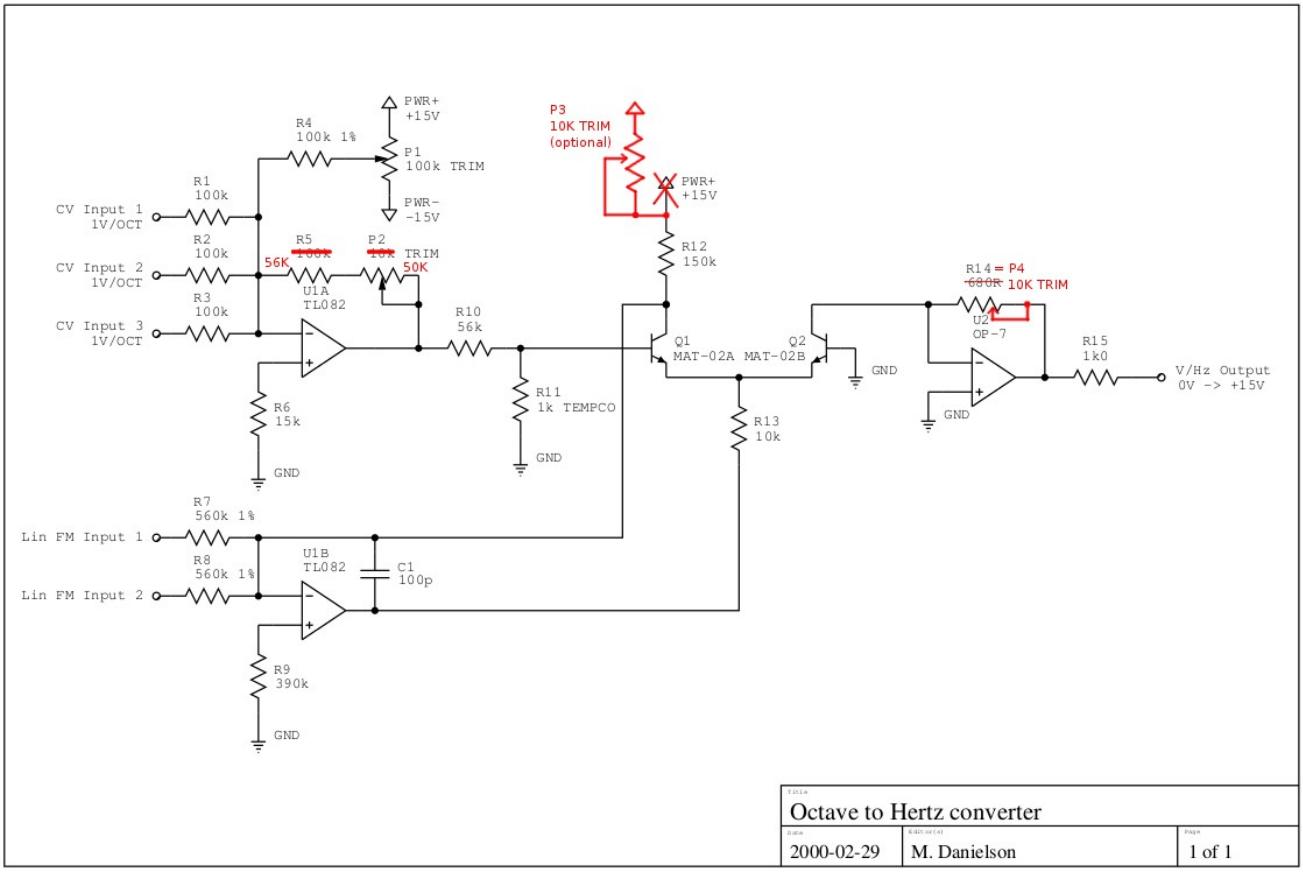
Octave to Hertz converter
by Magnus Danielson

1 Schematic



Differences to the original schematic:

- Changed R5 from 100K to 56K
- Changed P2 from 10K to 50K
- Added P3 as a 10K trimmer
- Changed R14 from a 680 Ohm resistor to a 10K trimmer

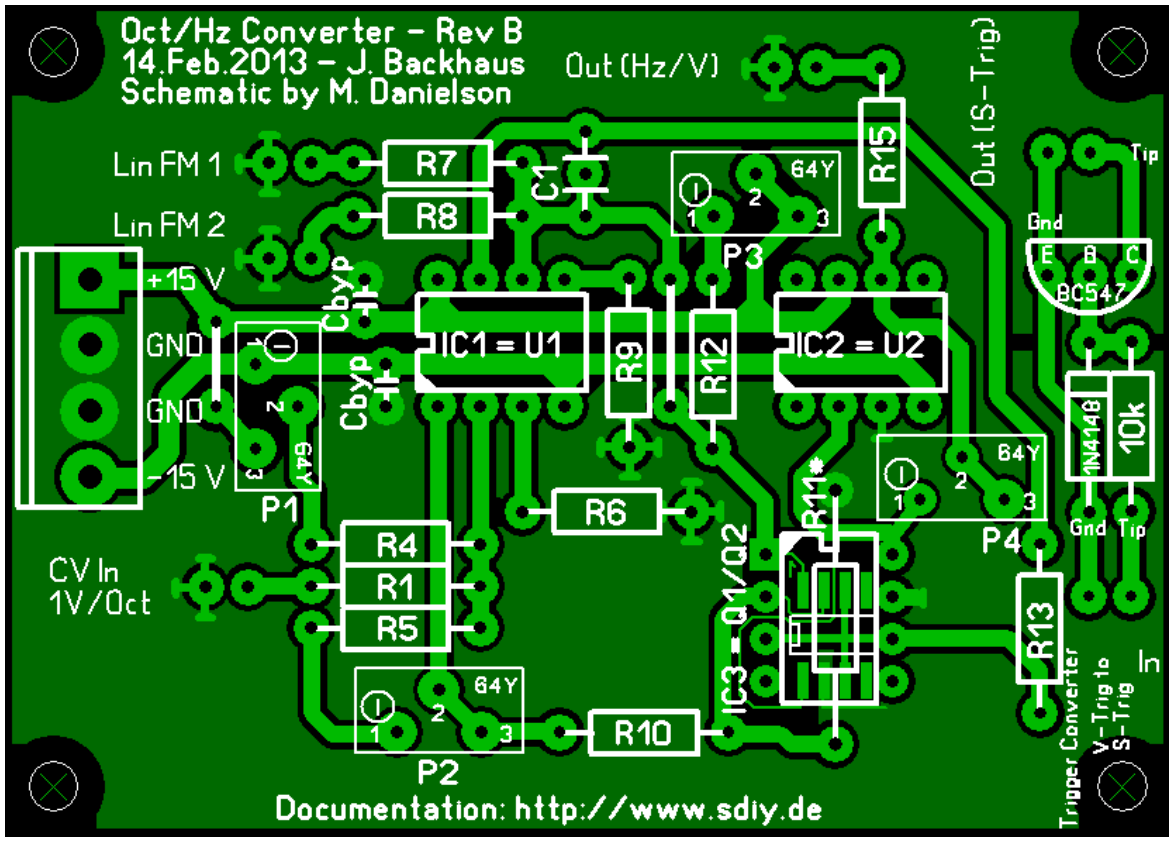
I omitted the CV inputs 2 and 3 with R2 and R3. U1 and U2 are called IC1 and IC2 on the PCB. Q1 and Q2 are IC3.

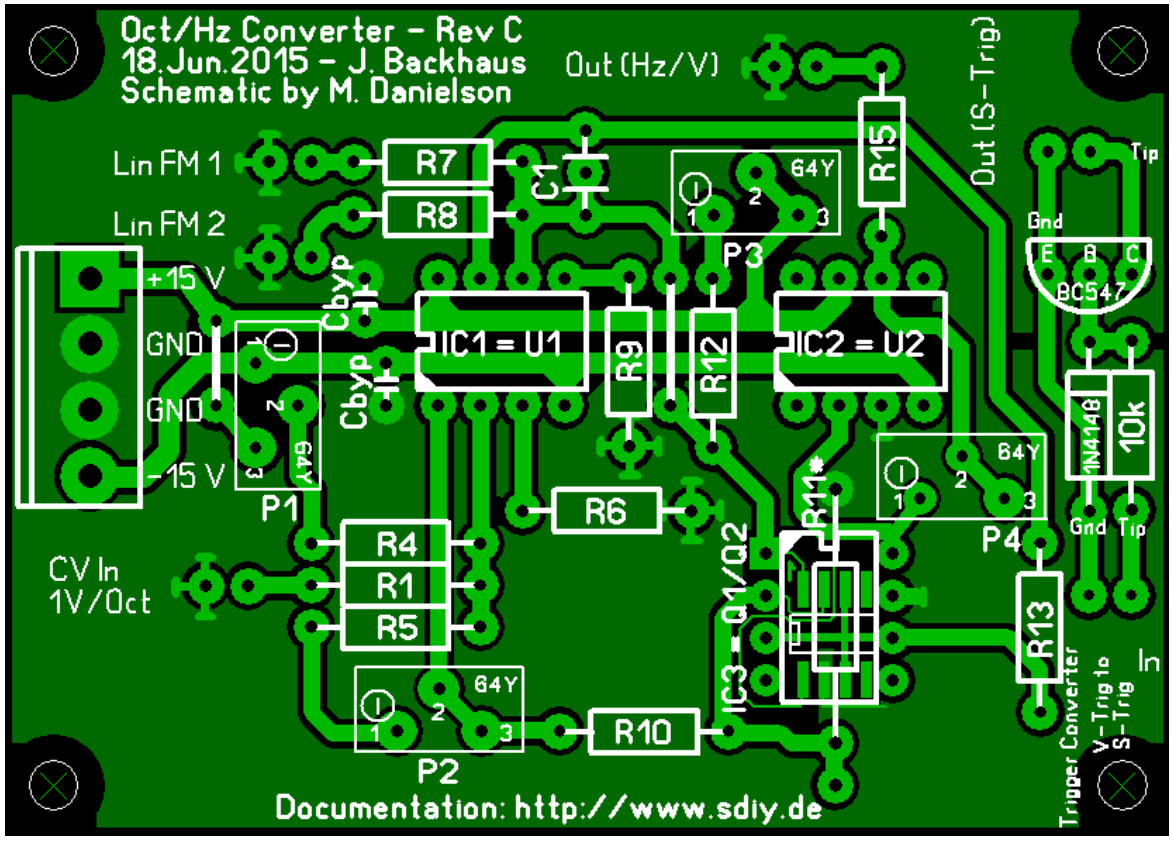
Source:

http://rubidium.dyndns.org/~magnus/synths/schematics/

2 Component placement

To the right is a simple voltage to switch trigger converter which is needed for example for the Korg MS series.





Revisions: A (Prototype), B (1. Batch), C (2. Batch)

3 Bill of materials

1% metal film resistors recommended!

Description	Quantity	Component number
1N4148	1	1N4148
BC547 or similar (I used a BC549)	1	BC547
100p C0G/NP0 capacitor with 2,5 or 5 mm grid	1	C1
100n capacitor with 2,5 mm grid	2	C_{byp}
TL082	1	IC1
OP-07 (if you substitute this make sure to get an opamp with similar or better low offset specs)	1	IC2
SSM2210, LM394 (DIP8), SSM2212 (SOIC_N), LS318 (DIP8 or SOIC) or similar. **Note:** You can also match two 2N3904, BC550 or similar single transistors instead and attach them to each other with the flat sides.	1	IC3
100K multiturn trimmer	1	P1
50K multiturn trimmer	1	P2
10K multiturn trimmer	1 or 2	P3 (optional), P4
1K	1	R15
10K	2	10K, R13
15K	1	R6
56K	2	R5, R10
100K	2	R1, R4
150K	1	R12
390K	1	R9
560K	2	R7, R8
1K (3300 or 3500 ppm Tempco) **Notes:** Always install it on the same side as the dual transistor and with physical contact to it. Use of thermal paste is recommended but not necessarily needed.	1	R11

Explanations:

- The four drilling holes are designed to use M3 screws.
- For the trimmers I suggest to use precision types with 25 turn and a screw reachable from the top, e.g. from Spectrol or Bourns.

Tempco & dual transistor sources:
You can get the SSM2210 at Bridechamber (USA), the SSM2212 at Mouser (Worldwide) or the LS318 at Micross (UK).
Sources for the tempco are: Bridechamber (USA), Synthcube (USA) or Thonk (UK).

4 Calibration

P1 = Initial Frequency (ASM2)

P2 = V/Octave (ASM2)

P4 = Scale

I included the trimmer P3 on advise from Magnus (new trimmer = P3):

For expo-convertors I usually include a trimmer (10k) in series with R12, as it allows for a much quicker trimming procedure:

1) Set up the input so that the output of the input summer-op-amp is 0 V (at R10).
2) Trim the new trimmer to hit the base note of your choosing.
3) You should only really need to apply 1V and trim P2 until you hit the note.
4) Now, having nothing connected, trim P1 until you have your desired base note.

This trimmer has been included in the SAS-VCO and ASM-2.

He also advised me to replace R14 with another trimmer (P4):

Be adviced that R14 may need to be selected to match the actual scale. Be sure to include that in your manual. It is a rather coarse method of setting the range, but the rest is taken in calibration.

4.1 Necessary steps

1. Set P4 on a middle value or leave it untouched.
2. Without anything connected to the input jack set the base tone with P1. This could be the lowest key on the keyboard, e.g. F on the Korg MS-10.
3. Connect a +1V source to the input jack, e.g. via an offset generator or a sequencer.
4. Set P2 to the octave of the base tone.
5. If the octave can't be reached via P2 set P4 accordingly. It's possible you have to experiment with P4 together with P1 and P2 as P4 also affects the initial frequency.

5 Known issues

5.1 Revision A:

This was the prototype revision with only two boards:

- The trigger converter resistor was labelled 100K instead of 10K.
- The SSM2212 is unusable because I forgot to mirror the connections to it.

5.2 Revision B

Revision of the first batch.

- Space for the tempco isn't sufficient for bigger tempcos (e.g. PT146)

6 Thanks

To Magnus Danielson for allowing me to create a PCB from his schematic.