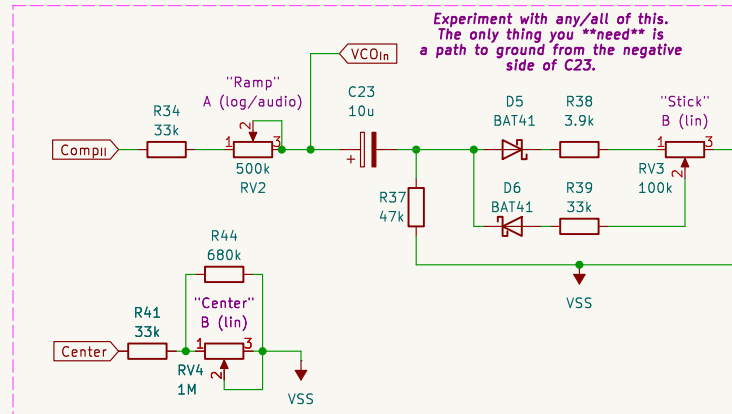


[illegible]

### 3. Octaves and VCO

The first diagram shows a buffer circuit. The input `VCOOut` is connected to a 200k resistor `R13`, which is then connected to the non-inverting input (pin 5) of a 4558 op-amp. The inverting input (pin 6) is connected to ground through a 100k resistor `R14`. The output (pin 7) is connected to `VCOBuff`.

The second diagram shows a divider circuit. The input `VCOOut` is connected to a 10k resistor `R15`, which is then connected to the D input (pin 5) of a 4013 flip-flop. The clock input (pin 3) is connected to ground through a 680pF capacitor `C13` and a 1N914 diode `D4`. The Q output (pin 1) is connected to `Down1` through a 10k resistor `R16`. The flip-flop is powered by `VSS` (pins 2, 4, 6).

The third diagram shows another divider circuit. The input `Down1` is connected to a 33k resistor `R17`, which is then connected to the D input (pin 9) of a 4013 flip-flop. The clock input (pin 11) is connected to ground through a 10k resistor `R18`. The Q output (pin 13) is connected to `Down2` through a 10k resistor `R18`. The flip-flop is powered by `VSS` (pins 2, 4, 6).

# 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.

The diagram shows a two-stage circuit. The first stage is an input buffer and filter. It starts with an input J2 connected to a 1M resistor (R4) and a 15pF capacitor (C4) to ground. The signal then passes through a 10k resistor (R6) and a 22nF capacitor (C7) to the non-inverting input (pin 5) of a TL072 op-amp (U3B). The op-amp's other input (pin 6) is connected to ground through a 510k resistor (R11). The output of U3B (pin 7) is connected to the non-inverting input (pin 3) of a second TL072 op-amp (U3A). U3A is configured as a voltage follower, with its output (pin 1) connected back to its inverting input (pin 2) through a 510k resistor (R9) and a 220pF capacitor (C5). A 33k resistor (R5) connects the output of U3B to the input of U3A. A 68k resistor (R7) is connected from the output of U3A to ground. A pink oval highlights the input filter and the first op-amp. A red arrow points from the text 'We just wanna make sure we smush the signal a bunch and cut off the high-highs.' to the input filter components. A red arrow points from the text 'Doesn't have to be exact. "Big" is fine.' to the feedback network of the second op-amp. A red arrow points from the text '(Any common op amp is probably fine)' to the second op-amp. The output of the second op-amp is labeled 'Boosted'.

(Any common op amp is probably fine)

# 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!

[illegible]

# 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 of 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"

"DC Ground"  
a.k.a. "Supply Ground"

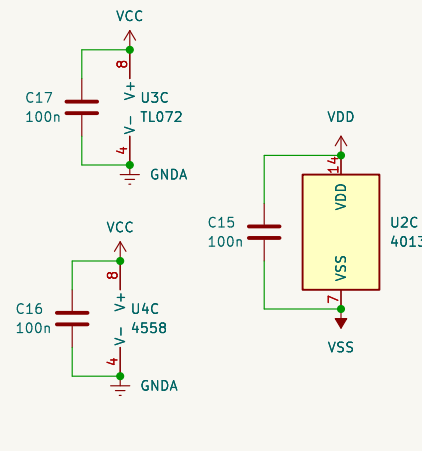
This is the "star point" for all your 4.5 refs!  
"Signal Ground"  
a.k.a. "VRef"

1

2

3

4



# 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)

<b>NOTES:</b> <ul style="list-style-type: none"> <li>- Connect ground symbols at respective star grounds</li> <li>- You can omit VSS and just use GNDA as audio ground (I think the signal will swamp out any noise anyway)</li> <li>- Octave down is optional: just exclude CD4013</li> <li>- This was another lunch hack: don't judge.</li> <li>- Do hack!</li> </ul>		
Patched F_fund --> VCO_buff WARNING: HACK! NOT CHECKED FOR ERRORS (yet). Pink Circles = Fiddle with these! (Fiddle with any) <b>Andrew T. Canaday (povins), D.B. Buchholz (QuickButterfly_4571)</b>		
Sheet: / File: OSM.kicad_sch		
<b>Title: Olangrall's Sex Machine</b>		
Size: B	Date: 2025-01-20	Rev: 0.0.5
KiCad E.D.A. 8.0.7		Id: 1/1