

## nonlinearcircuits

### 8HP triple Sloth Build & BOM

This module contains 3 Sloth chaos circuits. Each one runs at a different rate; Torpor takes approx. 15-30 seconds to travel around 2 strange attractors, Apathy takes 60-90 seconds and Inertia takes 30-40 minutes.

There are no controls for Inertia, it does what it wants.

The pots for Apathy and Torpor do not specifically alter the frequencies, rather the weight of the outputs. Various settings will cause the signals to spend more time travelling around one strange attractor rather than the other.

Apathy and Torpor also have CV inputs. Sometimes the CV signals are injected onto the chaotic signals but depending upon conditions may cause windows of periodicity or voltage jumps. Generally the results are good.

The X, Y & Z outputs for each Sloth are taken from different stages of the circuit and are all different to each other. Z is simply the inverted signal of Y. The three Z outputs are also fed into a Difference Rectifier and the results of this are available from the + and - outputs at the bottom of the panel. The Difference Rectifier outputs are (ignoring diode voltage drops):

$$\text{out +} = V_{\text{Apathy}} + V_{\text{Inertia}} - V_{\text{Torpor}} \quad \text{If greater than 0, otherwise 0}$$

$$\text{out -} = V_{\text{Apathy}} + V_{\text{Inertia}} - V_{\text{Torpor}} \quad \text{If less than 0, otherwise 0}$$

**Mod - VERSION 2 only (fixed on version 3) :** The two LL4148 diodes (D1, D2) should be installed backwards to the markings on the PCB. If you don't do this it is no biggie, just the + & - outputs are reversed on the panel....but they are both chaotic anyway.

**Update: R7 has been changed from 150k to 220k, this gives Inertia a bit more balance.**

**FOR VERSIONS 1-4 bottom PCB ONLY- THE POTS AND JACKS GO ON THE BACK OF THE BOTTOM PCB; THE SIDE WITH NO PRINTING ON IT, CHECK THE PICTURES IN THIS BUILD GUIDE**

**Version 5 of the bottom PCB** has the pots, LEDs and jacks mounted on the side where the screenprint indicates, also note vers. 5 only uses 'thonkiconn' type jacks (Tayda part number:A-2563)

### Building

1. The PCB components are marked with R1, R2, etc. I know this is a PITA but it means you can build the module with your preferred Sloths. Please note the component numbers are not compatible with the earlier 4HP and 12HP Sloths. The Torpor version has very similar components as the regular Sloth, but the others do not.
2. The Stasis Sloth cannot be built on this PCB, the large capacitors it requires means it can only be built on the 4HP thru-hole PCB.
3. Some of the text printed on the PCB is difficult to read, it is a very tight layout in places, check pages 4-7 in this manual for screenshots of the PCB to ascertain the component designators.
4. When connecting the top and bottom PCBs, it is best to insert the connectors on one PCB. Just solder the end pins 1<sup>st</sup> and check they are perpendicular to the PCB. If okay solder all the pins. Next insert the matching connectors on the other PCB, **do not solder anything yet**. Bring the PCBs together and insert the connectors into their mates, check everything looks straight and true, then solder up all the pins.
5. Finally, the PCB is all surface mount, not particularly difficult for an experienced DIYer but not suitable for a beginner. If you are new to synth DIY, I suggest you start with the 4HP single Sloth which has a PCB for thru-hole components.

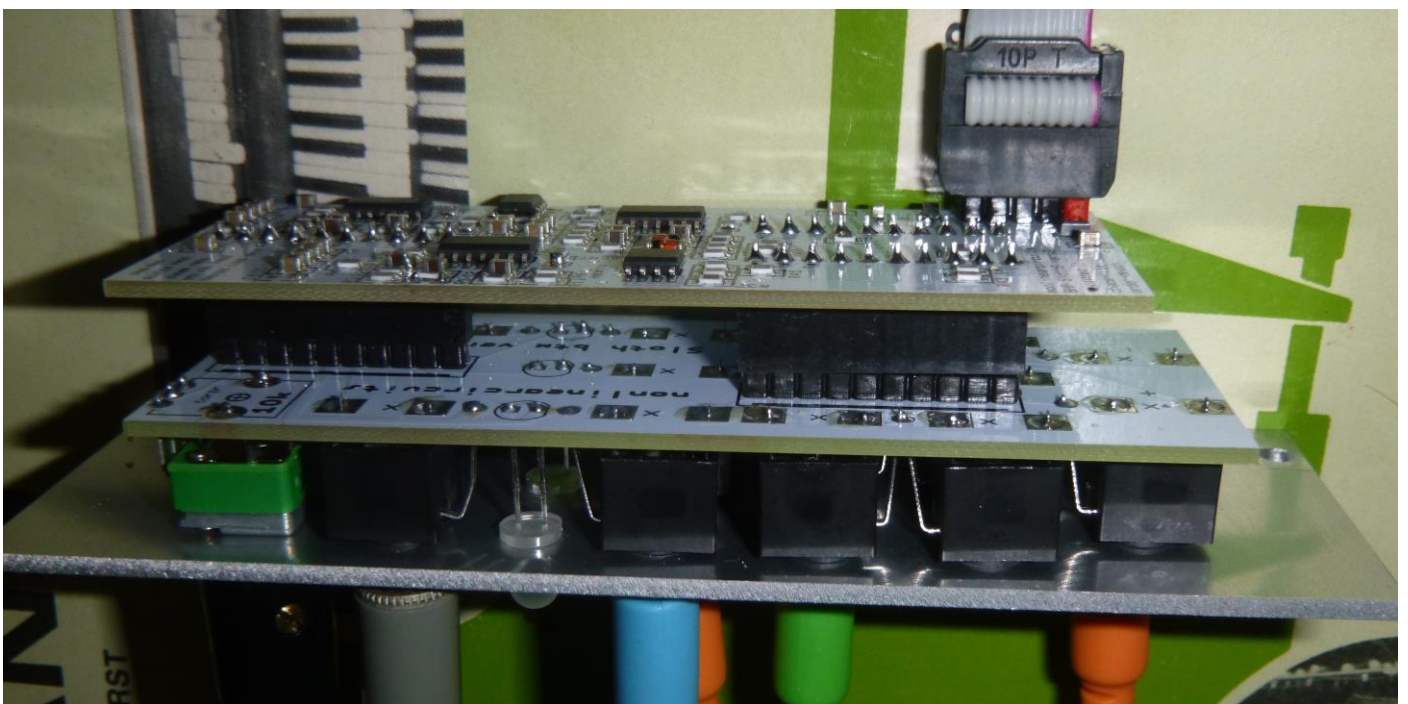
## BOM

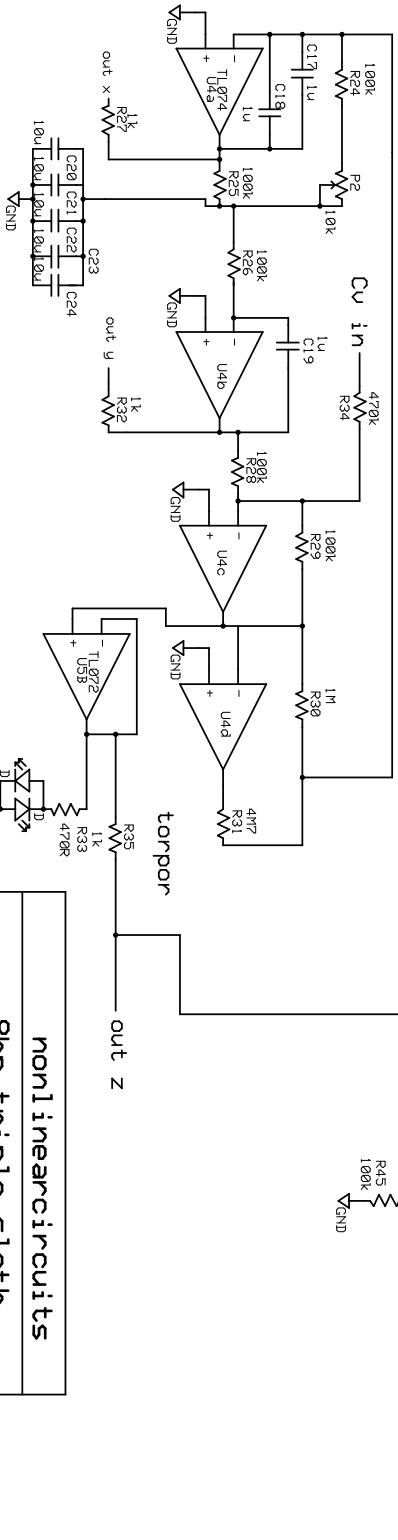
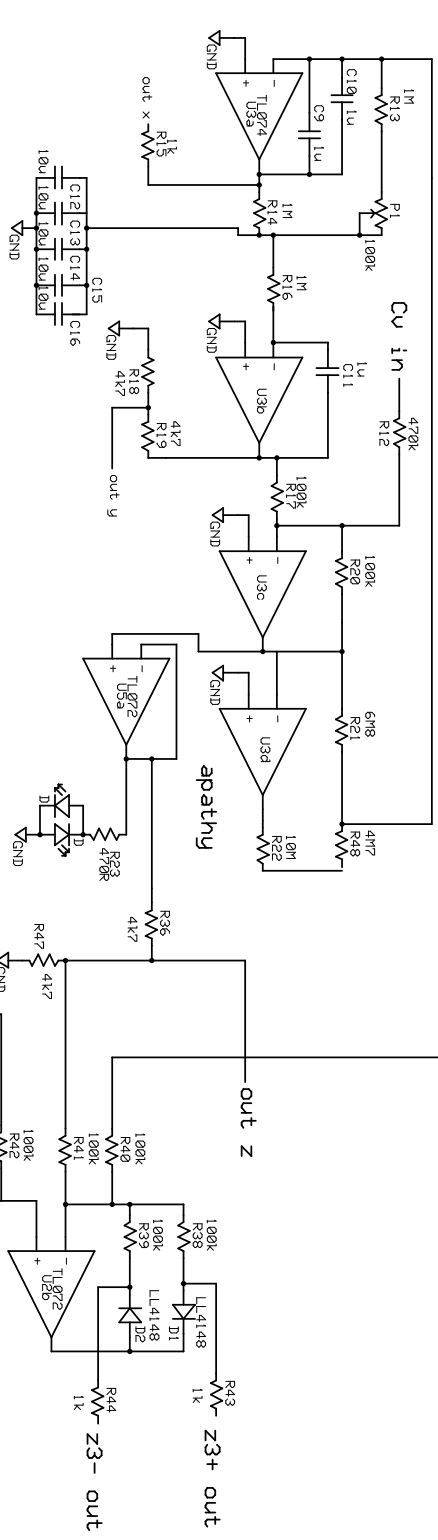
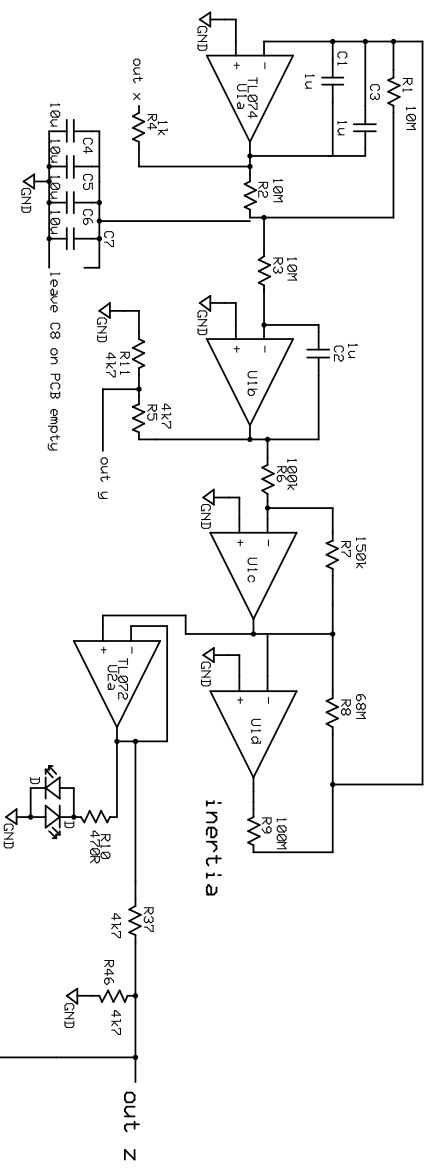
VALUE	DESIGNATOR/QUANTITY	DETAILS
1 $\mu$ F	C1, C2, C3, C9, C10, C11, C17, C18, C19	0805 25V rating
10 $\mu$ F	C4, C5, C6, C7, C12, C13, C14, C15, C16, C20, C21, C22, C23, C24, C25, C26, C27, C28	0805 25V rating
-	C8	LEAVE EMPTY
470 $\Omega$	R10 (RL), R23 (RL), R33 (RL)	0805 adjust to suit LED brightness
1k	R4, R15, R27, R32, R35, R43, R44	0805
4k7	R5, R11, R37, R46, R18, R19 R36, R47	0805
100k	R17, R24, R25, R26, R28, R29, R38, R39, R40, R41, R42, R45, R6, R20	0805
220K	R7,	0805
470K	R12, R34	0805
1M	R13, R14, R16, R30	0805
4M7	R31, R48	0805
6M8	R21	0805
10M	R1, R2, R3, R22	0805
68M	R8	0805
100M	R9	0805
TL072 or TL082	U2, U5	SOIC Tayda: A-1136
TL074 or TL084	U1, U3, U4	SOIC Tayda: A-1137
Eurorack 10 pin power connector	1	Tayda: A-198
10 Pin 2.54mm Single Row Pin Header Strip	3	Tayda: A-197
10 Pin 2.54mm Single Row Female Pin Header	3	Tayda: A-1306
S1JL or similar, optional - for reverse voltage protection	2	SMD, standard power diode 600V 1A, dot on PCB indicates cathode (stripe)
LL4148	D1, D2	SOD-80
10k POT	P2	Tayda: A-1847
100k POT	P1	Tayda: A-1848
Bipolar two pin LED	3	5mm
3.5MM SOCKET Kobiconn style	13	Tayda: A-865 (version 5 of the bottom PCB must use Thonkiconns, Tayda: A-2563)

### Additional shopping notes:

1. 10uF 0805 25V - Mouser Part No: 81-GRM21BR61E106KA3L
2. 1uF 0805 25V - Mouser Part No: 81-GRM219R71E105KA8D
3. The prices for these 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.
4. Bipolar two pin LED – cheapest source is ebay, search ‘bipolar 2 pin LED diffused’ or variations of. Otherwise Mouser Part No: 604-WP57EGW

5. S1JL Power diode for Reverse voltage protection - Mouser Part No: 821-S1JL
6. The 68M and 100M 0805 resistors will need to be bought from Mouser or similar.
7. LL4148 - Mouser Part No: 512-LL4148





c28, c27, c25, c26 = 10U 0805



