

nonlinearcircuits

Kareishuu VCO build & BOM

This VCO was mainly designed as an upgrade for the dual OTA VCO. It is a traditional triangle core VCO with a built in VCA for the FM control section. The design draws on sections of the Electronotes EN1, EN2 and EN3 VCOs along with some NLC injected in there for good measure.

It has much better tracking than the dual OTA VCO, a sine output and attenuators for all inputs. The self-modulation control via the FM VCA enables voltage controlled waveshaping, the sine and tri waves can morph between their original shapes to a pulse.

The pot spacing is quite tight, so I suggest using T18 knurled shaft pots along with the micro knobs. Other than the 1k tempco, no rare parts and a fairly easy build.

Additional notes:

1. SMD capacitors are currently in short supply globally (May 2018). At least for the 10uF caps on the PCB, feel free to substitute any value you can get, preferably over 100nF.
2. If you can get them, the prices for these 10uF 0805 capacitors drops to approx. 10c each when buying more than 10...and you should always get plenty of spares, it is easy to drop and lose smd parts.
3. 1N400x (x = 1, 2, 3, 4) Power diodes are for Reverse voltage protection - Mouser Part No: 821-S1JL. Any similar rectifier with at least 1A rating should be okay, such as 1N4001, 1N4002, 1N4004. **Get these sizes; SOD-123 or sub-SMA** (DO-214 is too big, so avoid)
4. Most of the components are cheapest from Tayda. Part numbers are given but consider these as examples. Feel free to buy from wherever you like.
5. **The 8k2 and 360R can be replaced with 10k and 470R respectively, which are more common sizes and more likely to be in your stash.** If you change one make sure you change the other. Be sure to adjust your shopping list.
6. The 2n2 (222) capacitor gives a frequency range from 1 cycle every 20 seconds up to 16kHz. If you want to go a lot higher and drop the LFO ability, use 1nF which will enable a range from 20Hz to over 40kHz.
7. Mount the 1k tempco resistor over the BCM857 so they are in contact (1kT on PCB). Once the VCO is tested and working, add a little heatsink paste so they are thermally in sync (!). If you don't care about 1V/oct tracking just use a regular 1k resistor.
8. **The pots and jacks are mounted on the back of the bottom PCB, not on the silkscreened side - see pics after the BOM.** Same for all NLC PCBs.
9. The two 3mm holes on the top PCB are for people wishing to build the PCB in other formats and need somewhere to mount it with a spacer or 2. If building the eurorack version, just ignore these.
10. The 100k trimpot is to get a nice sinewave, best to use a 'scope, if you don't have one just tune until the sine out is annoyingly siney, or just leave it in the middle.
11. The 20k trimpot is to tune for 1V/oct. Everybody seems to have their fave method for this. I use a Korg tuner and 1V, 2V, 3V etc. voltage sources and just trim it until it jumps an octave with each 1V increase. It takes a few goes to get it right.
12. Join the Nonlinearcircuits Builders Guild on FB and ask questions there if you have any. If you prefer not to FB then email is fine.

(<https://www.facebook.com/groups/174583056349286/>)

BOM

VALUE	QUANTITY	DETAILS
100pF (101)	1	0805 25V rating or higher
2.2nF (222)	1	0805 25V rating or higher
100nF (104)	8	0805 25V rating or higher
1μF (105)	2	0805 25V rating or higher
10μF	2	0805 25V rating or higher Mouser No: 81-GRM21BR61E106KA3L (or similar)
360R	1	0805 see notes #5
470R	2	0805
1k	3	0805
1k TEMPCO	1	THRU-HOLE
2k2	5	0805
8k2	1	0805 see notes #5
10k	4	0805
12k	1	0805
27k	1	0805
30k	1	0805
33k	1	0805
39k	1	0805
47k	3	0805
51k	2	0805
56k	1	0805
62k	1	0805
91k	1	0805
100k	6	0805
120k	1	0805
220k	2	0805
1M	1	0805
1M5	2	0805
2M2	2	0805
BC857	1	PNP, sot23-3
BCM857DS	1	PNP, SOT23-6 or SOT457 Mouser: 771-BCM857DS-T/R
LM13700	2	SOIC
TL072 or TL082	4	SOIC Tayda: A-1136
LL4148 diodes	4	SOD-80 Mouser Part No: 512-LL4148
Eurorack 10 pin power connector	1	Tayda: A-198
1N400x or S1JL or similar, optional - for reverse voltage protection	2	SMD, standard power diode 200-600V 1A, dot on PCB indicates CATHODE (stripe on component) SEE NOTES #2
3.5MM SOCKET Kobiconn style	9	Tayda: A-865 or preferably get Thonkiconn Jacks (PJ301M-12) from Thonk or Modular Addict
100kB pots	8	Tayda: A-1848
100k trimpot	1	Tayda: A-2506
20k multi-trimpot	1	3296W type Tayda: A-592
10 Pin 2.54mm Single Row Pin Header Strip	3	Tayda: A-197 (cut to size)
10 Pin 2.54mm Single Row Female Pin Header	3	Tayda: A-1306

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andrewulf		







