

State Variable Filter [SVF] V1.2

The OTA State Variable VCF is a classic, all-analog multi-mode filter design. Built around a classic Operational Transconductance Amplifier (OTA – LM13700) design, this module delivers a deeply musical, fluid character with continuous, expressive control over your frequency spectrum.

Unlike dedicated low-pass filters, the State Variable topology provides simultaneous access to three distinct filter characters, making it a powerful utility and creative processor for everything from smooth sub-basses to sharp, cutting lead sweeps.

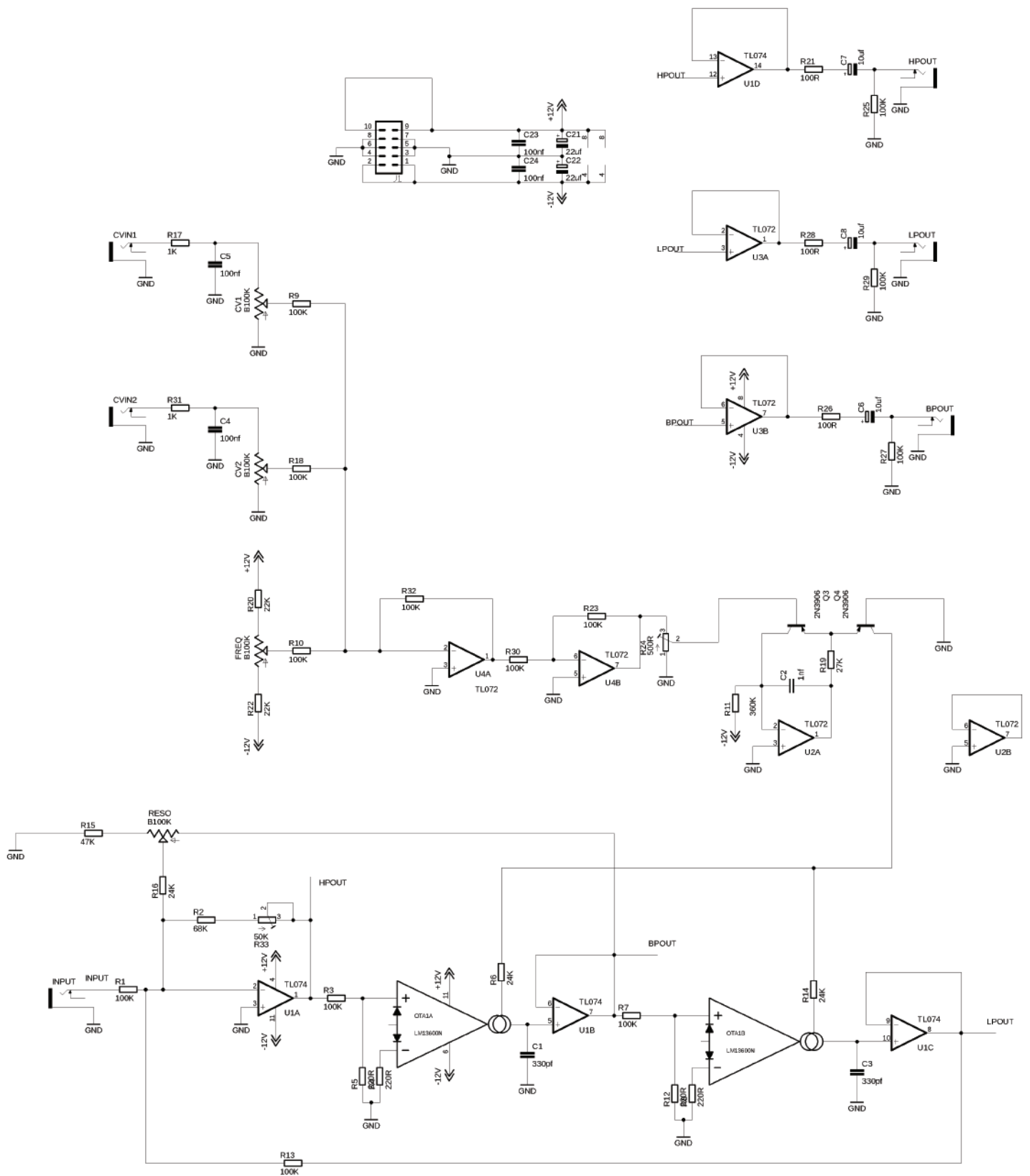


Bom

Qty	Value	Part Number
1	10 Pin IDC Socket	J1
13	100K	R1, R3, R7, R9, R10, R13, R18, R23, R25, R27, R29, R30, R32
3	100R	R21, R26, R28
4	100nf	C4, C5, C23, C24
3	10uf	C6, C7, C8
2	1K	R17, R31
1	1nf	C2
4	220R	R4, R5, R8, R12
2	22K	R20, R22
2	22uf	C21, C22
3	24K	R6, R14, R16
1	27K	R19
2	2N3906	Q3, Q4
2	330pf	C1, C3
1	360K	R11
1	47K	R15
1	500R / Trimmer	R24
1	50K / Trimmer	R33
1	68K	R2
4	B100K / 9mm Potentiometer	CV1, CV2, FREQ, RESO
1	LM13600	OTA1
6	TPJM398SM / Jack Socket	BPOUT, CVIN1, CVIN2, HPOUT, INPUT, LPOUT
3	TL072	U2, U3, U4
1	TL074	U1

Use capacitors rated 25V or higher.

Schematic



Calibration

Frequency Pot Resolution [R24]

The trimmer R24 is used to calibrate the sweep range of the front panel frequency pot. If it is uncalibrated, you might find that the entire frequency sweep happens within just a short turning section of the pot, leaving the rest of the rotation dead. Adjusting R24 spreads the filter's frequency range across the pot's entire rotation.

- Step 1.
Find the audible point: Pass an audio signal through the filter. Slowly turn the front panel frequency pot clockwise from the bottom until you just start to hear the lowest bass frequencies break through.
- Step 2.
Walk it down to the minimum: Slowly adjust trimmer R24 so that this lowest audible bass frequency moves down toward the minimum position of the pot. As the frequency drops, follow it by turning the front panel frequency pot down as well.
- Step 3.
Lock in the baseline: Repeat this interactive adjustment until you reach the absolute physical minimum position of the pot, with the lowest audible frequencies sitting right at that bottom edge
- Step 4..
Check the full range: Sweep the frequency pot all the way to maximum. The filter should now open smoothly across the entire rotation of the pot without hitting a "dead zone".

Input Gain Adjustment [R33]

The 50k multiturn trimmer on the board adjusts the gain of the input buffer. Unlike a standard volume control that goes from zero to maximum, this trimmer acts as a fine-tuning mechanism. It allows you to scale your input signal from 68% up to 118% of unity gain to perfectly match the signal levels of the rest of your system.

- Step 1.
Connect a VCO: Patch a raw waveform from a VCO into the input of the State Variable Filter.
- Step 2.
Match the levels: Monitor the filter's output and adjust the trimmer until the output signal level matches the original signal level coming directly out of your VCO.
- Step 3.
Check for stability: Listen to the filter at high resonance settings. If the incoming VCO signal is too hot for the SVF - causing unwanted distortion or making the filter core unstable - simply adjust the trimmer to lower the input setting.



Thank you for choosing Guru Gara Synth.
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