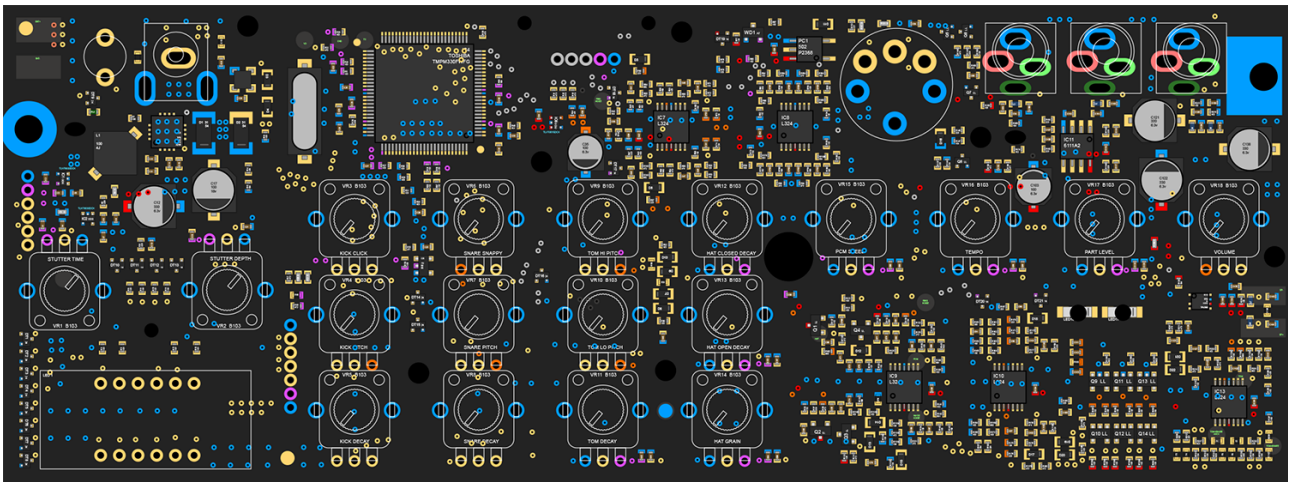
Korg Volca Beats mods by Dimitree

I was, like everyone else, disappointed by the snare sound on the Volca Beats.
I tried some common mods, but none was enough for me, it still sounded not right.
So I spent some day tracing the PCB and came out with an almost complete schematic. It is missing the microcontroller circuitry and the PSU, but I don't need that. It may contain errors obviously.

Disclaimer: I'm not responsible for any damage to you or to your Volca or other devices when attemping to do the same things that I did. As I said, the schematic may contain errors. The schematic is property of **Korg**, this is just a tracked and guessed version, not the actual one. Furthermore disassembling the unit and soldering those tiny parts is not easy at all.

First I draw the PCB in scale on Adobe Illustrator:



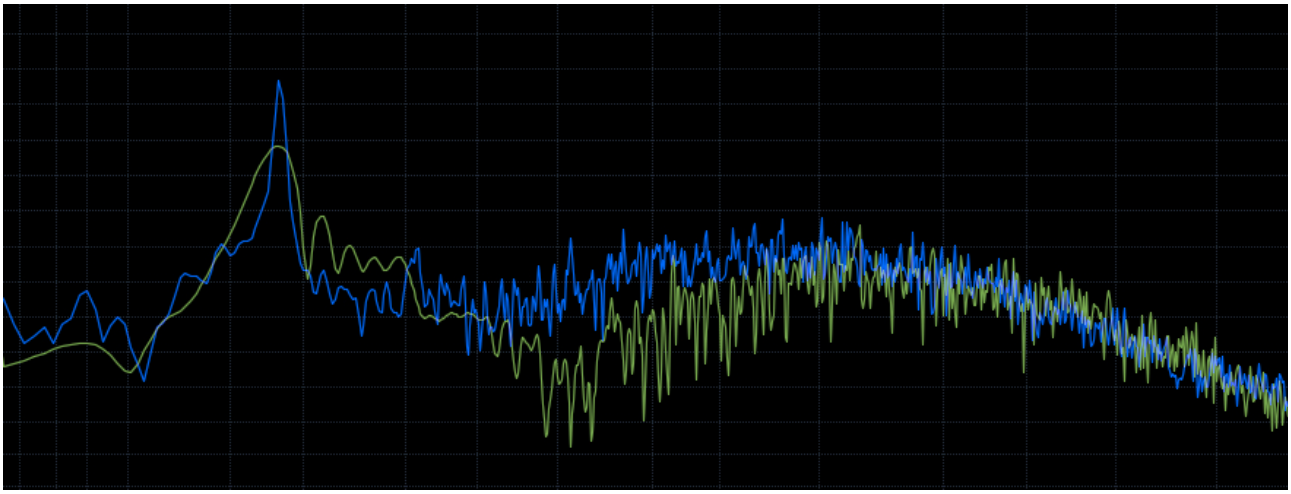
then I found the different voltage levels (GND, 3.3V, 1.5V) and marked them; then I started tracing with a multimeter and a magnifier. After some hours I came up with the schematic.

Many parts of the circuit really looks like a TR808, so I compared the two schematics, simulated some parts of it using LTSpice and used an oscilloscope + FFT to find out what should be changed in order to get a sound similar to a TR808.

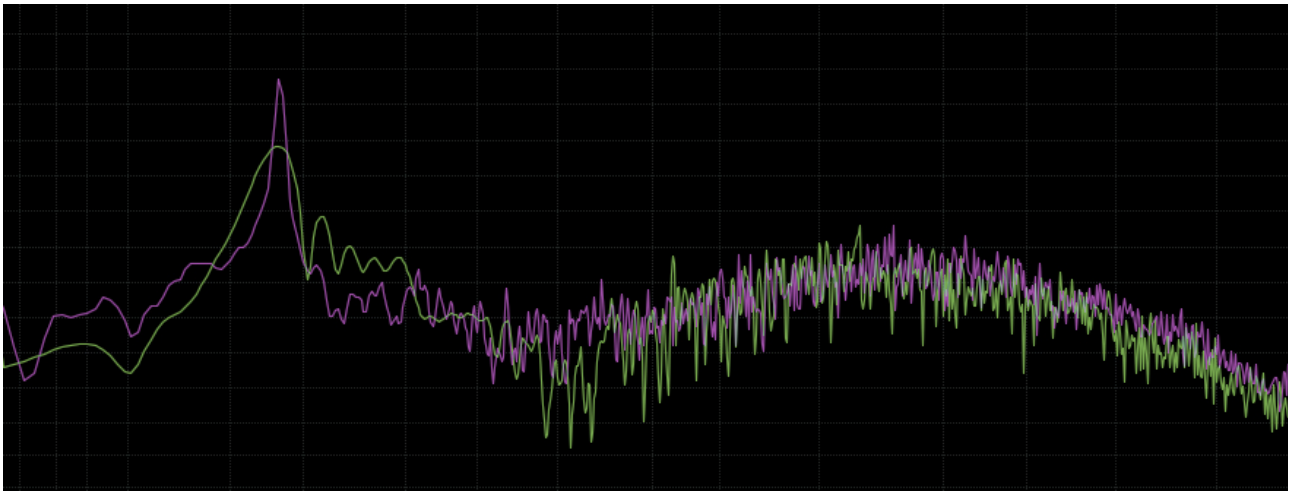
Just like on the TR808, the snare sound on the Volca is composed by 2 sounds: a bridget t-network oscillator and a filtered noise.
The main differences between the two are:

1) the noise on the Volca has got a different cutoff frequency for its HPF that the one on the 808, so it just sounds different.
2) the envelope used to shape the noise is generated by the output of the snare oscillator and so is not a true envelope. Instead, on the 808 the envelope is generated by the trigger input, so it does not contain oscillations.

here, some FFT comparison, before and after the mods:



green: 808 snare, blue: original Volca Beats snare



green: 808 snare, pink: Volca Beats snare after mods

Then I added 3 capacitors on the snare envelope to smooth it out. I used the same values as the 808, even if the 808 envelope generator is a bit different, but they are fine anyway.
Another mod I could try is to use the digital trigger, instead of the oscillator output, as EG input, but then the noise decay time would be always the same (like on the 808).
Also, I'd need to modify the mix between noise and oscillator, so that the oscillator gets a bit attenuated and less resonant.

For the Hats, I did the same of the snare noise, I had to move the HPF cutoff, but this time I adjusted it to taste.

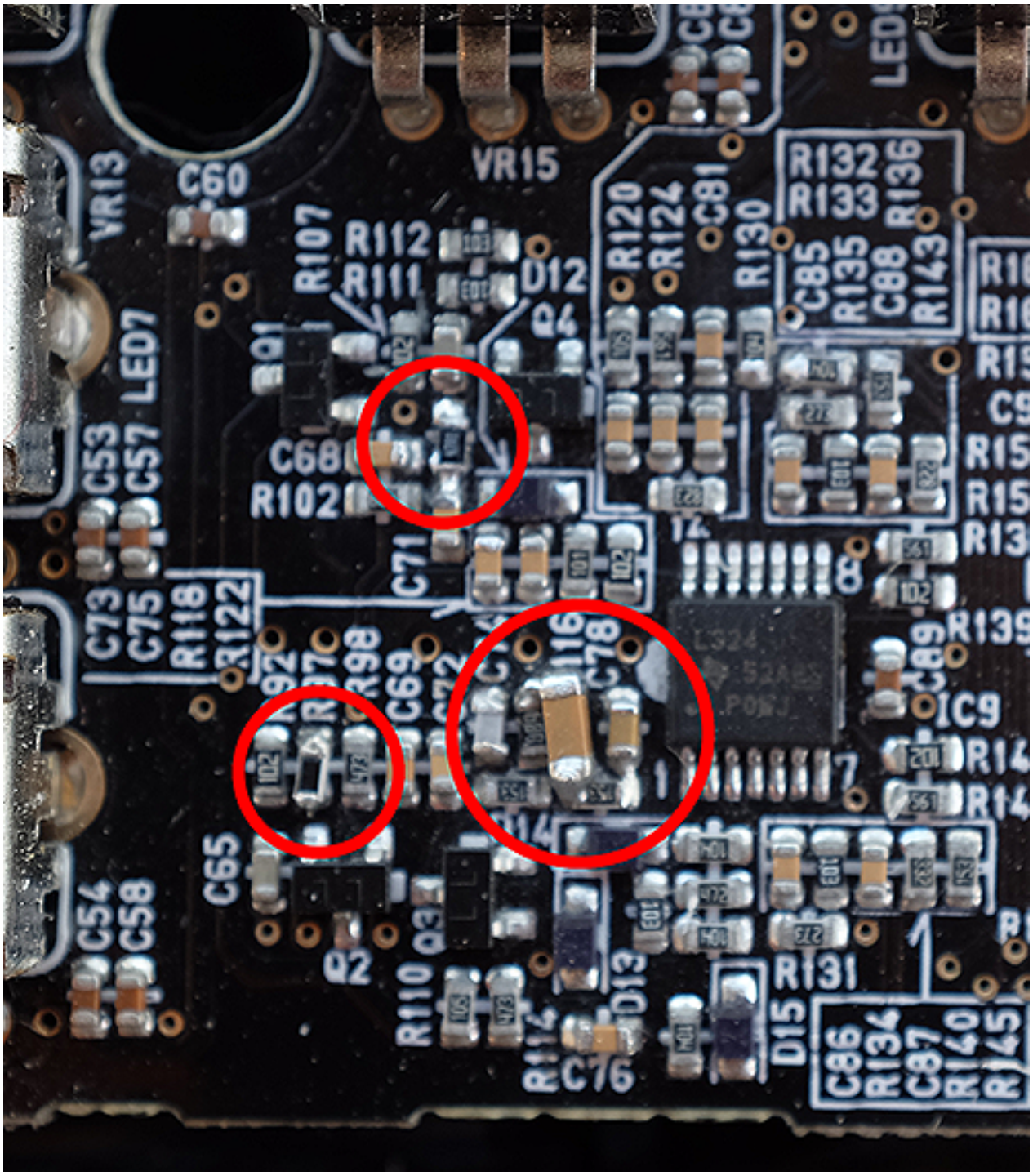
So the mods I've done so far are:

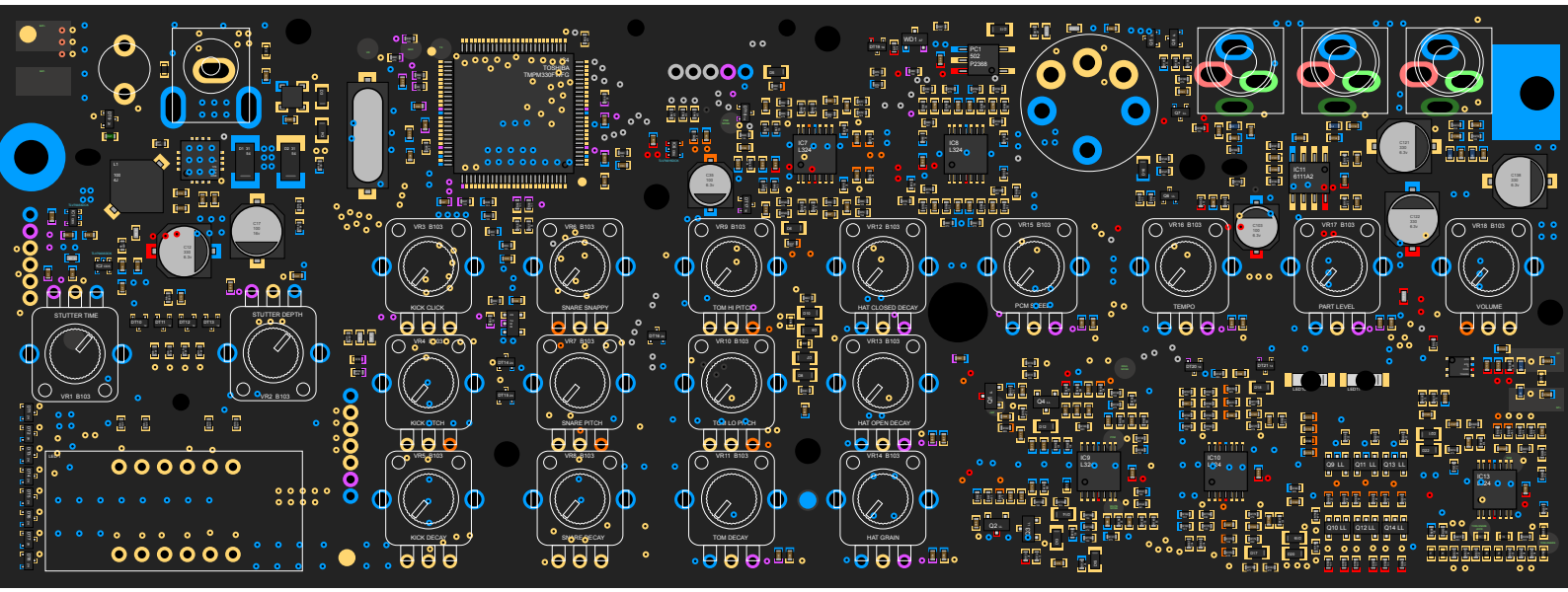
SNARE

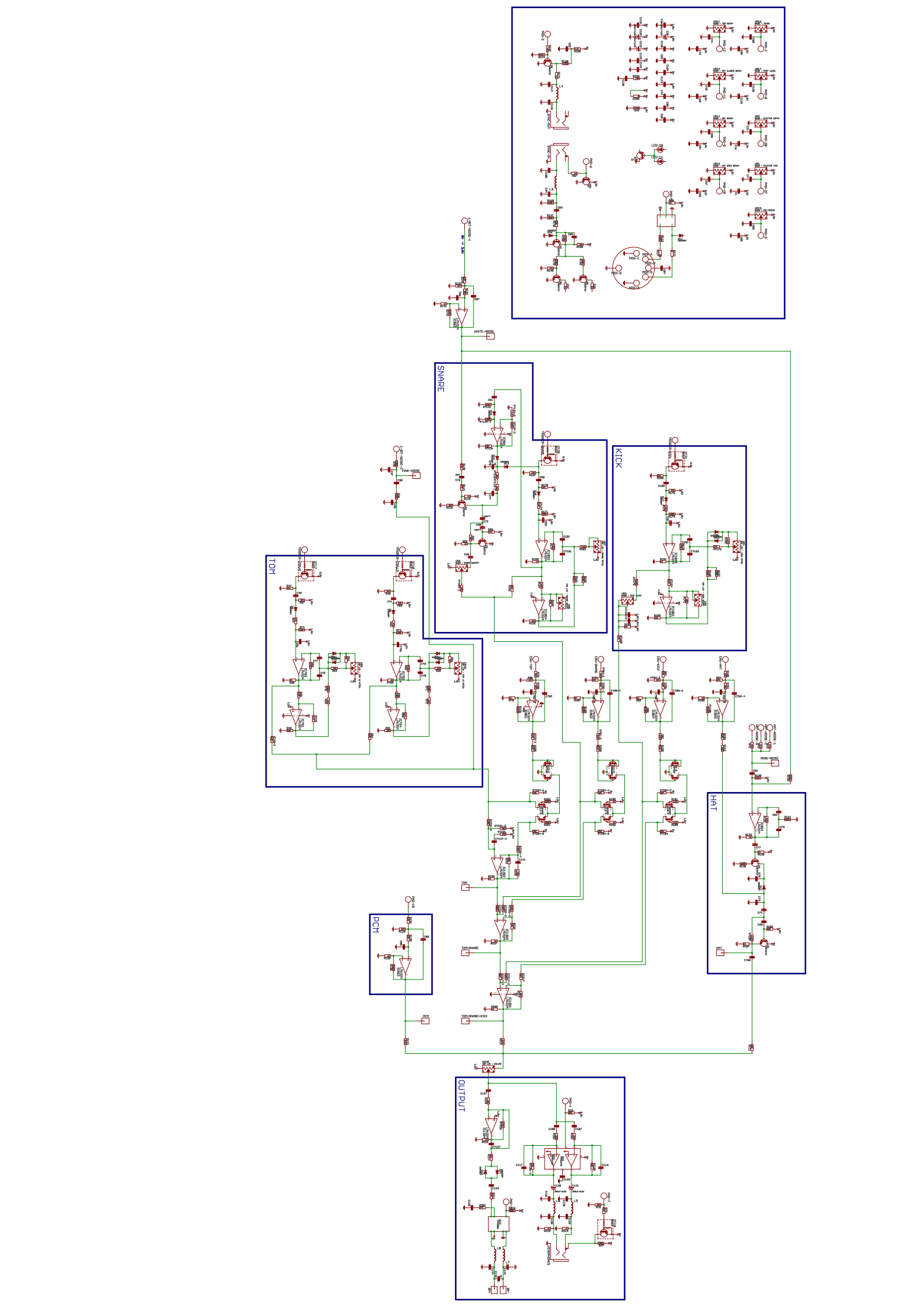
- 10K resistor in parallel with "R97" (now it's 6.9K, so I could just replace "R97" with a single 6.9K)
- 470nF cap for "C78" and 1nF cap for "C74", then I also added a capacitor (100nF), one side at the junction between "R?116" and "R?116-2", and the other side to ground.

HATS

- replaced "R?107" with a 4.7K resistor (instead of 2.7K)


VR15
VR13
C60
R107
R112
R111
D12
Q4
Q1
LED7
C53
C57
C68
R102
C71
C73
C75
R118
R122
C69
C72
C78
C116
R120
R124
C81
R130
R132
R133
R136
C85
R135
C88
R143
C89
IC9
R139
R131
D15
C86
R134
C87
R140
R145
C65
C54
C58
Q2
Q3
R110
R114
C76
D13
D14


STUTTER TIME
VR1 B103
STUTTER DEPTH
VR2 B103
KICK CLICK
VR3 B103
SNARE SNAPPY
VR8 B103
KICK PITCH
VR4 B103
SNARE PITCH
VR7 B103
KICK DECAY
VR5 B103
SNARE DECAY
VR6 B103
TOM HI PITCH
VR9 B103
TOM LO PITCH
VR10 B103
TOM DECAY
VR11 B103
HAT CLOSED DECAY
VR12 B102
HAT OPEN DECAY
VR13 B102
HAT GRAIN
VR14 B103
PCM SPEED
VR15 B103
TEMPO
VR16 B103
PART LEVEL
VR17 B103
VOLUME
VR18 B103


SNARE
KICK
TOM
PCM
HAT
OUTPUT