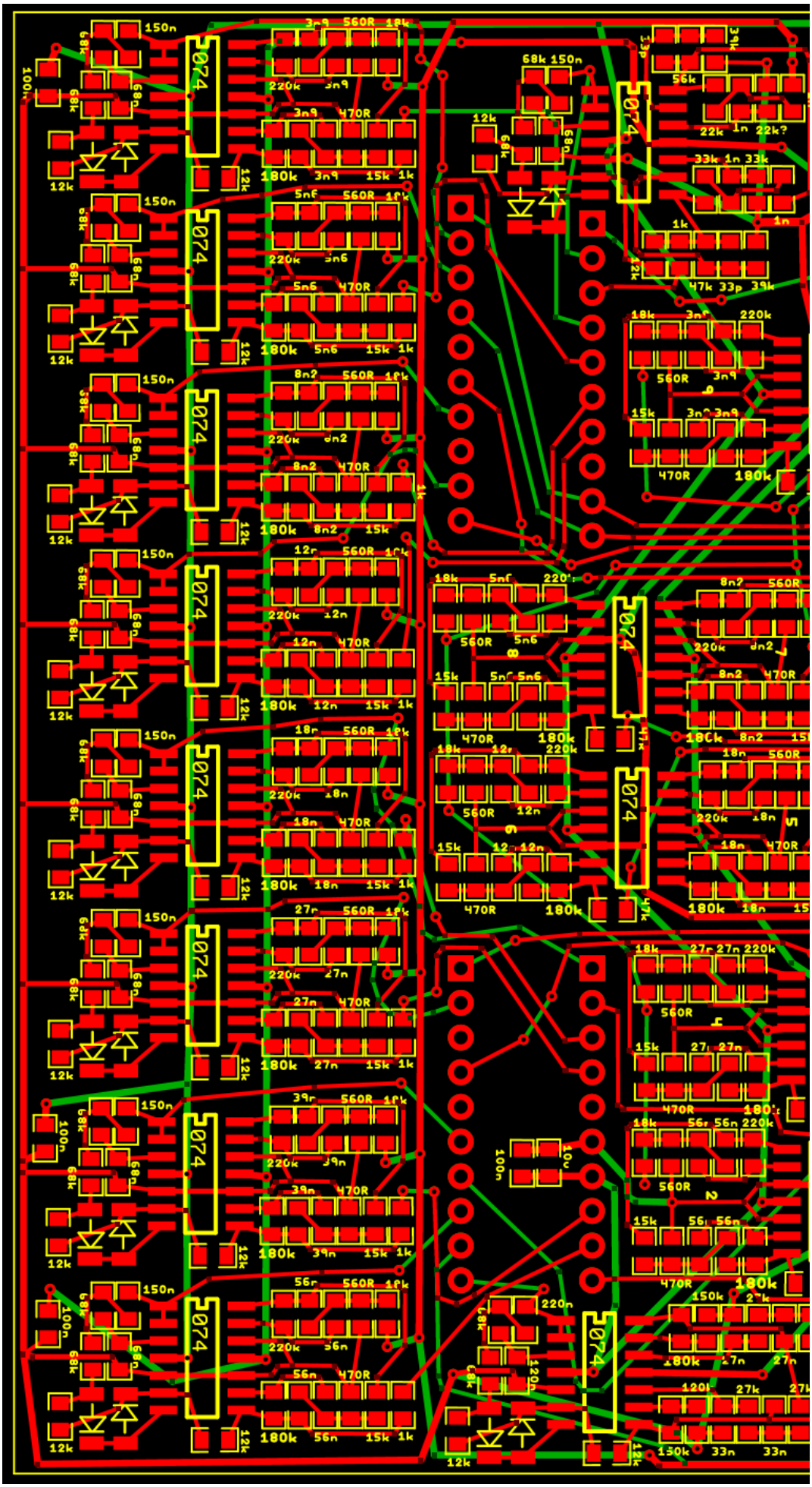
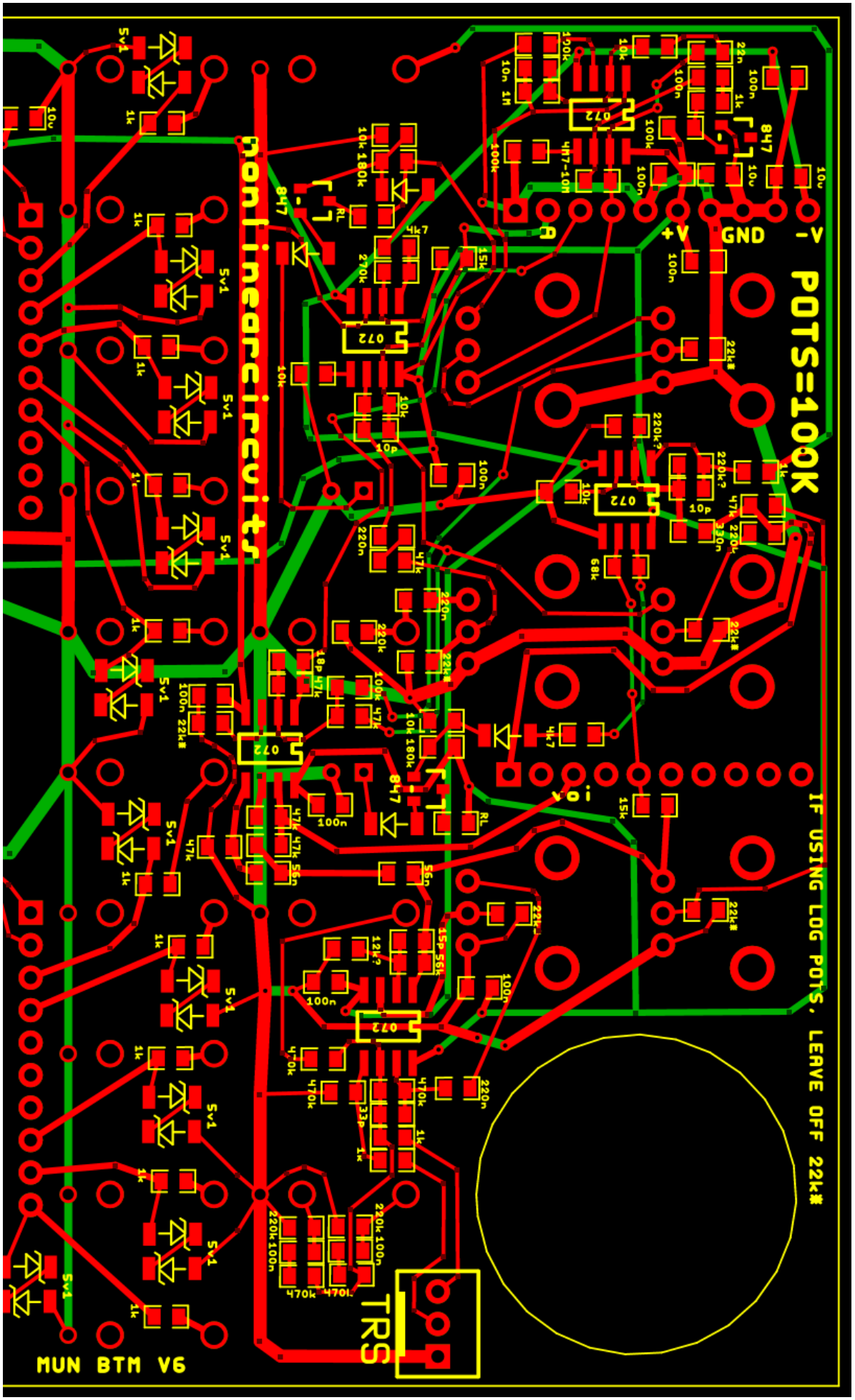
Top PCB, upper sectio



Top PCB, lower section



Bottom PCB, upper section



Bottom PCB, lower section