

## nonlinearcircuits

### The Suppository of all wisdom build & BOM

This module is supposed to be a phase shifter, but is so badly designed that spits, shits and burps all over the place. It can even do it without even using any CV signal.

As has been noted, I have been on a bit of a tour of phase shifters. There are two that have long intrigued me; the Steiner Phaser, which uses diode strings as variable resistors - a method also seen in the well-known Steiner filter and in some old 70s compressors. The other is the Lovetone Doppelganger, which is a typical 4 stage LDR based phaser, except the filter capacitors increase for each stage, so 4.7n, 10n, 22n and 47n. Also it had two modulating inputs, one for stages 1-2 and the second for stages 2-4. Furthermore, it just used LEDs and LDRs mounted on the PCB with no isolation, so there was some interaction between the stages.

It seemed entirely logical to combine the Steiner and Lovetone circuits, replacing the diodes in the Steiner with LEDs that would fire up the LDRs in the Lovetone section.

Initially I had these running in parallel with individual and mixed outputs, along with stepped capacitor values. After a lot of experimenting, it ended up with the two sections in series and dropping the stepped capacitors for 10nF thru-out.

Phase 1 and CV1 control stages 1-2, Phase 2 and CV2 control stages 3-4. The whole lot is sitting inside a single black box, so everything affects everything else. To make matters worse, if the audio is too hot (and it is designed to be), it will turn on the LED strings and so affect the LDRs in stages 4-8. CV bleed-thru in diode strings is a known problem; here we have audio bleed-thru into the CV circuit.

There are two feedback pots; one sends the signal from stage 4 back to stage 1 or into stage 5 (which totally overloads stage 5 as it is already getting the same signal from stage 4....oh dear). The other feedback pot sends the signal from stage 8 back to stage 1 or stage 4. The outputs are stage 8 or MIX out is a combination of stage 4 and stage 8.



**BOM – The Tayda & Mouser part numbers are given as examples**

VALUE	QUANTITY	DETAILS
100pF	4	0805 Tayda: A-3503
10nF	11	0805 Tayda: A-3507 SEE NOTES #5
100nF	2	0805 Tayda: A-3511
10uF	4	0805 25V or higher voltage rating Mouser: 963-TMK212BBJ106MG-T or similar
1k	2	0805
6k8	2	0805
10k	25	0805
47k	3	0805
100k	12	0805
TL074 / TL084 / LF347	4	soic Tayda: A-1140
LDR	4	GL5506 or GL5516 or whatever
3mm LEDs	24	red/yellow/green very bright ones
Eurorack 10 pin power connector	1	Tayda: A-198 cut to size
Schottky diodes	2	I use MBR0540 in a sod-123 package. Any with 30V+ and 0.25A+ ratings will do. dot on PCB indicates CATHODE (stripe on component).
3.5MM SOCKET Kobiconn style	6	Tayda: A-865 or Thonkiconn Jacks (PJ301M-12) from Thonk, Synthcube or Modular Addict
100k pots	7	Probably best to use T18 (or similar) splined/knurled shaft pots as the spacing is tight. Otherwise : Tayda:A-1848 or A-5513 or A-4729
20 Pin 2.54mm Single Row Female Pin Header	2	Tayda: A-1310
15 Pin 2.54mm Single Row Female Pin Header	2	Tayda: A-1669
40 Pin 2.54mm Single Row Pin Header Strip	2	Tayda: A-197 snap into 15 and 20 pin sections, get spares

### Additional notes:

1. The chips, resistors, caps are cheapest from Tayda. Schottky diodes, CMOS & 1uF, 10uF 25v 0805 caps from Mouser/E14/Farnell/etc.

2. Join the Nonlinearcircuits Builders Guild on FB:  
<https://www.facebook.com/groups/174583056349286/> and ask questions there if you have any. If you prefer not to FB then email is fine.

3. For some reason pots are somewhat scarce these days. It makes no sense to me, I order 1500 at a time from my regular supplier and get them in 3 weeks. If you want to order a minimum 500 pots @ \$0.30 each contact Rita at [sales1hongyuan@163.com](mailto:sales1hongyuan@163.com). Shipping is a bit pricey, but should still work out cheaper than buying from Tayda or elsewhere.

For knurled shaft you want

H09312NA B100K L15KQ-006

9mm single gang knurled shaft B100K rotary potentiometer ,no tab. hardware (nuts+washer) .shaft dia 6.0mm

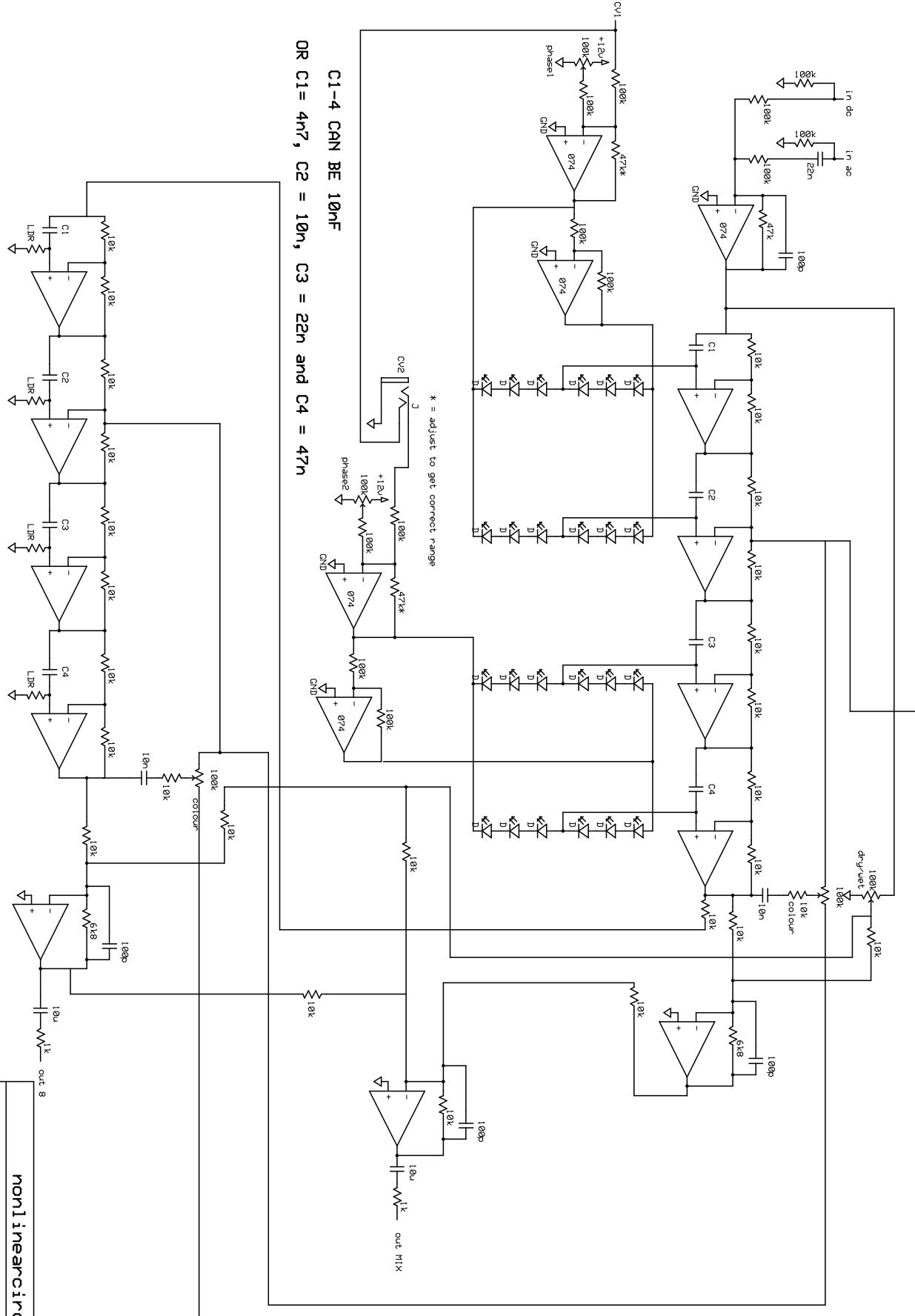
For regular shaft (note these are 6mm, ask if you want 6.5mm), you want

RV9312NO-SB15A1.5-B104-060 no tab

9mm single gang B100K rotary potentiometer,no tab. hardware (nuts+washer) .shaft dia 6.0mm.

4. LEDs should be red, green, yellow or orange.....not blue anyway. Very bright diffused ones are probably best but it is not a big deal

5. I left in the labelling for stepped capacitor values if you wish to experiment. C1 = 4n7, C2 = 10n, C3 = 22n and C4 = 47n. Otherwise just install 10nF



C1-4 CAN BE  $10\text{nF}$

LDRs positioned between LEDs above

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