

nonlinearcircuits

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<http://www.sdiy.org>

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Two Neurons build doc. 8 Jan 2012

This circuit was inspired by a paper on neural computing and is a variation of a typical analogue neuron circuit. It is not a chaos circuit but good luck trying to predict what it will do.

To use it: put some LFO and/or EG signals on the inputs, plus maybe something from a sequencer. Use the output to control pitch on a VCO or cut-off on a VCF – or anything else you can think of. Twiddle the pots until it sounds good.

It will even work with just one input signal, although is much more interesting with two or three.

It can also handle audio frequencies, so try it out as a wave-shaper. Feed it two or three signals from different VCOs and let them fight it out. Or feed it a VCO signal and a slow envelope or LFO to modulate the audio.

Just some ideas, if you find some other uses, do share! If you find the errors in this build document please let me know (except for my two stupid typos on the John Waters quote.....) – thanks!

Relevant thread on muffwiggler -

<http://www.muffwiggler.com/forum/viewtopic.php?t=45741&start=0&postdays=0&postorder=asc&highlight=>

Resistors

10 Ω - 2 (thru-hole)

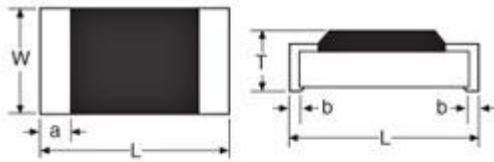
22k Ω - 6 (thru-hole)

1k Ω - 2 (thru-hole)

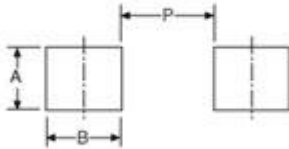
100k Ω - 10 ***These are SMD 1206*** You should install these first

If you have no experience soldering SMD, check out some how-to vids on youtube.

1206 size is very easy, although a set of tweezers is required.



Package Size (mm)					
Type	L	W	a	b	T
1206	3.10	1.60	0.50	0.50	0.55



PCB Pad Layout(mm)			
Type	A	B	P
1206	1.6	1.5	2.0

Diodes

1N4148 – 4 (regular thru-hole signal diodes).

Take care installing the diodes. The two for the upper circuit point in opposite directions, the two for the lower circuit point in the same direction. The markings are a bit hard to see on the PCB, see the pictures below for a close up. If you install one or both diodes incorrectly, the output will just bounce from rail to rail in response to the input signals. It won't damage anything, but it won't be very interesting either. I know this because I installed them incorrectly on my 1st build ☺

1N4004 – 2 (optional – just to protect against power being connected backwards)

Pots

100kΩ Linear – 6

I use 100k pots from Song Huei - R0903N-B100k, L-25KC (the 25 is the length L).

It seems a pretty common footprint. Another pot that fits is this Alpha from Altronics - <http://www.altronics.com.au/index.asp?area=item&id=R1948>

If mounting the pots on the PCB, the spacing is 1 inch apart.

Caps

10μf 25V (or higher) – 2

47nF-100nF – 6

All caps are for decoupling, the spacing is 2.5mm. An example is here - <http://futurlec.com/Capacitors/C100UC.shtml>

ICs

TL072 – 3 (Any dual general purpose op amp should work)

I'd recommend installing IC sockets; these PCBs are plated thru-hole, making it somewhat difficult to remove a dead IC.

Connectors

Holes for Power connector suit 3.96mm 3 pin Molex.

The connectors for the two 4 pin terminals are the standard 4 Pin .100" Header Connectors.

The "in" hole next to the "out" hole is 'In C' and is the one connected to a pot. The other two inputs have no pots on the PCB (install them on the panel if you like but not really needed).

Ground/0V connection

You might notice there is no ground/0V hole.

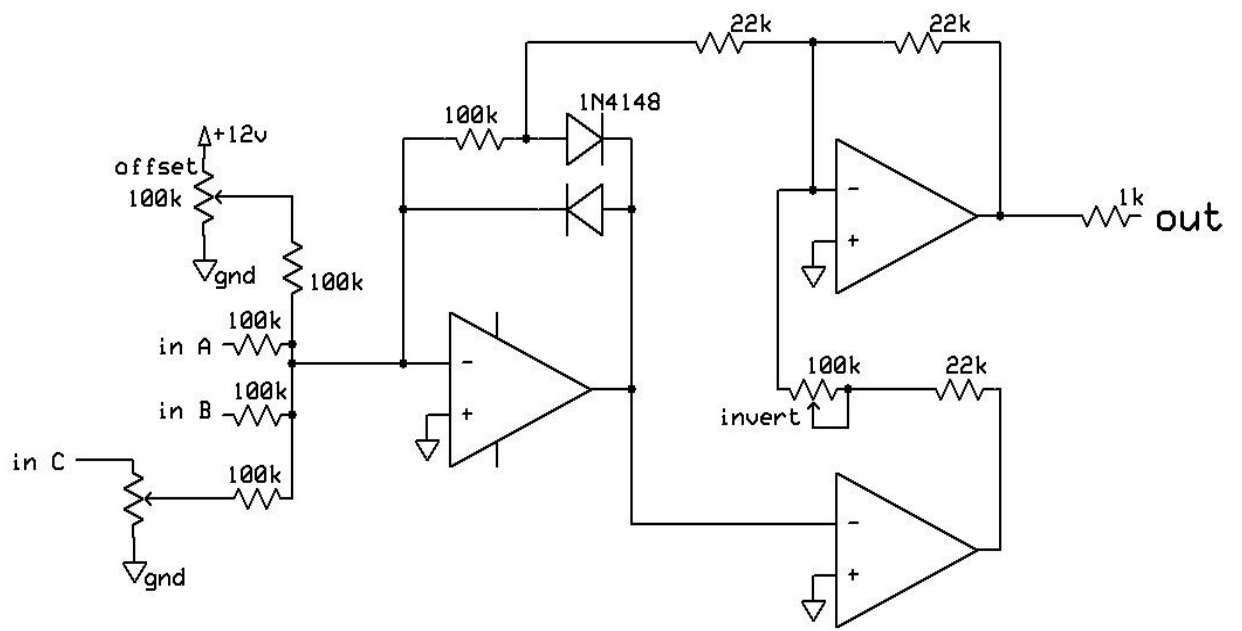
If using minijacks, you will need one, bananas don't need one (I got nanas)

You could leave out the 1N4004 diodes and use the two holes there for your ground/0V connections.

Or

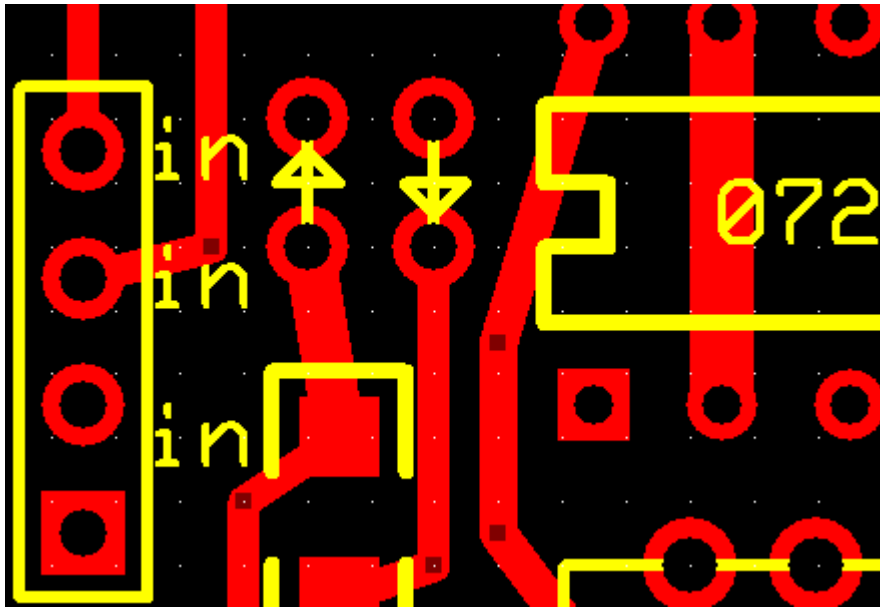
Install the 1N4004 diodes so that terminal to the ground holes is exposed and then solder your ground/0V wires to the exposed diode terminal.

This circuit will work on +/-12V or +/-15V with no mods required.

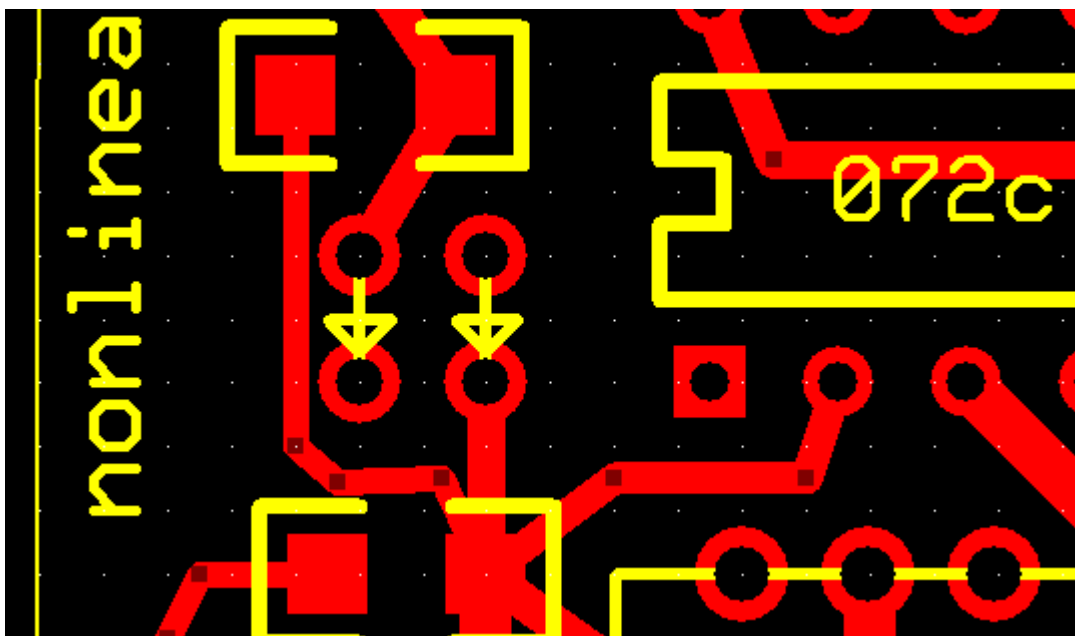


Two Neurons - two circuits on one PCB

Power connections and decoupling caps not shown.



upper circuit – note diode orientation



lower circuit – note diode orientation

