

# DELUXE *Sonomatic*



doc v1.1 copyright 2019 - info: ceesvaneijk@live.nl

## - Building instructions

*Skidmark*™

## DISCLAIMER

The Sonomic Deluxe V1. PCB is not a commercial product and the boards that I have left are therefore available at cost price plus a small additional fee for packing and handling. Please duly note that the PCB comes with no technical support ...\* It has however been (triple) verified to work just fine, just make sure you use parts from a trustworthy source, especially on the PT2399 IC's.

Due to the large part count and the complexity of the circuit, you should at least have intermediate knowledge of electronics and ditto experience with populating a PCB.

Also make sure you got it 'right the first time'. The PCB contains a lot of fragile through hole connections, which makes desoldering a real pain ... If you want to experiment with (different) component values, I strongly recommend using sockets. Otherwise you could end up using 'wire jumpers' in order to restore broken connections ...

One of the tricky steps when building a pedal with board mounted pot's and switches, is of course getting the hardware to line up with the holes in the enclosure. If you do not feel comfortable in achieving this, then just wire up the pots and switches with short wire leads. This will create some leeway and additional tolerance when drilling the enclosure.

Now that we have all that negativity out of the way, have fun building the Sonomic Deluxe, the results will be rewarding!

If you want to use the same (waterslide decal) design I used for the enclosure, just drop me a mail!

**The Sonomic Deluxe would not have been possible without the knowledge I have gained when building (and analysing) great PT designs in the likes of Madbean's - Zero Point SDX2, 1776Effects - Multiplex Echo Machine and Deadastronaut FX – Abductor II Delay, so check them out!**

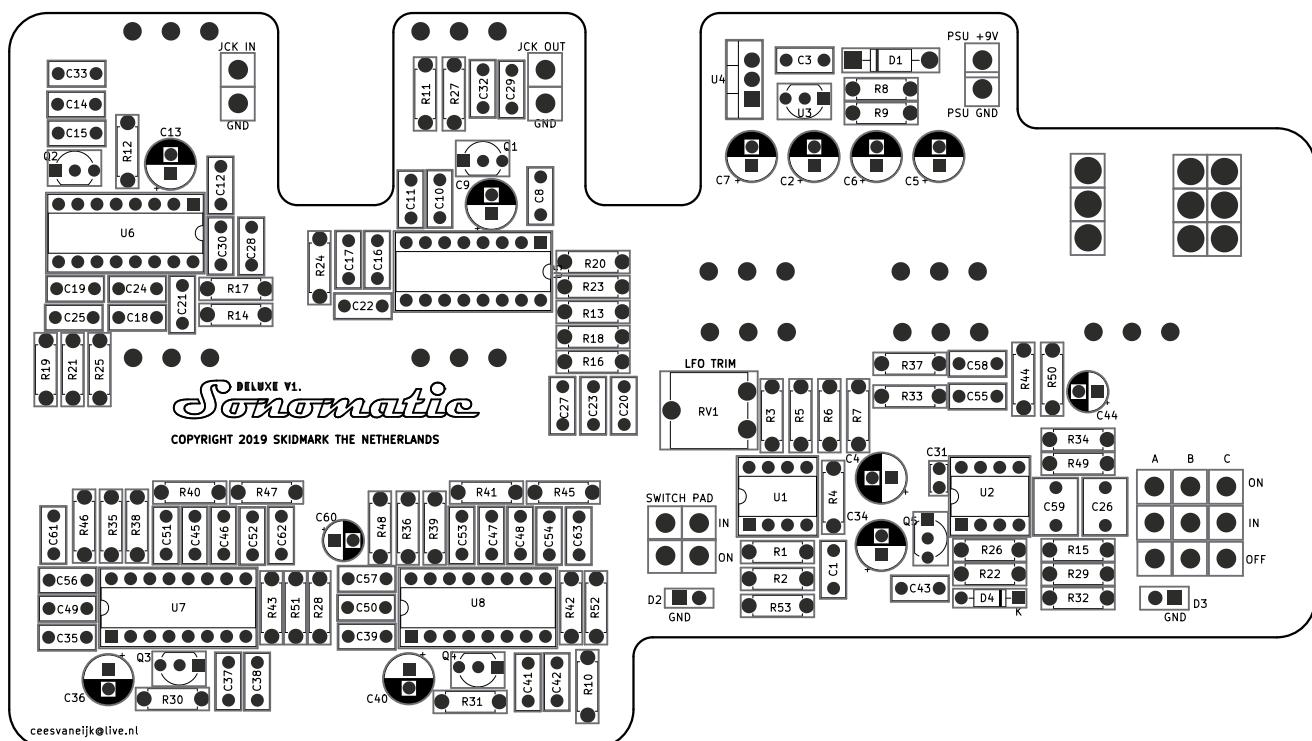
Happy pedalling people!

info: [ceesvaneijk@live.nl](mailto:ceesvaneijk@live.nl)

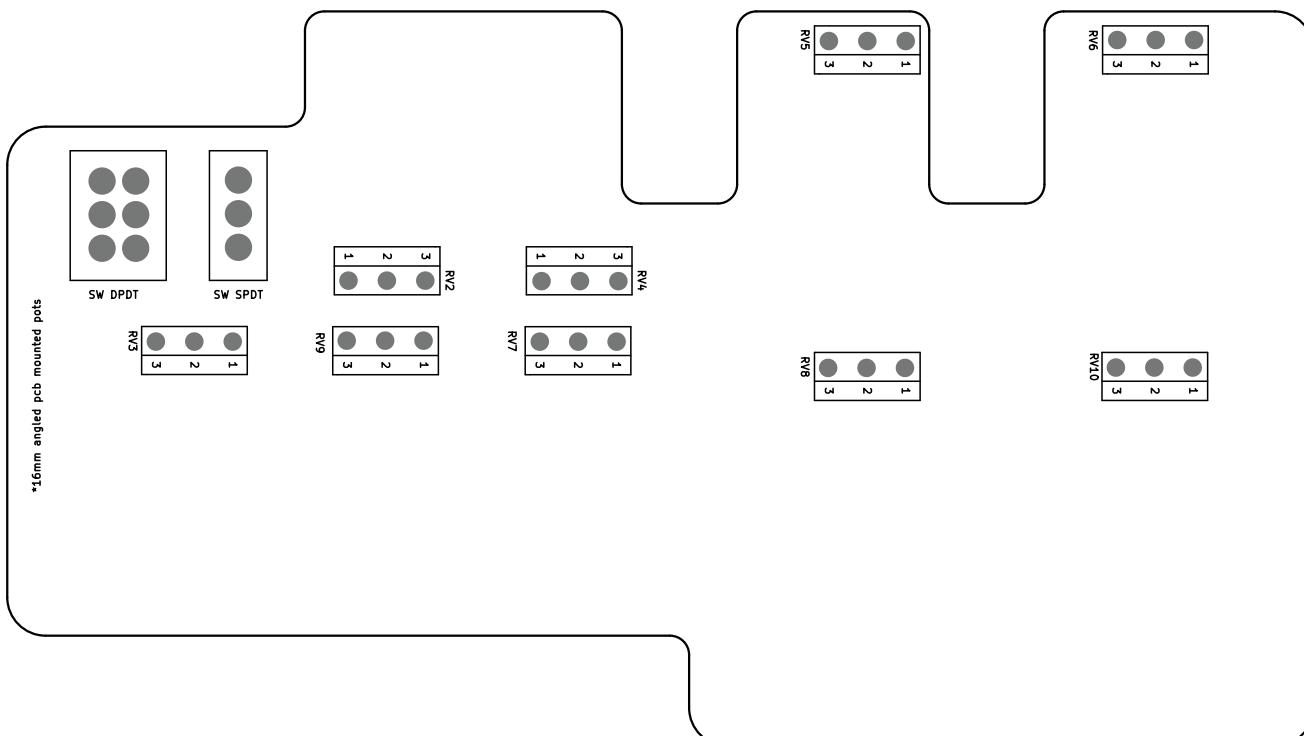
\* of course you can always drop me a mail and I will try to help you out where I can, but expect response time to take a while ...

# Sonomatic

## (Deluxe V1.) - LAYOUT

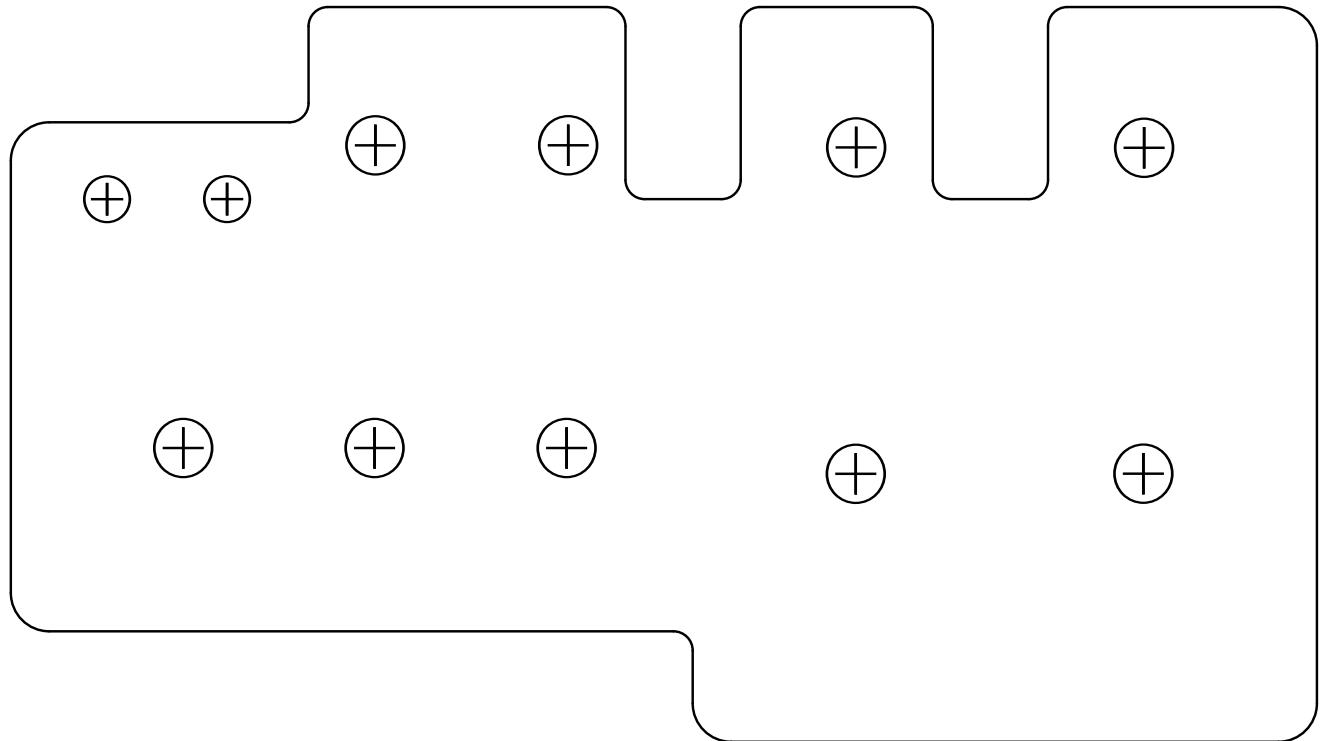


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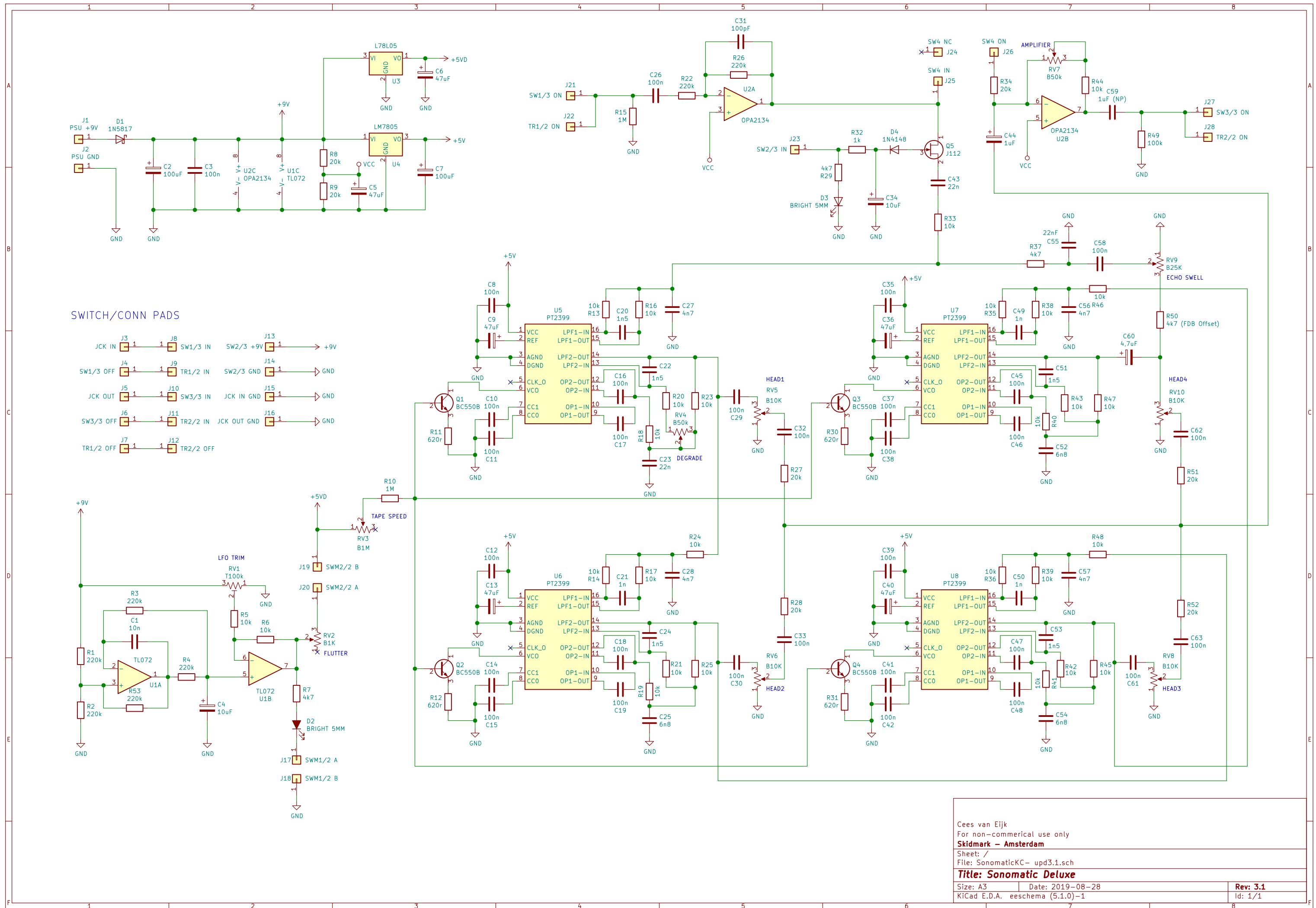
(Deluxe V1.) - Drill Template



**Note:** when using the included (design) decal, print and use that as the drill template, then print the same design once again on decal paper.



1" or 2,54 mm   **Check your .pdf printing settings!**





## (Deluxe V1.) - BOM

### Capacitors

C1	10n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C2	100uF	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor
C3	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C4	10uF	Capacitor_THT:CP_Radial_D5.0/6.3mm_P2.50mm	Polarized capacitor
C5	47uF	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor
C6	47uF	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor
C7	100uF	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor
C8	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C9	47uF	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor
C10	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C11	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C12	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C13	47uF	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor
C14	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C15	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C16	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C17	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C18	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C19	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C20	1n5	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C21	1n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C22	1n5	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C23	22n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C24	1n5	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C25	6n8	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C26	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C27	4n7	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C28	4n7	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C29	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C30	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C31	100pF	Capacitor_THT:C_Disc_D3.4mm_W2.1mm_P2.50mm	Unpolarized capacitor
C32	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C33	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C34	10uF	Capacitor_THT:CP_Radial_D5.0/6.3mm_P2.50mm	Polarized capacitor
C35	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C36	47uF	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor
C37	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C38	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C39	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C40	47uF	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor
C41	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C42	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C43	22n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C44	1uF	Capacitor_THT:CP_Radial_D5.0mm_P2.00mm	Polarized capacitor
C45	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C46	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C47	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C48	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C49	1n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C50	1n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor



## (Deluxe V1.) - BOM

### Capacitors

C51	1n5	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C52	6n8	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C53	1n5	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C54	6n8	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C55	22nF	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C56	4n7	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C57	4n7	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C58	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C59	1uF (NP)	Capacitor_THT:C_Rect_L7.2mm_W5.5mm_P5.00mm	Unpolarized capacitor
C60	4,7uF	Capacitor_THT:CP_Radial_D6.3mm_P2.50mm	Polarized capacitor
C61	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C62	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor
C63	100n	Capacitor_THT:C_Rect_L7.2mm_W3.0mm_P5.00mm	Unpolarized capacitor

### Resistors

R1	220k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R2	220k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R3	220k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R4	220k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R5	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R6	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R7	4k7	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R8	20k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R9	20k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R10	1M	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R11	620r	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R12	620r	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R13	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R14	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R15	1M	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R16	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R17	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R18	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R19	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R20	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R21	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R22	220k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R23	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R24	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R25	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R26	220k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R27	20k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R28	20k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R29	4k7	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R30	620r	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R31	620r	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R32	1k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R33	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R34	20k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor



## (Deluxe V1.) - BOM

### Resistors

R35	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R36	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R37	4k7	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R38	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R39	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R40	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R41	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R42	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R43	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R44	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R45	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R46	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R47	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R48	10k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R49	100k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R50	4k7 (FDB Offset)	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R51	20k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R52	20k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor
R53	220k	Metal film 1/4 W 1 % Resistor_THT:R_Axial_(DIN0207)	Resistor

### Potentiometers

RV1	T100k	Trim Potentiometer 10 mm_THT:ACP_CA9-V10_Vertical	Trimpot
RV2	B1K	Alpha (right angle) 16 mm Potentiometer_THT	Potentiometer
RV3	B1M	Alpha (right angle) 16 mm Potentiometer_THT	Potentiometer
RV4	B50k	Alpha (right angle) 16 mm Potentiometer_THT	Potentiometer
RV5	B10K	Alpha (right angle) 16 mm Potentiometer_THT	Potentiometer
RV6	B10K	Alpha (right angle) 16 mm Potentiometer_THT	Potentiometer
RV7	B50k	Alpha (right angle) 16 mm Potentiometer_THT	Potentiometer
RV8	B10K	Alpha (right angle) 16 mm Potentiometer_THT	Potentiometer
RV9	B25K	Alpha (right angle) 16 mm Potentiometer_THT	Potentiometer
RV10	B10K	Alpha (right angle) 16 mm Potentiometer_THT	Potentiometer

### IC's & voltage regulators

U1	TL072	THT DIP-8_W7.62mm	Dual Low-Noise Operational Amplifiers
U2	OPA2134	THT DIP-8_W7.62mm	Dual Low-Noise Operational Amplifiers
U3	L78L05	THT:TO-92_Inline	Positive Linear Regulator
U4	LM7805	THT:TO-220-3_Vertical	Positive Linear Regulator
U5	PT2399	THT DIP-16_W7.62mm	Echo Processor IC
U6	PT2399	THT DIP-16_W7.62mm	Echo Processor IC
U7	PT2399	THT DIP-16_W7.62mm	Echo Processor IC
U8	PT2399	THT DIP-16_W7.62mm	Echo Processor IC



## (Deluxe V1.) - BOM

### Transistors & Diodes

D1	1N5817	Diode_THT:D_DO-41_SOD81_P10.16mm_Horizontal	20V 1A Schottky Barrier Rectifier Diode
D2	5MM (BRIGHT) GR	LED_THT:LED_D5.0mm	Light emitting diode
D3	5MM (BRIGHT) GR	LED_THT:LED_D5.0mm	Light emitting diode
D4	1N4148	Diode_THT:D_DO-35_SOD27_P7.62mm_Horizontal	100V 0.15A standard switching diode
Q1	BC550B	THT:TO-92_Inline	Small Signal NPN Transistor
Q2	BC550B	THT:TO-92_Inline	Small Signal NPN Transistor
Q3	BC550B	THT:TO-92_Inline	Small Signal NPN Transistor
Q4	BC550B	THT:TO-92_Inline	Small Signal NPN Transistor
Q5	J112	THT:TO-92_Inline	N-JFET transistor, drain/source/gate

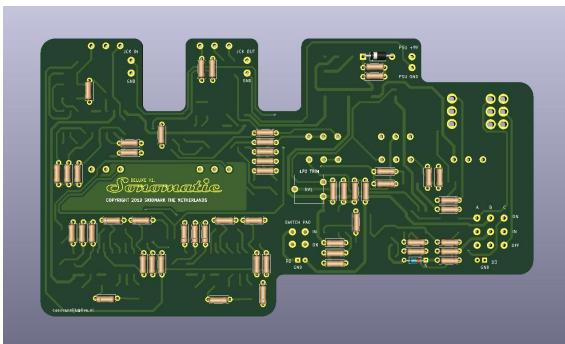
### Hardware (miscellaneous)

1x	Input Jack	6,3 mm Lumberg mono jack	Hardware
1x	Output Jack	6,3 mm Lumberg mono jack	Hardware
1x	Bypass switch	Standard 12 mm 3PDT Footswitch	Hardware
1x	LFO Switch	Standard 12 mm 3PDT Footswitch (only 2PDT required)	Hardware
1x	Wet only switch	6 mm toggle SPDT switch	Hardware
1x	Trails on/TBP	6 mm toggle DPDT switch	Hardware
1x	DC input jack	2,1 mm Lumberg DC jack	Hardware
4x	IC socket	DIP-16_W7.62mm_Socket	Hardware
2x	IC socket	DIP-8_W7.62mm_Socket	Hardware
6x	Strip sockets	3 pin x 2,54 mm (for convenient TO-92 mounting)	Hardware

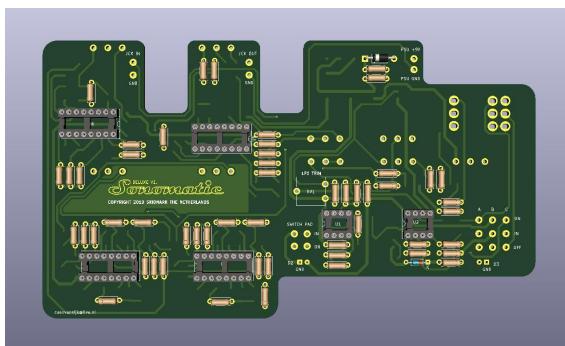
# Sonomatic

## (Deluxe V1.) - General instructions

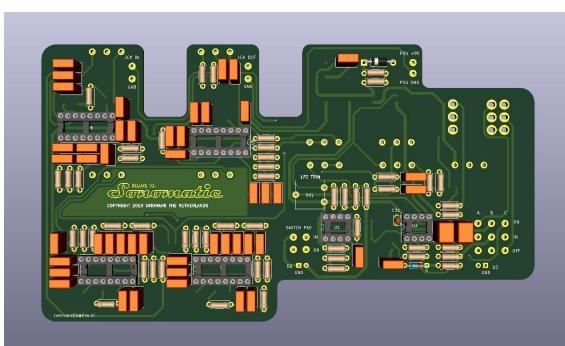
It's probably common practice for most of you, but when populating a board it's a good idea to keep the height of the individual components in account. Build the board up in 'layers', otherwise it could get tricky 'dropping in' a resistor between other components surrounding it.



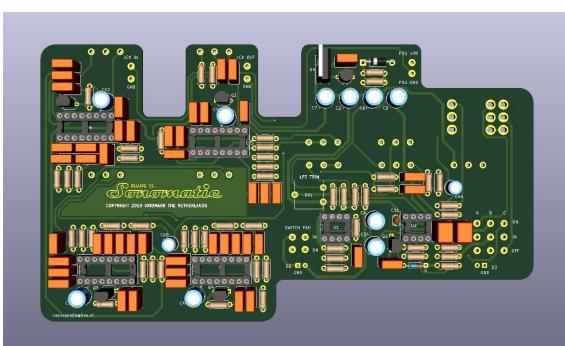
Start with mounting the resistors and the diodes.



Than install the IC sockets and the trimpot.



Next up are the (non-polarized) film box capacitors.



And finish this side of the board with the transistors, voltage regulators and electrolytic capacitors.

# Sonomatic

(Deluxe V1.) - 1590DD ENCLOSURE



During the design of the PCB, I just totally overlooked the fact that most 1590DD sized enclosures, have six set screws for the back plate, instead of the regular four ...

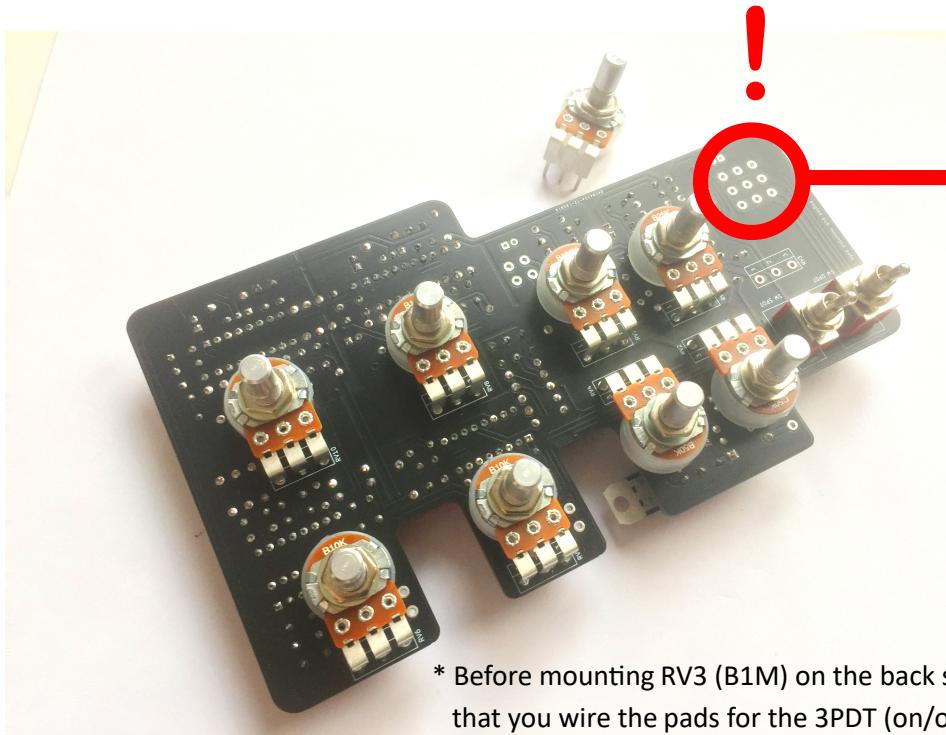
Thanks to Murphy's law, the drill hole for the output jack is situated exactly at the position of one of the screws for the back plate.

There's really no easy way around this, so filing out the lower part of the screw hole, is probably your best option. I used a 'Dremel' to cut it out (it took me about ten minutes), but a hand file and some elbow grease should do the job just as well ...

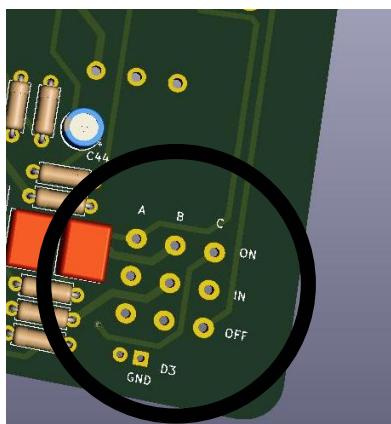
Alternatively you could decide to use a single TRS jack, and hook up the Sonomatic with a Y-cable, or simply use a different enclosure.

# Sonomatic

## (Deluxe V1.) - SWITCHES (WIRING)



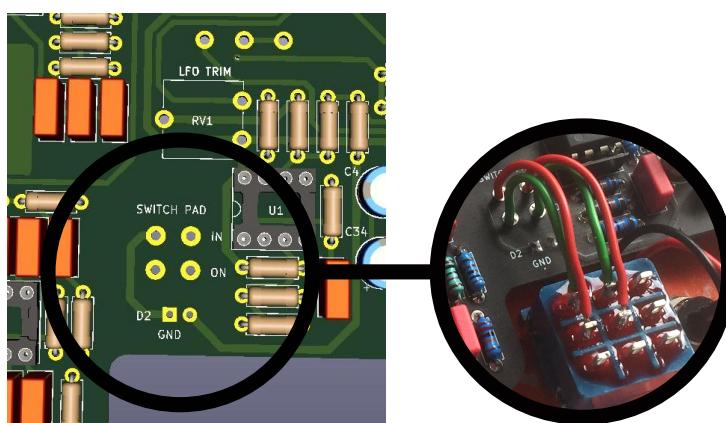
\* Before mounting RV3 (B1M) on the back side of the PCB, make sure that you wire the pads for the 3PDT (on/off) switch on the front side of the PCB first!



The markings on the PCB should correspond with the below pictured switch 'matrix', so A-on of the PCB goes the A-on of the switch, and so on.



*Start with the bottom row ('off') of the PCB and work your way up.*



*For the tape effect switch you can use a DPST, DPDT, or in this case a 3PDT.*

# Functions



**'Head 1'** – sets the volume of the first delay tap (max. 200 ms).

**'Head 2'** – sets the volume of the second delay tap (max. 400 ms).

**'Head 3'** – sets the volume of the third delay tap (max. 600 ms).

**'Head 4'** – sets the volume of the fourth delay tap (max. 800 ms).

**'Tape speed'** – sets the delay time for all four taps simultaneously.

**'Echo swell'** – sets the amount of overall feedback.

**'Amplifier'** – sets the master volume (also active in bypass with the TBP switch set to tails!).

**'Flutter'** – sets the amount of tape friction simulation.\*

**'Degrade'** – sets the amount of filtering on the repeats thus simulating 'tape age'.

**'Wet'** – toggles off the dry (analog) through for wet/dry set ups.

**'TBP'** – toggles between tails and true bypass.

**ON/BP** – activates the Sonomatic Deluxe.

**TAPE** – toggles on/off the 'Flutter' as set in the tape effect section .

**DC in** – socket for 9 volt centre negative

\* with the internal trimpot (LFO trim) you can set the 'scope' of the friction effect.

Duly note that this circuit is specifically designed to mimic those little imperfections in the magnetic tape of real tape delay's.

# Sonomatic

Update V1.1

## The LM7805

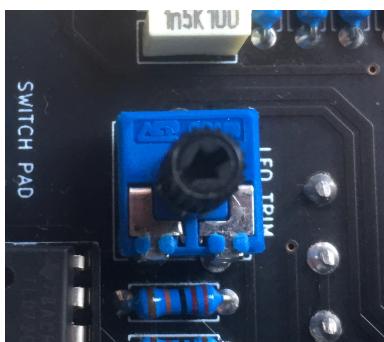
It was brought to my attention that in the building doc's it is not clearly stated that the larger voltage regulator (U4 - LM7805) needs to be bend down, as otherwise the lid won't fit on the enclosure. In addition I would say, bend the legs in a 90° angle before mounting the regulator. Also make sure that the conductive side doesn't contact the tip of the output jack! - *Cheers Ronald, solid advise!*



## Self oscillation with The Sonomatic?

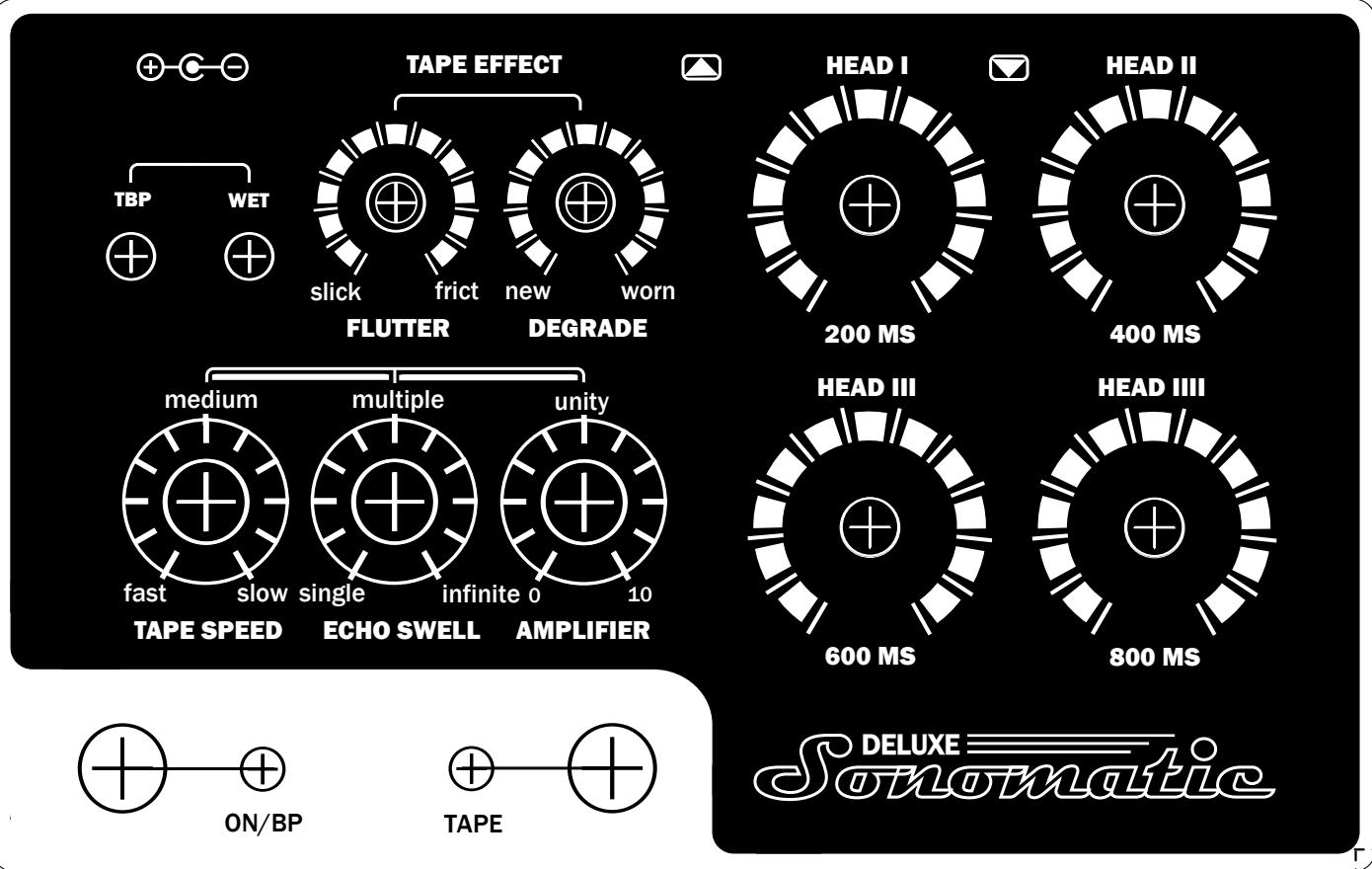
Depending on the input level and the individual 'head' settings, the Sonomatic generates (near to) infinitive repeats with the 'Echo swell' set to full. Some of you have asked if it would be possible to make the Sonomatic (also) go in to self oscillation. Although I'm not a huge fan of oscillation with PT2399 based delay types in general, it surely can be done by reducing the value of R50 (also called 'FDB offset' in the schematic). Keep in mind that if this 'offset' is set to low, you might not be able to create just a single repeat from one of the heads. Some of the subsequent repeats may become faintly audible ... I strongly suggest that you socket R50, and start with a value of 3k9 and then work your way down.

## Setting the trim for the 'Flutter' effect



Of course there is no right or wrong way to set up the flutter, any setting that works for you is the proper one! The below method is just to make sure you have the effect over the full range of the flutter pot.

- Set the level of 'Head III' at full.
  - Set 'Tape speed' at 12 o'clock.
  - Set 'Flutter' to zero (slick).
- 
- Play a chord and slowly turn the trimpot clockwise until you here the flutter/pitch bend.
  - Turn the trimpot a little bit back, making sure the flutter/pitch bend is not audible anymore.



GENERIC 'DD STYLE' (TAYDA ETC.) 186 X 117 MM. TOPSIDE

