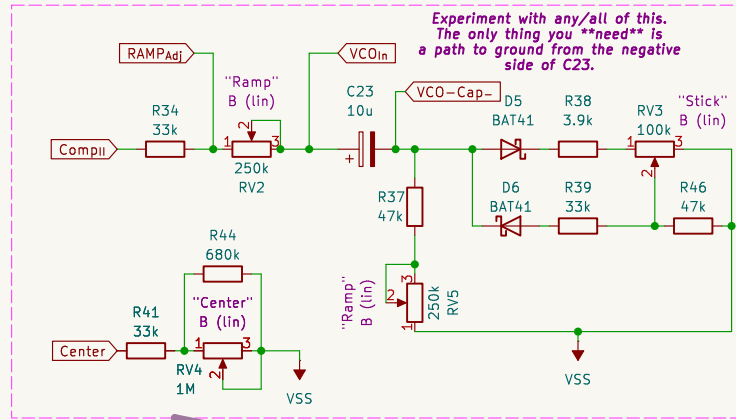# 2. PLL + Control

- 470n = more rumble/glitch (less "charge up" after silence)
- 150nF - 330n = between 470nF and 100nF...
- 22nF-100nF = crisper highs, less rumbly lows
- 10nF or less = more nasal + gets static

Omit entirely for cleanest tracking!
(But also less sustain)
My current preference is 100nF
It's 470nF in the video

Experiment with any/all of this.
*The only thing you **need** is*
a path to ground from the negative
side of C23.

U1 4046

C18 100n
C11 100n
C10 560p
C12 680p
R8 2.2k
Boosted
VCCOut
Center
GNDA

RefIn FOUT, SigIn VDD, VSS, C1, C2, R1, R2, Inh, PC1, PC2, VCOin, PCP, SFout, ZOUT

RAMPAdj
VCOIn
VCOOut
CompII
VCO-Cap-

R34 33k
RV2 250k
C23 10u
D5 BAT41
R38 3.9k
D6 BAT41
R39 33k
RV3 100k
R46 47k
R37 47k
RV5 250k
R44 680k
R41 33k
RV4 1M
"Ramp" B (lin)
"Center" B (lin)
"Ramp" B (lin)
"Stick" B (lin)

4. Auto-Adj

Ramp / VCO
OR
COMPII / RAMP
OR
COMPII / VCO

C26 100n
U5 LM311
R47 1k
RAMPAdj
VCOIn
VCO-Cap-

3. Suboctaves

R15 10k
R16 10k
R17 33k
R18 10k
U2A 4013
U2B 4013
VCOOut
Down1
Down2
C13 680p
D4 1N914
R27 33k
R28 20k
C24 100n
C20 3.3n
R43 68k
R21 51k
R45 47k
SubOctaves
R29 33k
R30 20k
C25 68n
C21 10n
R22 68k
R42 47k
Down1
Down2

1. Input + Boost

Doesn't have to be exact. "Big" is fine.
We just wanna make sure we smush the
signal a bunch and cut off the high-highs.

(Any common op amp is probably fine)

D3 BLUE
D2 BLUE
R10 39k
C8 68n
C9 220p
R12 360k
C5 220p
R9 510k
U3B TL072
U3A TL072
R5 33k
R6 10k
C7 22n
R11 510k
R7 68k
Input J2
C4 15p
R4 1M
C6 220p
Boosted

PLL Notes:

1. RV4 + RV2 make noise when: both up/down/full-opposite. (Only one extreme == usable). Play with sizes/ranges!
2. RV4 and C12 set the center frequency: If R4 gets smaller; make C12 bigger.
3. Increase R37 = less droop/slide/wah.
4. Fiddle with the diodes and stuff!
5. P.S. Signals ARE also at PC1/PCP, BTW.
6. When PCP = HIGH + PC1 = LOW 4+ times in a row: you are at frequency lock!
7. If you put a counter/divider between CompII out and VCOIn, the PLL will shift the frequency UP as much as the divider divides. Use one half of the CD4013 in the loop instead: octave up!

4. Summing Stage & Output

SW1 Sub-Octaves
SubOctaves
VCOBuff
R20 62k
R23 47k
R24 200k
R26 10k
C22 10u
R32 10k
C19 470p
R40 10k
U4A 4558
RV1 100k Volume B (lin)
R31 200k
R33 2.2k
R35 20k
R36 2.2K
Output J3
R13 200k
R14 100k
U4B 4558
VCOOut
VCOBuff
R25 24k

Metal jacks + enclosure:
do NOT solder wire to sleeve.
(Grounded through enclosure)

For insulated jacks,
DO attach ground wire
and attach at R21.

0. Power + VRef

Or any Schottky.
Or any Diode at all that is rated for:
- *180mA+ repetitive forward current*
- *80mA+ continuous forward current*
- *rated for 500mW*
- *24V continuous reverse voltage*

(All overestimates)

This is the "star point"
for all the CD4xxx IC's

This is the "star point"
for all your 0V grounds!
"Analog Ground"
a.k.a. "Audio Ground"
a.k.a. "Ground Reference"

This is the "star point"
for all your 4.5 refs!
"Signal Ground"
a.k.a. "VRef"

J1 DC-In
D1 BAT43
R19 100
R1 100
C14 100u
C1 100u
R2 33k
R3 33k
C2 10u
C3 100n
C17 100n
U3C TL072
C16 100n
U4C 4558
C15 100n
U2C 4013
+9V
VDD
VCC
VCC
VCC
VDD

"DC Ground"
a.k.a.
"Supply Ground"
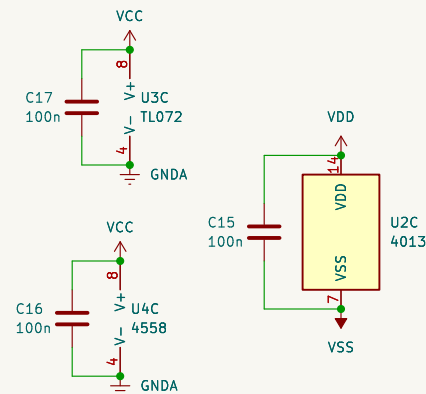
WARNINGS:

- **LUNCHTIME HACK / ALPHA!**

- Keep the volume low while experimenting. This circuit can produce very high or loud tones if adjusted live!

- Breadboard before you solder anything! This is hastily documented and NOT double checked! (Yet)

NOTES:

- Connect ground symbols at respective star grounds
- You can omit VSS and just use GNDA as audio ground (I think the signal will swamp out any noise anyway)
- Octave down is optional: just exclude CD4013
- This was another lunch hack: don't judge.
- Do hack!

WARNING: HACK! NOT CHECKED FOR ERRORS (yet).
Pink Circles = Fiddle with these! (Fiddle with any)
Andrew T. Canaday (povins), D.B. Buchholz (QuickButterfly_4571)
Sheet: /
File: OSM2.kicad_sch
Title: Olangrall's Sex Machine (II)
Size: B | Date: 2025-01-18 | **Rev: 0.1.0a**
KiCad E.D.A. 8.0.7 | | Id: 1/1