

## nonlinearcircuits

### 1U PiLLs Build & BOM

This is a raw 12HP 1U version of the Mobius PiLL. It uses two cross-coupled Phase locked loop (PLL) ICs that go in and out of chaotic zones at audio rates. If you like making electronic noise, this module is for you. Oh yeh, it has vactrols.

It is a pretty simple build and capable of a wide variety of sounds.

There are 5 inputs, everything affects everything:

FM IN - feeds both PLL ICs

CV Range 1 & 2 - these control the vactrols. The control circuits are very simple.....a resistor and a vactrol!

CV 1 & 2 - these inject a signal into the VCO control input, shove in anything from audio to CV rates and see what you get.

The 4 outputs are from the PLL VCOs and the phase comparators, all are pulse/square waves running from 0-approx 5V.

Please note the white Pulp Logic panel has the manufacturing code on the front, I paid extra for this not to happen but the manufacturer did it anyway and gave me my \$1.50 back. It would be a greater crime to chuck the panels because of this, so it is there, use some whiteout if you really hate it. In the same order I specified gloss black panels and got matte, also specified white PCBs and got one batch of white and one batch of green. Somebody was a bit unfocused that day.



One point to note – Install 100k resistors on the pads marked 1M. If you install 1M it will still work but not as well.

### BOM

component	quantity	notes
1k	4	0805
2k2	4	0805
100k (install on pads marked 1M as well)	6	0805
RL	2	See notes #2
100n	3	0805
1u	2	0805
10u	1	0805 Can use 1u here if you like

CD4046	2	Soic Mouser 595-CD4046BNSRE4 or 771-HEF4046BTD-T
TL072 or TL082	1	Soic Tayda: A-1136 or A-1139
Eurorack 10 pin power connector <b>OR</b> Pulp Logic connector	1	Tayda: A-198 cut to size
Schottky, power rectifier or 10R, optional - for reverse voltage protection...or not. BAT54GWX	1	SMD, Schottky <b>dot on PCB indicates CATHODE (stripe on component)</b> Mouser: 841-BAT54GWX
3.5MM SOCKET Kobiconn style	9	Tayda: A-2563
2.54mm single row pin header strip	2x 3 pins AND 2x 2 pins	Tayda: A-197 cut to size
vactrols	2	See notes #2

Other sources for sockets are Synthcube, Modular addict and Thonk.

#### **Additional notes:**

1. Capacitors should have at least a 25V rating.
2. The two vactrols are best if DIYed. The vactrol circuits are as simple as possible, so it is best to use a superbright LED and a 4k7 or higher resistor for RL. GL5516 is a suitable LDR, get 100 on ebay for a few dollars. Make a vactrol case with heatshrink, black silastic or some black electrical tape....or even don't bother and mount the LED and LDR on the PCB facing each other, this is chaos anyway.
3. The circuit runs on +12V only, if you want to use a Pulp Logic type power connector, the space is marked for it.
4. Make sure the 4046 is rated for at least 15V, some types are 74xxx series and will die in this circuit.
5. As mentioned, install 100k on the pads marked for 1M. I forgot to change these from the proto-type, it gets down to lower freqs with 100k.







