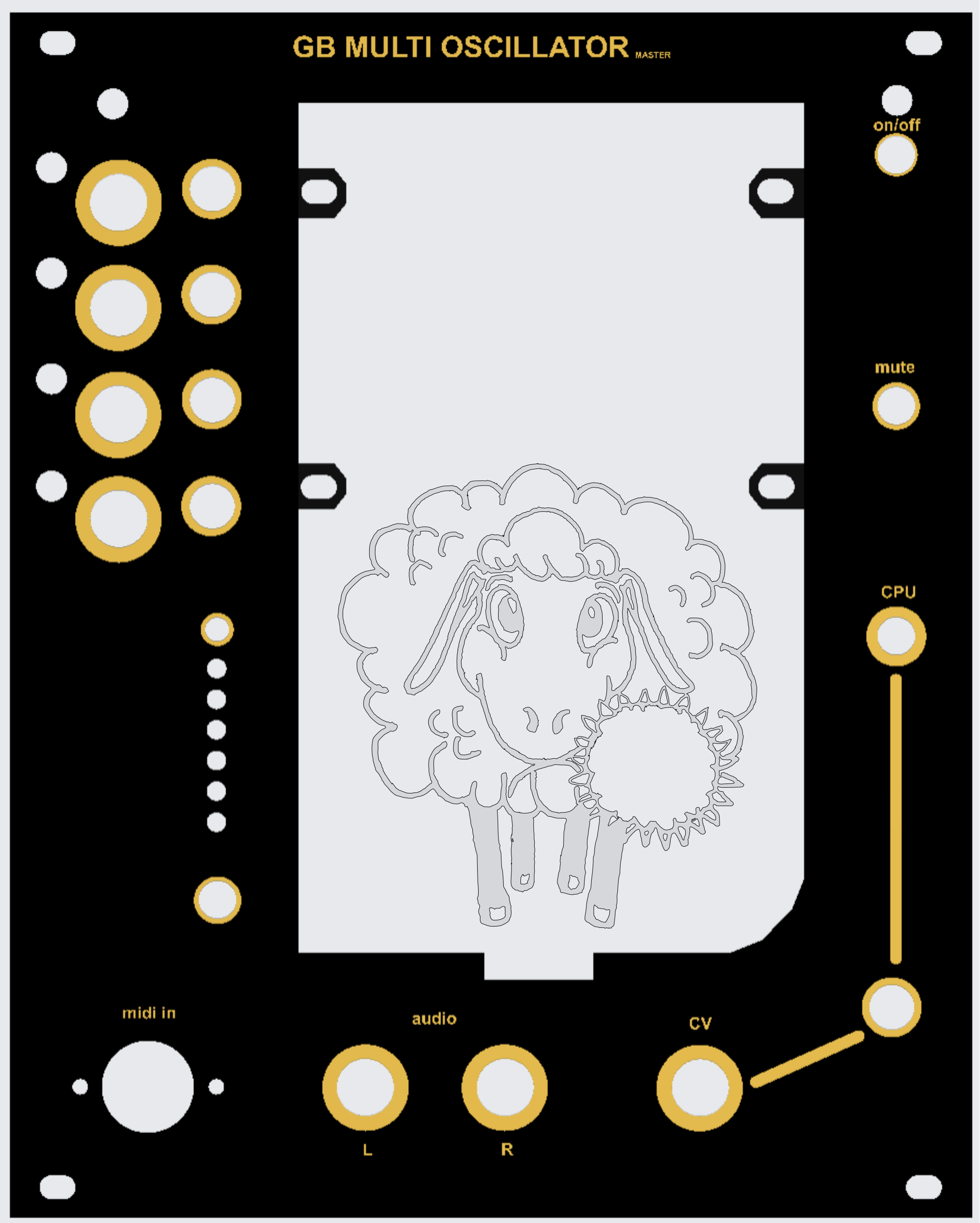
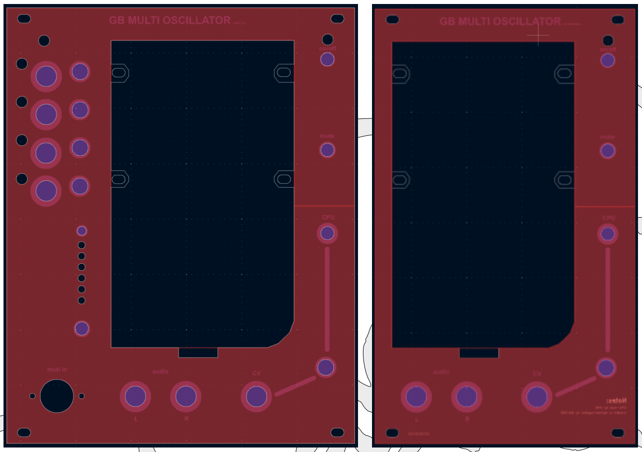
GB Multi Oscillator
and variants

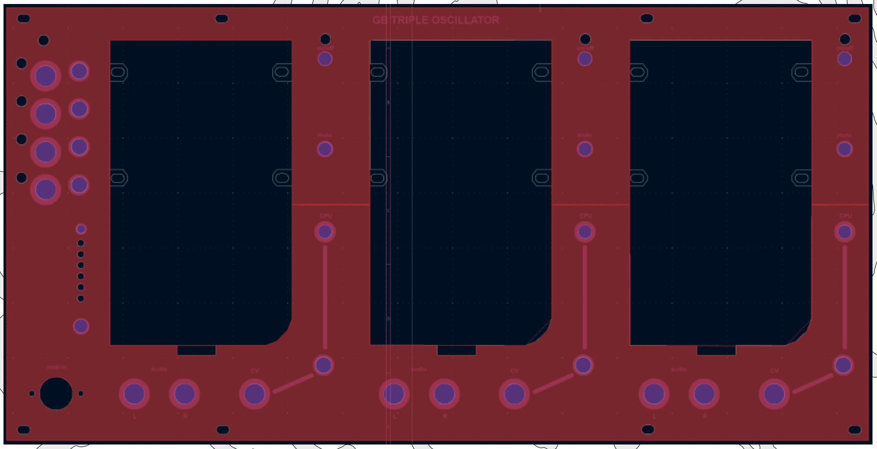


Basics:

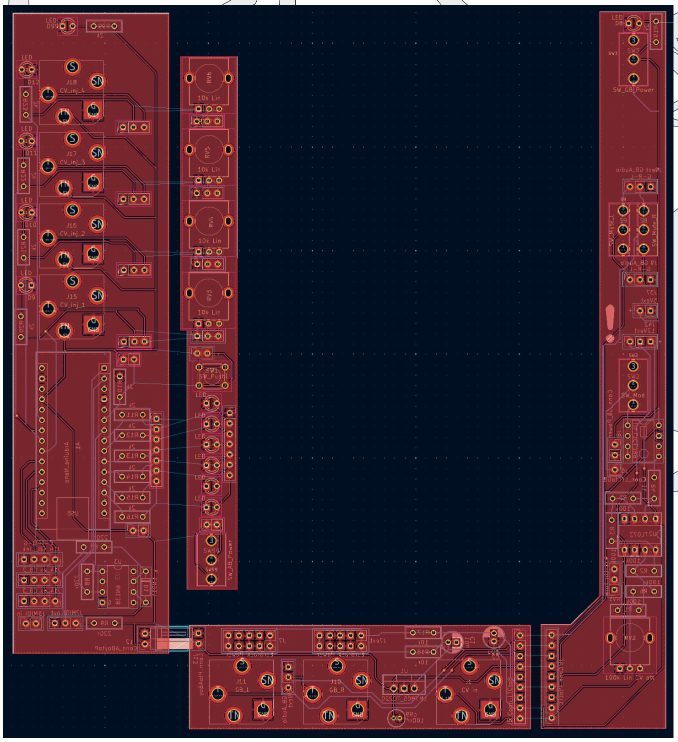
Explained on the “Classic” version but also true for variants with minor changes. E.g. there is no *daughter* board on the “pocket” version.



Face plates for single modules
Master & Extension(s)
(16cm x 20cm & 12cm x 20cm)

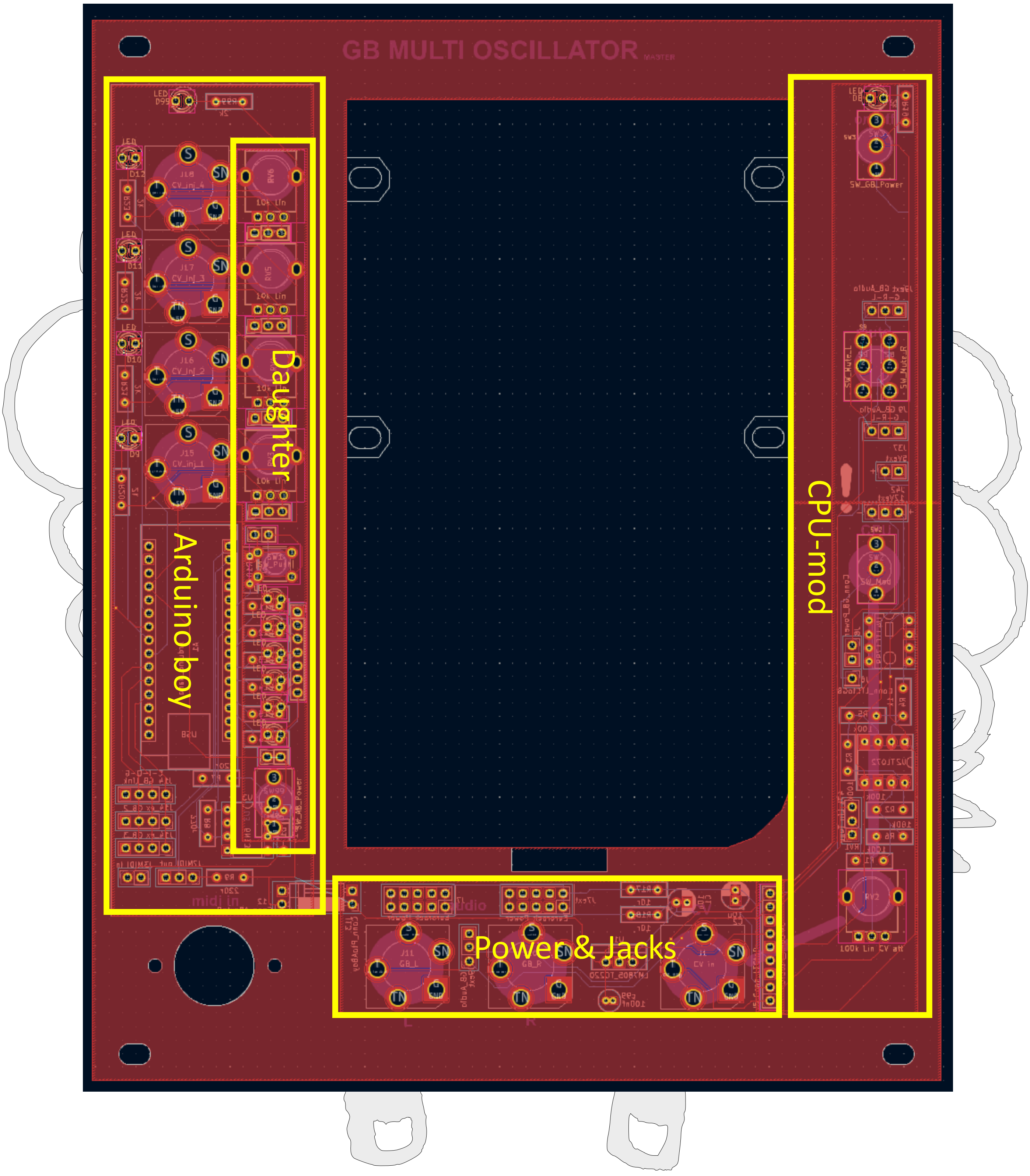


Face plate
Triple Oscillator
(40cm x 20cm)



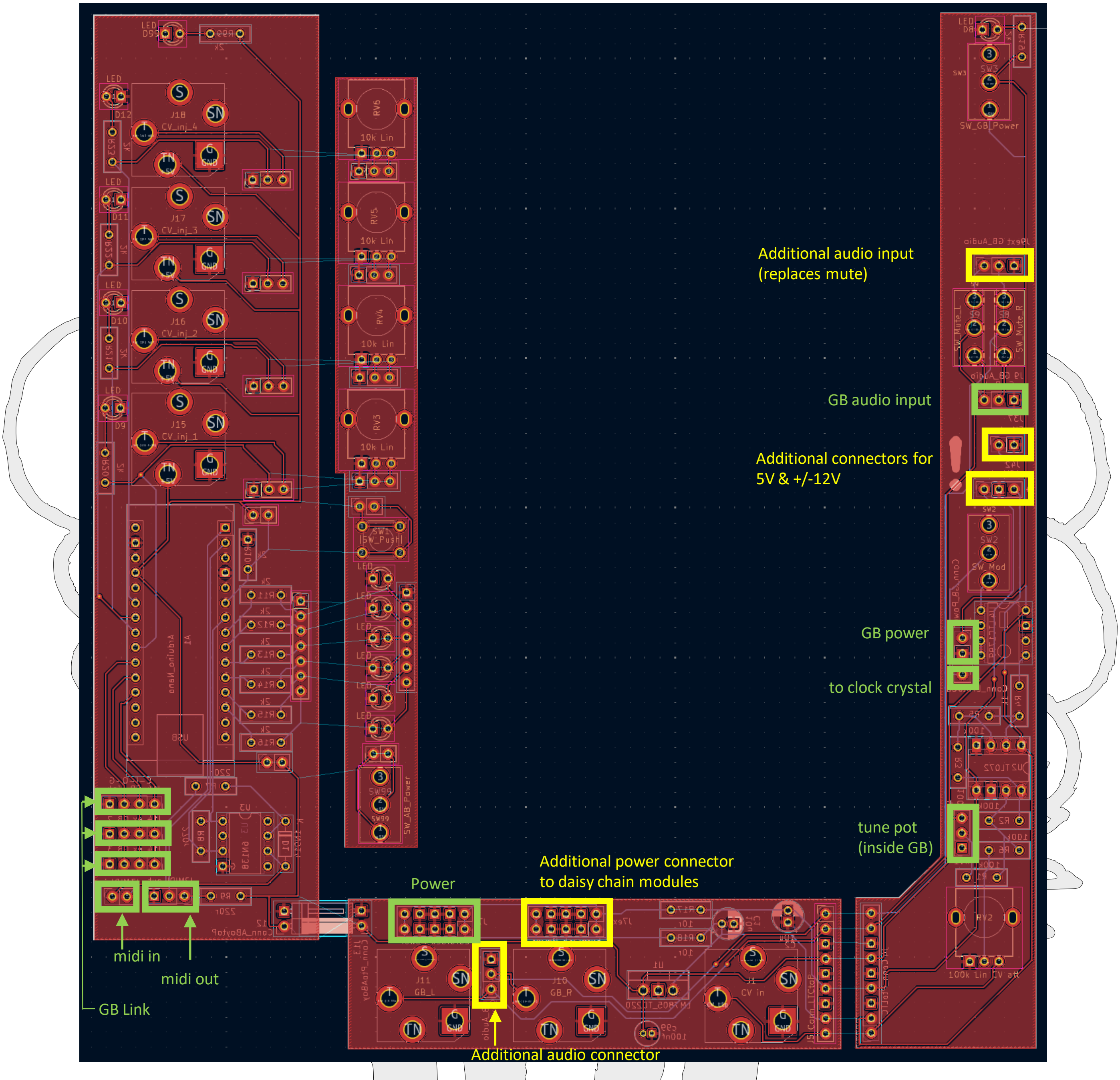
Functional PCBs:
Arduino boy (left)
Daughter (with pots & LEDs)
Power & Jacks (center)
CPU-mod (right)

Anatomy:


GB MULTI OSCILLATOR
Arduino boy
Daughter
CPU-mod
Power & Jacks

Features & Connectors:

The “extension” ports exist only on the “Classic” module.



Additional audio input (replaces mute)

GB audio input

Additional connectors for 5V & +/-12V

GB power

to clock crystal

tune pot (inside GB)

Additional power connector to daisy chain modules

Power

Additional audio connector

midi in

midi out

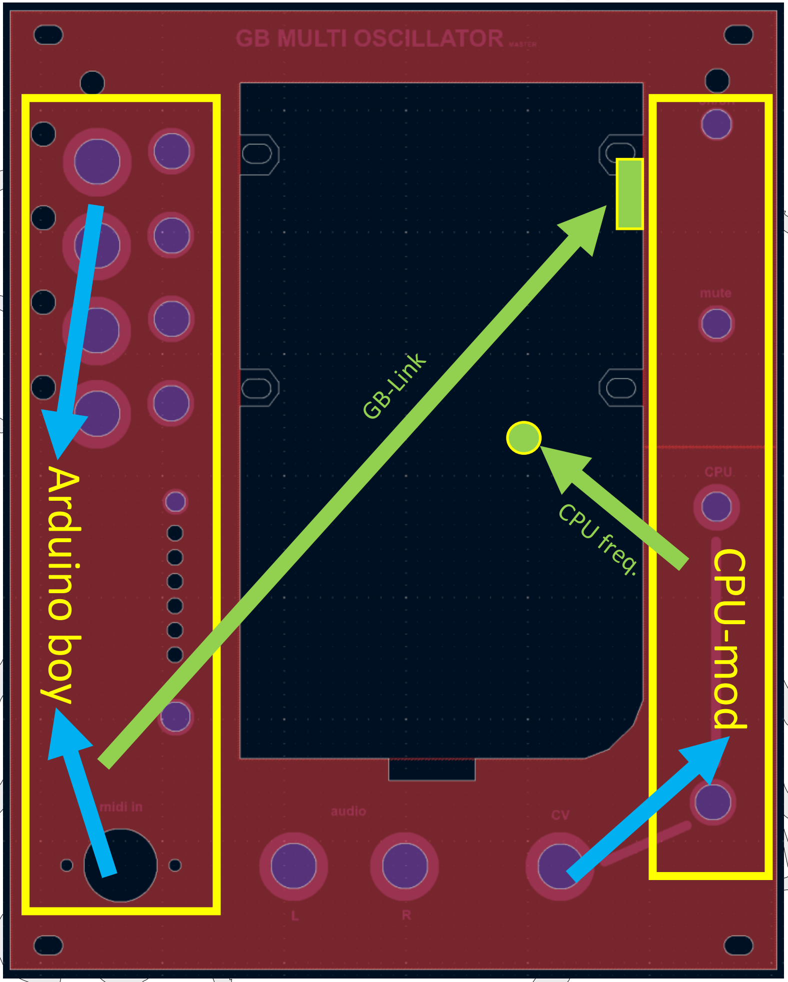
GB Link

ATTENTION:

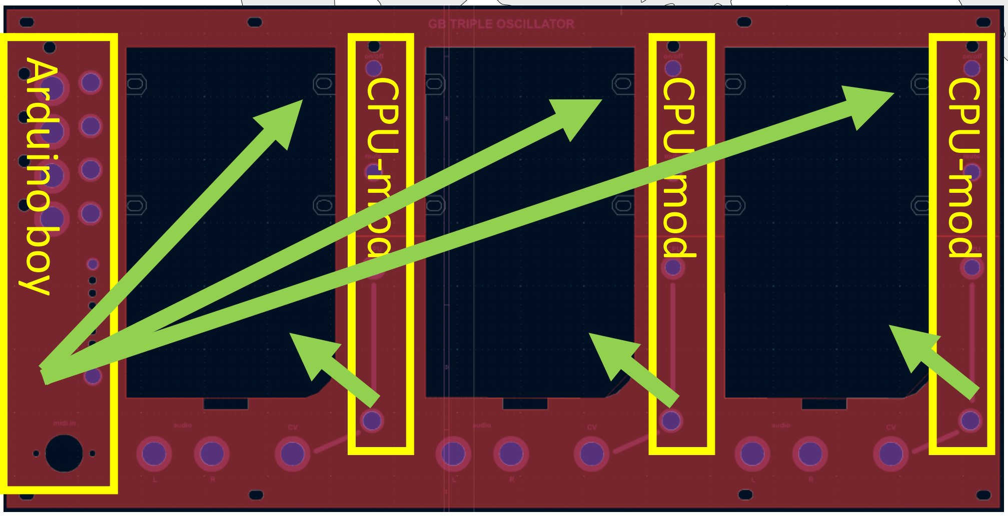
- There are many header connections in this build be careful with the order you solder things in.
- Be extra cautious when you are merging the boards with the face plate. There are current pins in header connections you don’t want that to go wild.
- If you are using more than one module (extensions or triple) the space for the link cables between the GBs is a bit tight but you can “make it fit”.
- There is a midi type selector on the “pocket” variant.

On “Pocket & Color” variants the link connection has to be soldered to the GB-PCB because the link port interferes with the face plate

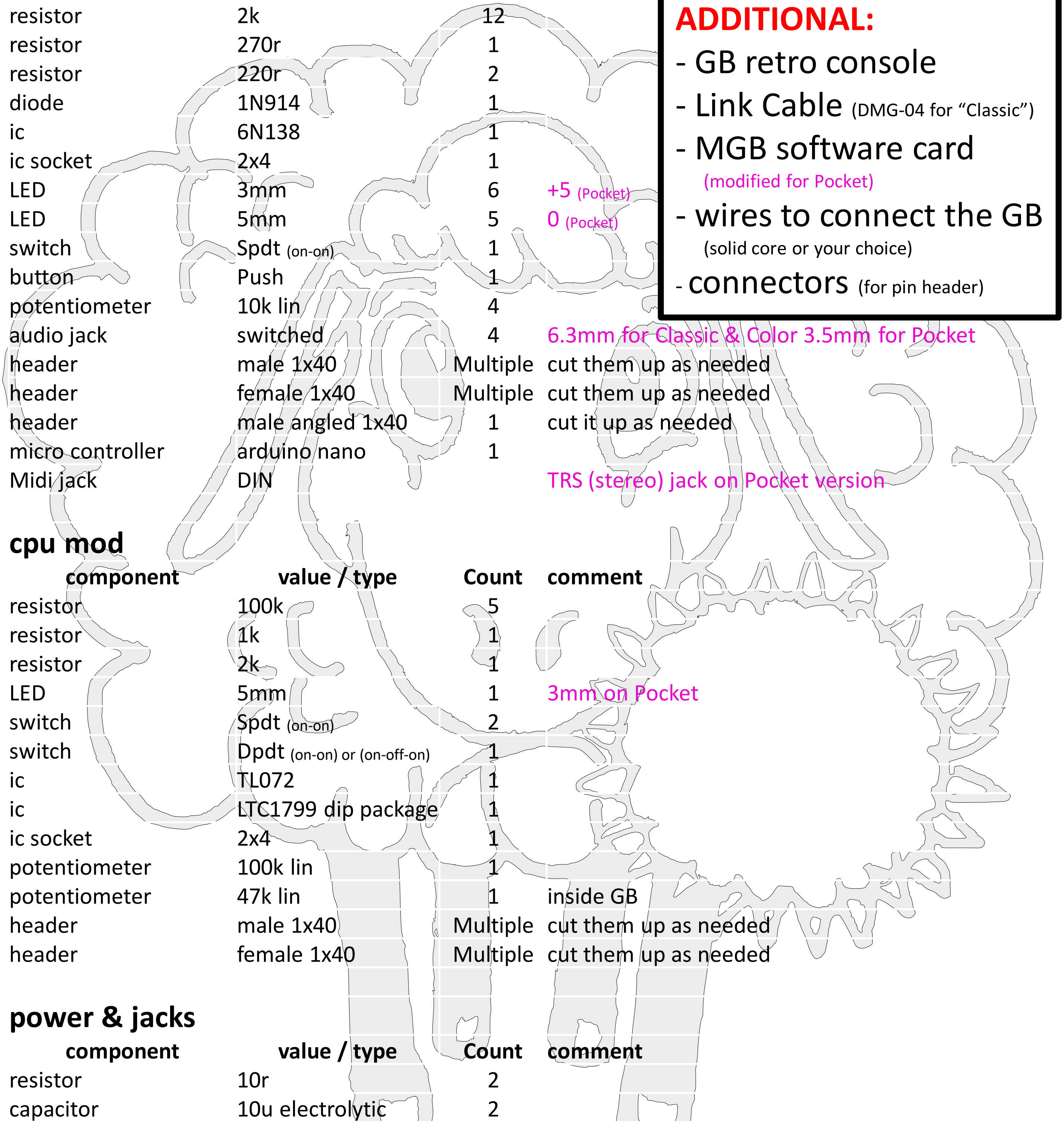
Structure:



- The Arduino boy is controlled via the Midi in port (user input)
- The Arduino boy controls the GB via the link port (internal signal)
- The CPU mod controls the CPU frequency of the GB (internal signal)
- The CPU mod can be adjusted via (internal) Pot or attenuated CV (user input)
- The CV injectors are not part of the official Arduino boy project.
  You need to code them yourself. The idea is to inject a midi command for e.g. PWM.



- One Arduino boy controls three GBs, each GB has its own CPU mod & power



Bill of materials: (Classic & Variants)

Arduino boy

component	value / type	count	comment
resistor	2k	12	
resistor	270r	1	
resistor	220r	2	
diode	1N914	1	
ic	6N138	1	
ic socket	2x4	1	
LED	3mm	6	+5 (Pocket)
LED	5mm	5	0 (Pocket)
switch	Spdt (on-on)	1	
button	Push	1	
potentiometer	10k lin	4	
audio jack	switched	4	6.3mm for Classic & Color 3.5mm for Pocket
header	male 1x40	Multiple	cut them up as needed
header	female 1x40	Multiple	cut them up as needed
header	male angled 1x40	1	cut it up as needed
micro controller	arduino nano	1	
Midi jack	DIN		TRS (stereo) jack on Pocket version

ADDITIONAL:

- GB retro console
- Link Cable (DMG-04 for "Classic")
- MGB software card
  (modified for Pocket)
- wires to connect the GB
  (solid core or your choice)
- connectors (for pin header)

cpu mod

component	value / type	Count	comment
resistor	100k	5	
resistor	1k	1	
resistor	2k	1	
LED	5mm	1	3mm on Pocket
switch	Spdt (on-on)	2	
switch	Dpdt (on-on) or (on-off-on)	1	
ic	TL072	1	
ic	LTC1799 dip package	1	
ic socket	2x4	1	
potentiometer	100k lin	1	
potentiometer	47k lin	1	inside GB
header	male 1x40	Multiple	cut them up as needed
header	female 1x40	Multiple	cut them up as needed

power & jacks

component	value / type	Count	comment
resistor	10r	2	
capacitor	10u electrolytic	2	
capacitor	100nf ceramic	1+1	
voltage regulator	LM7805 & LD17V33	1+1	preferably plus heat spreader
audio jack		3	6.3mm for Classic & Color 3.5mm for Pocket
header	female 1x40	1	cut it up as needed
header	male 1x40	1	(optional) cut it up as needed
header	female angled 1x40	1	cut it up as needed

Resources, Help & Credits:

Arduinoboy & MGB:

https://github.com/trash80/arduinoboy

Triple Oscillator & CPU-mod:

Project page by LMNC

https://www.lookmumnocomputer.com/projects#/gameboy-triple-oscillator

LMNC Forum

https://lookmumnocomputer.discourse.group/t/gameboy-oscillator-documentation/1660/72

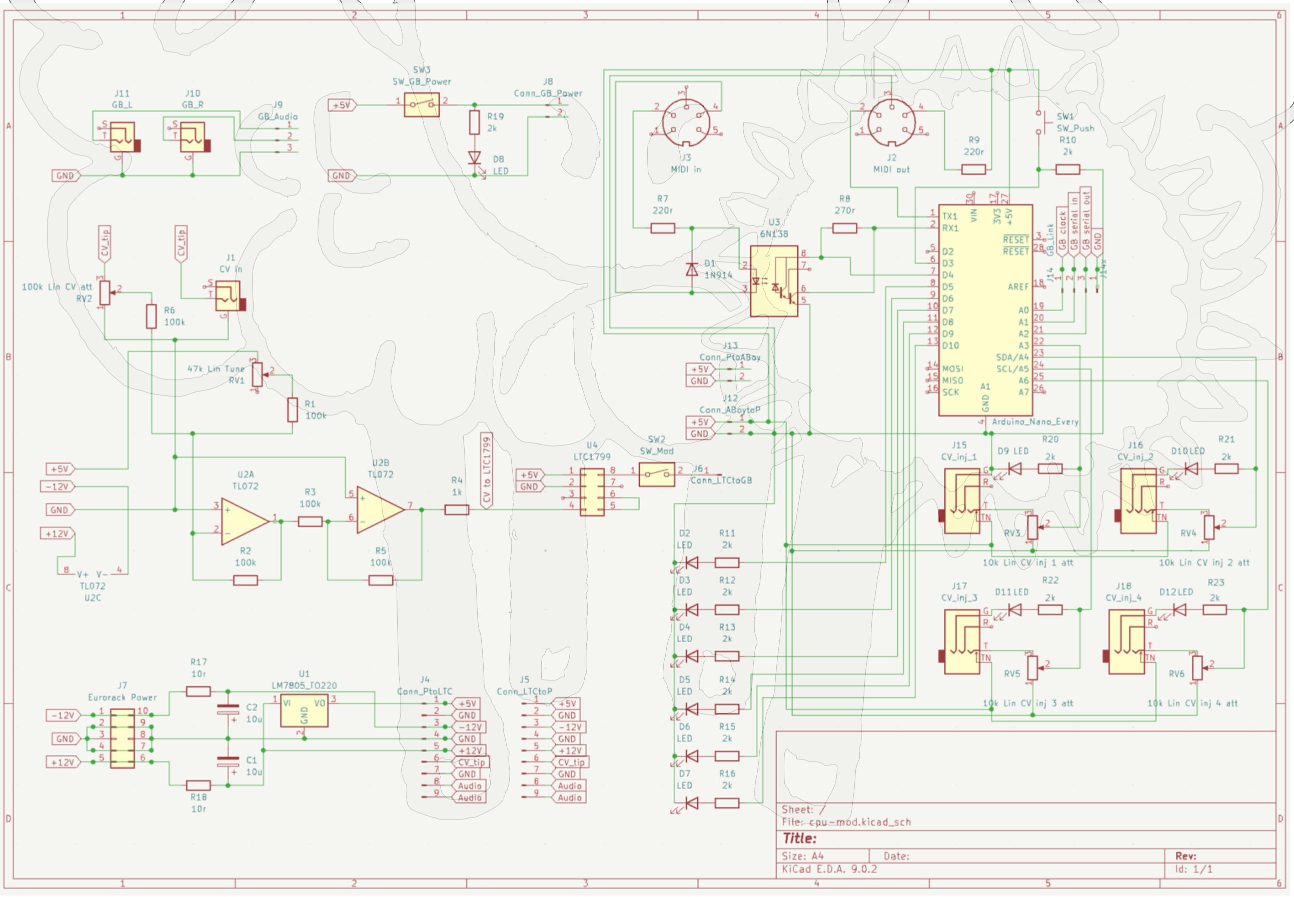
This module is based on the works of

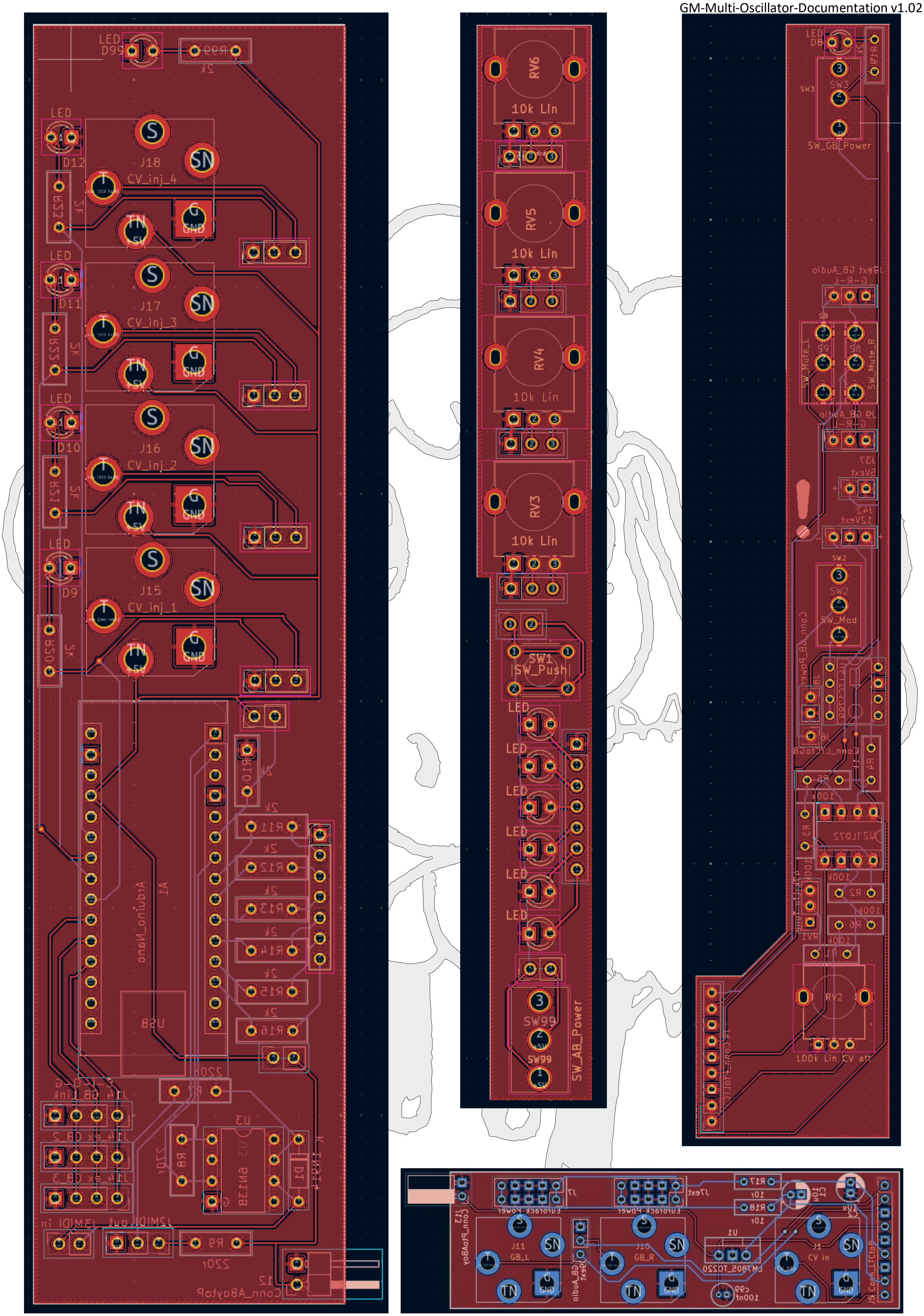
Trash80 (Arduino boy)

LMNC (Triple Oscillator & CPU-mod)

Sebastian from the forum (CV injectors & advice)

A. Wilke or willi359 on the forum (bashing it together into this PCB set & Documentation)




LED
D99
R99
2k
LED
D12
J18
CV_inj_4
R23
2k
LED
D11
J17
CV_inj_3
R22
2k
LED
D10
J16
CV_inj_2
R21
2k
LED
D9
J15
CV_inj_1
R20
2k
S
SN
T
TN
+5V
G
GND
Arduino_Nano
A1
USB
R10
2k
R11
R12
R13
R14
R15
R16
220
R7
J14 GB_Link
J14_ex GB_2
J14_ex GB_3
U3
6N138
R8
D1
J13MIDI_in
J12MIDI_out
R9
220
J2
Conn_ABtoPlo
RV6
10k Lin
RV5
10k Lin
RV4
10k Lin
RV3
10k Lin
SW1
SW_Push
LED
SW99
SW_AB_Power
LED
D8
R19
SW3
SW_GB_Power
J9ext_GB_Audio
L-R-G
S9
S8
SW_Mute_L
SW_Mute_R
J6 GB_Audio
J37
5Vext
J42
12Vext
SW2
SW_Mod
Conn_GB_Power
Conn_LTCtoGB
R4
R5
100k
R3
U2
TL072
100k
R2
R6
RV1
100k
R1
RV2
100k Lin CV att
J7
Eurorack Power
J7ext
J13
Conn_PtoABoy
J11
GB_L
J10
GB_R
J9ext
GB_Audio
U1
LM7805_TO220
C99
100n
R17
10
R18
10
C1
10u
C2
10u
J1
CV in
J5 Conn_LTCtoP

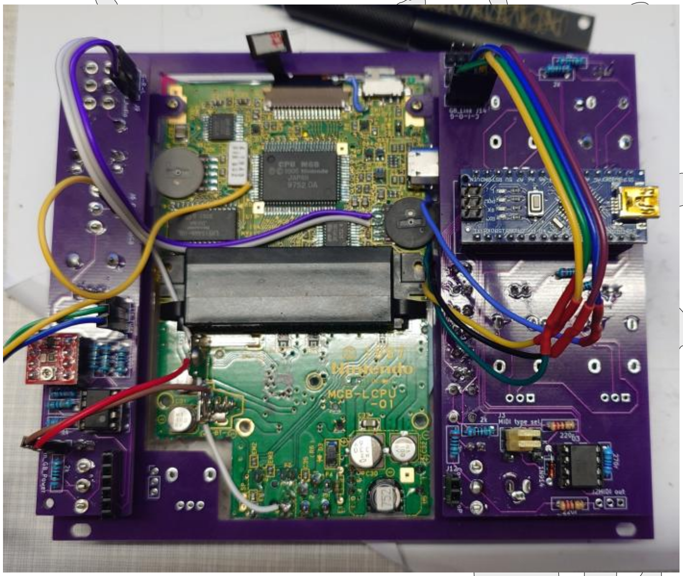
Pictures:


GB MULTI OSCILLATOR
mute
CPU
midi in
audio
CV


GB TRIPLE OSCILLATOR


GB MULTI OSCILLATOR
EURO-POCKET EDITION
mute
audio
CPU
CV
midi in
on/off


GB MULTI OSCILLATOR
EURO POCKET EDITION
mute
audio
CPU
CV
midi in
on/off



Disclaimer & Feedback:

Despite all my testing and best effort there might still be **errors** in this PCB kit. Proceed with **caution** at your own **risk**.

I am no engineer or by any means qualified and did this as a hobby project. Part of the project was to learn something, e.g. how to use Kicad. To give it a positive spin: It would not surprise if there is **potential for improvement**.

If you find an error or have ideas how to improve this module please **report back** to the LMNC forum.
https://lookmumnocomputer.discourse.group/t/gameboy-oscillator-documentation/1660/72

FAQ:

Q: How do I integrate the GB into this?
A: Search the internet: “DMG pro sound mod” and “DMG LTC1799 mod” and have a look at the Ifixit teardown of a DMG…
Q: How many GBs can I drive with one Arduino boy?
A: Three. LMNC said something about the GBs “smelling” each other and using MOSFETs in the Megamachine to separate them.