nonlinearcircuits

Ming Rod build & BOM

This module was developed from a paper by Tom Oberheim, presented at the Audio Engineering Society 1970 convention – A "Ring Modulator" Device for the Performing Musician.

The paper discusses the various types of ring modulators and states the transformers in the well-known diode ring modulator can be replaced with transistors. From pg.2 – *The transistors serve as phase inverters for driving opposite sides of the ring. The differential amplifier amplifies the sum and difference frequencies while rejecting the signal and the carrier.*

Well, this is exciting! Why hasn't anybody ever made one? Why didn't Mr Oberheim make one? Maybe because it is somewhat hard to dial in the pots and it gives pretty unexpected waveforms on the output or dedicated ICs became cheaper and did a better job. So, yeh it isn't the cleanest ring mod ever but flaws equal character and for a synth module, this is where the fun is, it sounds wonderful. What other Ring Mod has pots for adjusting the phase difference?

The upper two pots are input attenuators, the lower two are supposed to set it up for removing the input signal and the carrier from the output, good luck with that, just tweak it until it sounds good.

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

VALUE	QUANTITY	DETAILS
10uF	2	0805 25V+ Mouser:963-TMK212BBJ106MG-T or similar
1k	1	0805 marked '102'
10k	1	0805 marked '103' or '1002'
100k	11	0805
TL072 / TL082 / LF353	1	soic Tayda: A-1136, A-1139
BC847	2	NPN sot23 Tayda: A-1339
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	3	Tayda: A-865 or Thonkiconn Jacks (PJ301M-12) from Thonk, Synthcube or Modular Addict
100k pots	4	Probably best to use T18 (or similar) splined/knurled shaft pots as the spacing is tight. Otherwise : Tayda: A-4729
LL4148 diodes	4	SOD80 Tayda: A-1213

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. 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.

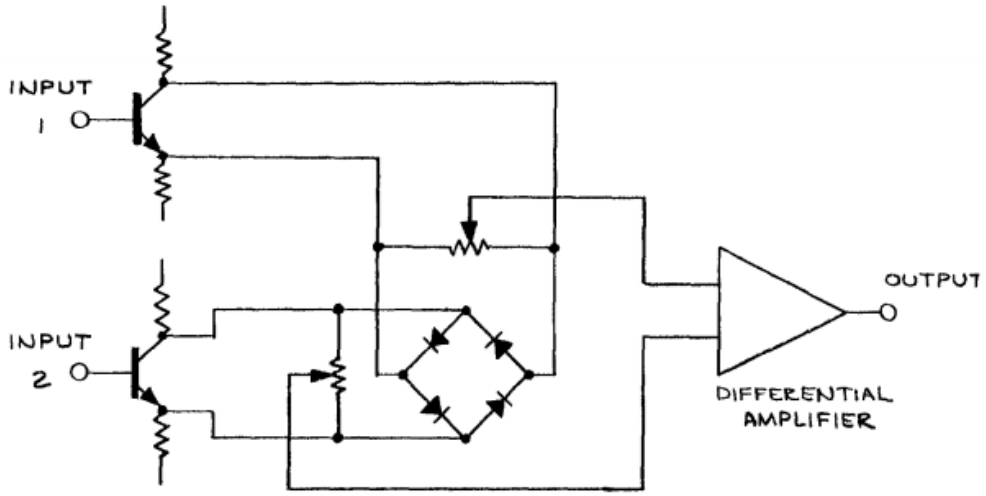
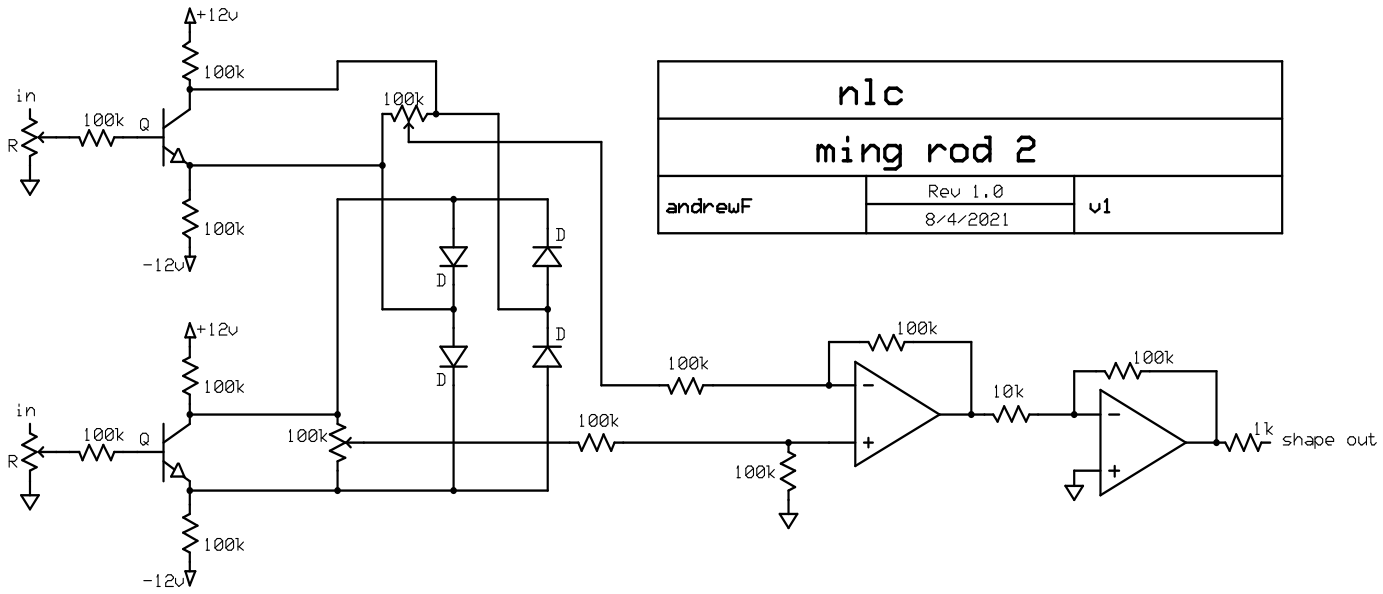
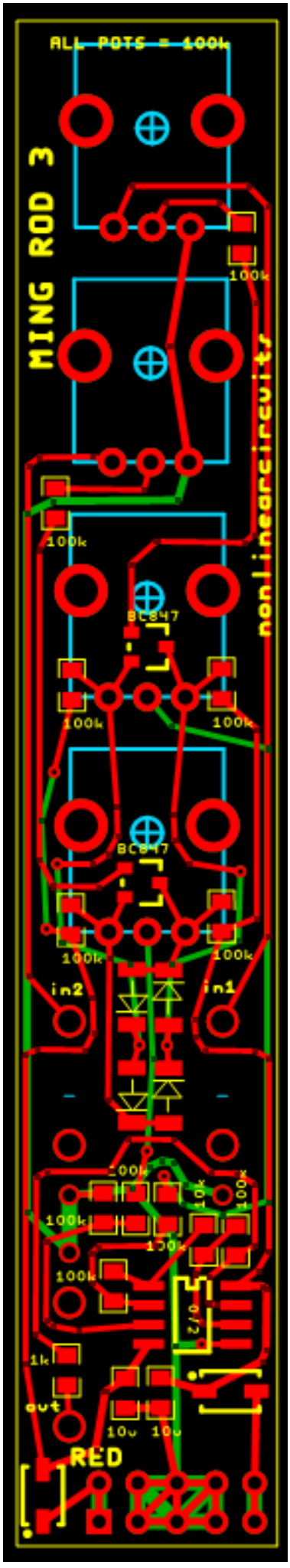


FIGURE 4. TRANSFORMERLESS RING MODULATOR

image from AES paper


nlc
ming rod 2
andrewF
Rev 1.0
8/4/2021
v1
+12v
100k
in
R
Q
-12v
D
10k
1k
shape out


ALL POTS = 100k
MING ROD 3
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100k
BC847
100k
100k
BC847
100k
100k
in2
in1
100k
100k
100k
100k
100k
100k
1k
out
10u
10u
RED