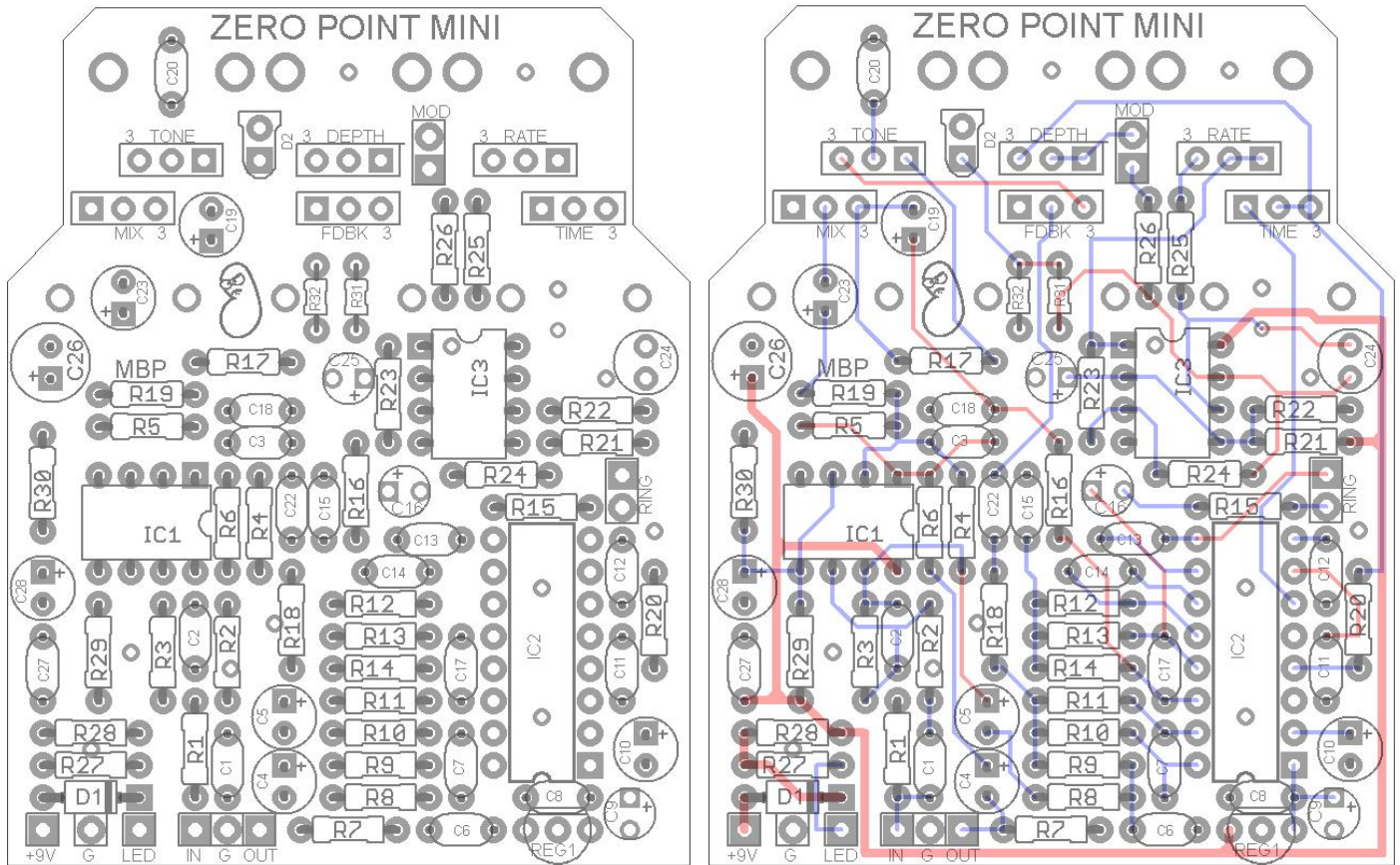


# ZERO POINT MINI

FX Type: Delay

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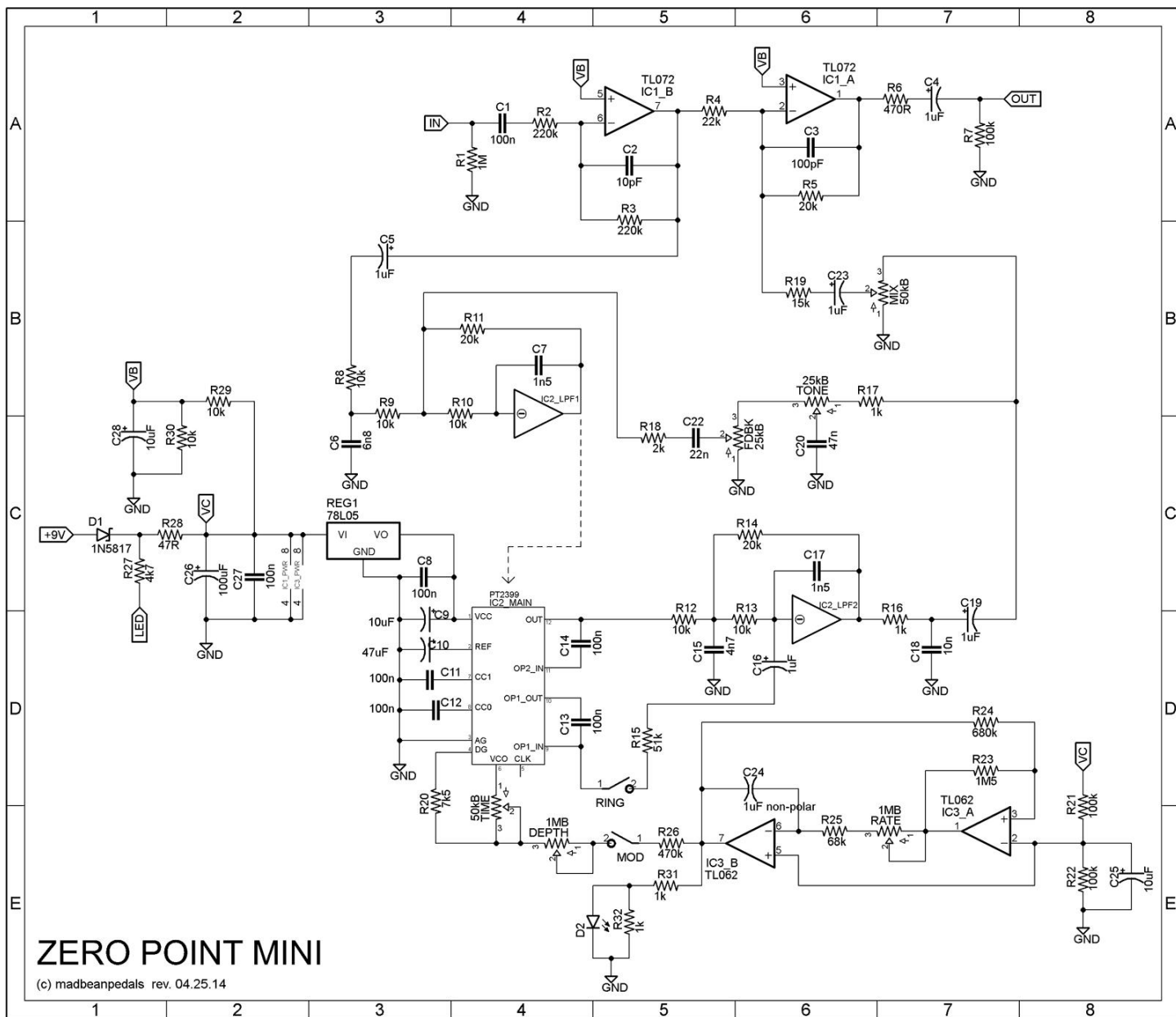
2.12" W x 2.66" H



**Terms of Use:** You are free to use purchased **Zero Point Mini** circuit boards for both DIY and small commercial operations. You may not offer **Zero Point Mini** boards for resale or as part of a "kit" in a commercial fashion. Peer to peer re-sale is, of course, okay.

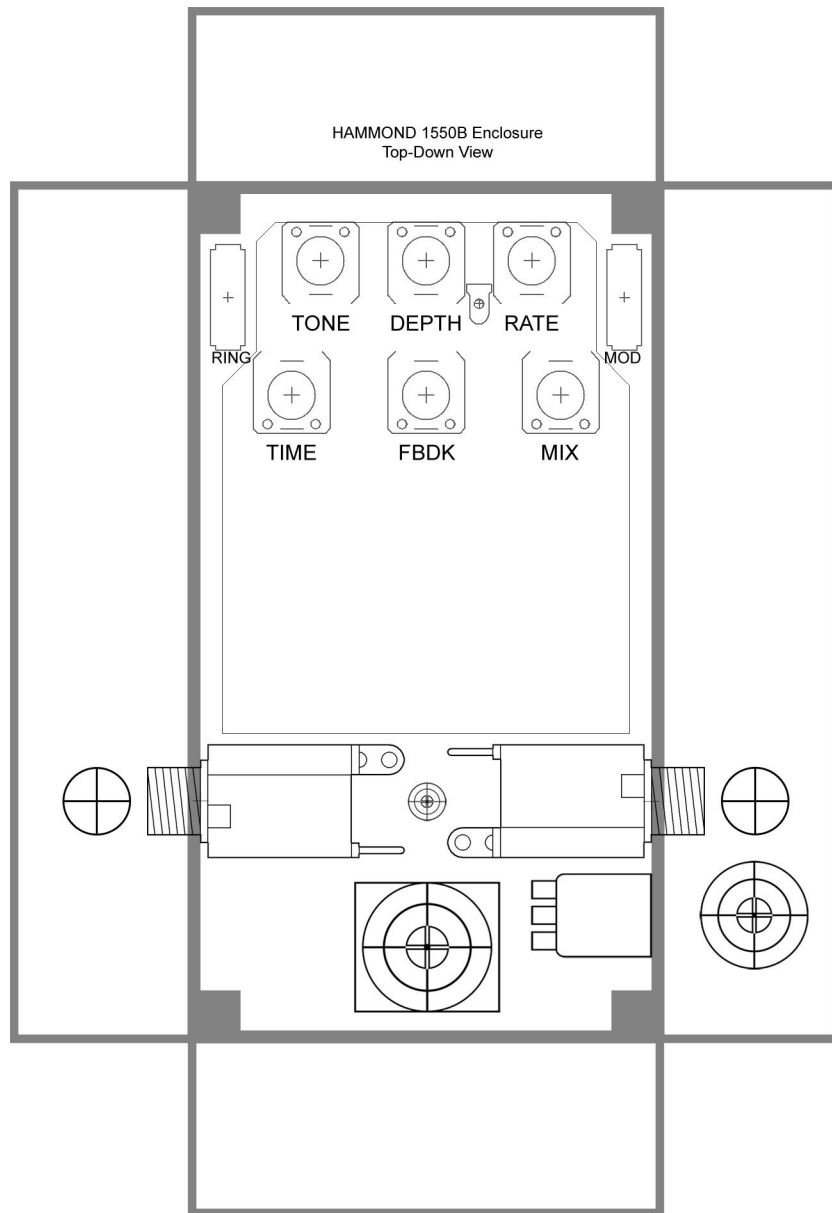
Resistors		Caps		Diodes	
R1	1M	C1	100n	D1	1N5817
R2	220k	C2	10pF	D2	LED3MM
R3	220k	C3	100pF	Regulator	
R4	22k	C4	1uF	REG1	LM78L05
R5	20k	C5	1uF	IC	
R6	470R	C6	6n8	IC1	TL072
R7	100k	C7	1n5	IC2	PT2399
R8	10k	C8	100n	IC3	TL062
R9	10k	C9	10uF Tant.	Switches	
R10	10k	C10	47uF	MOD	SPST
R11	20k	C11	100n	RING	SPST
R12	10k	C12	100n	Pots	
R13	10k	C13	100n	TIME	50kB
R14	20k	C14	100n	FDBK	25kB
R15	51k	C15	4n7	MIX	50kB
R16	1k	C16	1uF	RATE	1MB
R17	1k	C17	1n5	TONE	25kB
R18	2k	C18	10n	DEPTH	1MB
R19	15k	C19	1uF		
R20	7k5	C20	47n		
R21	100k	C22	22n		
R22	100k	C23	1uF		
R23	1M5	C24	1uF non-polar		
R24	680k	C25	10uF		
R25	68k	C26	100uF		
R26	470k	C27	100n		
R27	4k7	C28	10uF		
R28	47R				
R29	10k				
R30	10k				
R31	1k				
R32	1k				

Shopping List			
Value	QTY	Type	Rating
47R	1	Metal / Carbon Film	1/4W
470R	1	Metal / Carbon Film	1/4W
1k	4	Metal / Carbon Film	1/4W
2k	1	Metal / Carbon Film	1/4W
4k7	1	Metal / Carbon Film	1/4W
7k5	1	Metal / Carbon Film	1/4W
10k	7	Metal / Carbon Film	1/4W
15k	1	Metal / Carbon Film	1/4W
20k	3	Metal / Carbon Film	1/4W
22k	1	Metal / Carbon Film	1/4W
51k	1	Metal / Carbon Film	1/4W
68k	1	Metal / Carbon Film	1/4W
100k	3	Metal / Carbon Film	1/4W
220k	2	Metal / Carbon Film	1/4W
470k	1	Metal / Carbon Film	1/4W
680k	1	Metal / Carbon Film	1/4W
1M	1	Metal / Carbon Film	1/4W
1M5	1	Metal / Carbon Film	1/4W
10pF	1	Ceramic	16v or more
100pF	1	Ceramic	16v or more
1n5	2	Film	16v or more
4n7	1	Film	16v or more
6n8	1	Film	16v or more
10n	1	Film	16v or more
22n	1	Film	16v or more
47n	1	Film	16v or more
100n	7	Film	16v or more
1uF non-polar	1	Non-Polar Electrolytic	16v or more
1uF	5	Electrolytic	16v or more
10uF	1	Electrolytic	16v or more
10uF	2	Electrolytic	16v or more
47uF	1	Electrolytic	16v or more
100uF	1	Electrolytic	16v or more
1N5817	1		
LED3MM	1	Red Diffused	
LM78L05	1	T0-92	
TL072	1	DIP	
PT2399	1	DIP	
TL062	1	DIP	
SPST	2	SPST or SPDT	Mini Switch
50kB	2	9mm Alpha Metal Shaft	
25kB	1	9mm Alpha Metal Shaft	
1MB	2	9mm Alpha Plasic Shaft	*see notes
25kB	1	9mm Alpha Plasic Shaft	



## 1550B Enclosure

4.33" W x 6.3" H



The Hammond 1550B is wider than the 1590B but not as tall. This enclosure will fit the ZP Mini more easily, but is not required.

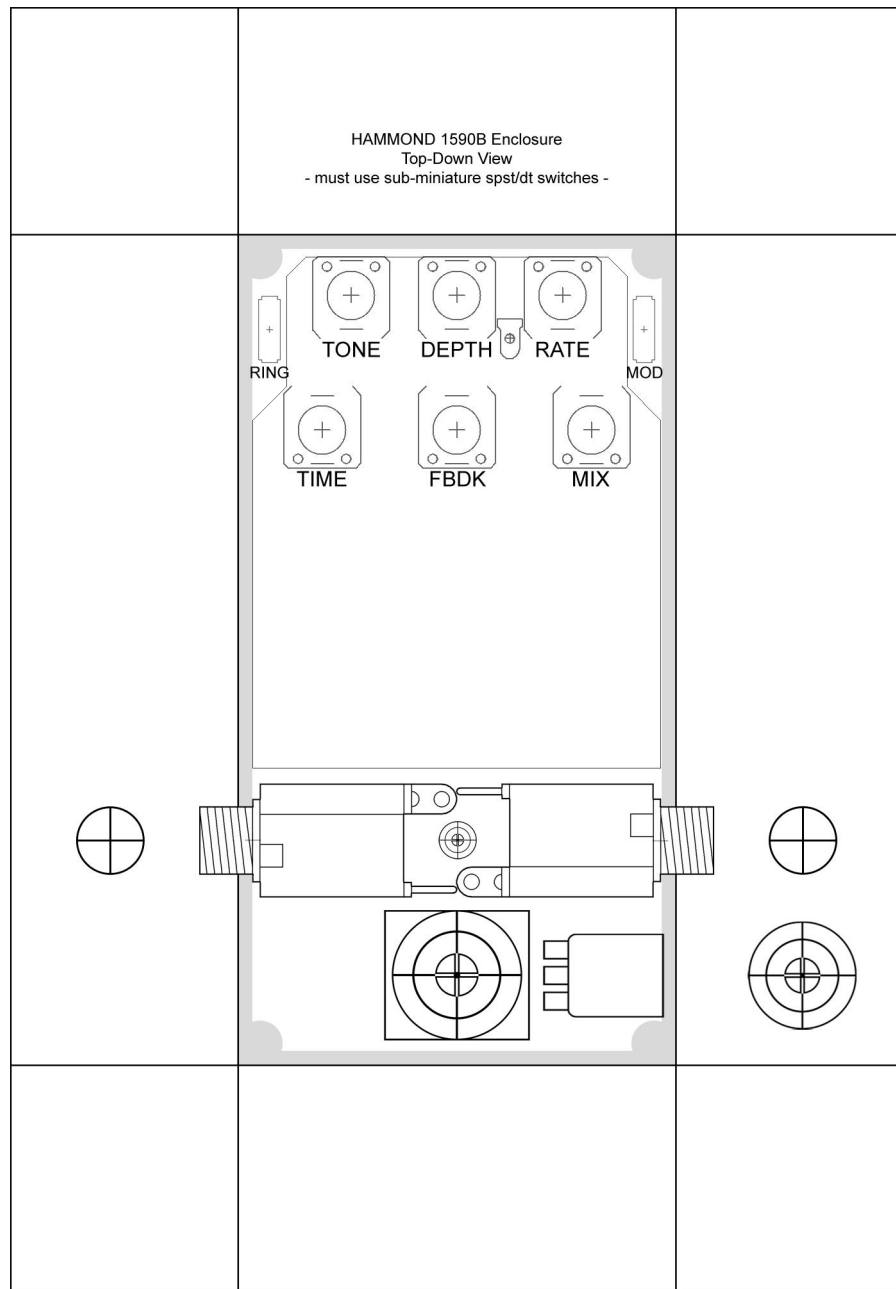
Hammond 1550B @ Mouser:

<http://www.mouser.com/ProductDetail/Hammond-Manufacturing/1550B/?qs=sGAEpiMZZMsrGrAVj6eTvWOQQjgNcnorpDBXWD232as%3d>

Datasheet:

<http://www.mouser.com/ds/2/177/1550B-64046.pdf>

**1590B Enclosure**  
**4.64" W x 6.68" H**



The ZP Mini will fit in a 1590B, but you must use sub-miniature SPDT switches in order to get them on the sides of the PCB.

Sub-Mini Switches:

<http://www.mouser.com/ProductDetail/Mountain-Switch/10TC410/?qs=%2fha2pyFaduJNkpWInYvF9jNUIsb2puRLLSVuSt44axA%3d>

Datasheet:

<http://www.mouser.com/catalog/specsheets/MS-100542.pdf>

The Zero Point Mini is a new PT2399 project that combines elements of some of the other Zero Points into a single, full-featured delay in a small form factor. The basic delay portion of the circuit is nearly identical to the ZP Micro and adds modulation with rate and depth controls, a delay tone control, and a “Ring” switch for dirty tape repeats. This makes the Zero Point Mini unlike any other PT2399-based DIY delay out there and should be both a useful and rewarding build for all levels of DIY’ers.

The modulation section makes use of a simple trick of tying the LFO to the delay stopper resistor (the resistor that sets the minimum amount of delay on the PT2399). This means that the modulation is constant over the range of delay, IOW: not too much and not too little irrespective of the delay time setting. However, you can still get some crazy modulation at high depth and rate settings. Coupled with short delay times, you can create faux vibrato and general useless nuttiness. I recommend socketing R26 and trying lower values there if you want to get higher depth settings. I chose 470k to keep the modulation at a minimum when the depth control is fully counter-clockwise. However, you can go as low as 68k on R26 for some really crazy settings. **D2** on the PCB is a rate indicator for the modulation and should be drilled to fit through the enclosure. Finally, the “Mod” switch turns off the modulation altogether.

The “**Ring**” switch is a hack I found through a great circuit bending site called CasperElectronics. His “Echo Bender” circuit uses an additional feedback path from pin 13 to pin 9 on the PT2399 (something I’ve never seen before). In the Echo Bender, it is used to create crazy self oscillation. By modifying the resistance in the feedback path, I found that it creates a very dirty, tape-like repeat. Imagine a tape-based delay with the tape nearly worn out....pretty close to that. Anyway, much credit to Casper Electronics for figuring out this hack which I have re-purposed for the ZP Mini. Check it out: <http://casperelectronics.com/finished-pieces/echo-bender/echo-bender-v2/>

The Simply Wonderful Tone Control is used to control the tone of the delay repeats. It ranges from fairly neutral (counter-clockwise) to mid-range focus then dark (fully clockwise). This tone control is also useful for longer delay times where noise becomes a problem for the PT2399. Note that the tone control does not affect the first repeat of the delay, but starts with the second one. This is a good feature to have when you are using slap-back with only one repeat, as the repeat itself stays pretty close to the tone of the direct signal.

The Zero Point Mini uses two types of 9mm potentiometers. The TIME/FDBK/MIX row of controls uses the metal shaft version and requires knobs. The TONE/RATE/DEPTH row uses plastic shaft knobs and does not require knobs. This implementation was chosen so that the 6 knobs and two switches could actually fit in the recommended enclosures.

9mm Right Angle pots (2x50kB, 1x25kB): <http://www.smallbearelec.com/servlet/Detail?no=1139>

9mm Right Angle Plastic Shaft (2x1MB, 1x25kB): <http://www.smallbearelec.com/servlet/Detail?no=1277>

**Download both the 1550B and 1590B Photoshop templates for this project here:**

[http://www.madbeanpedals.com/projects/ZeroPoint/ZPMINI\\_DRILL.zip](http://www.madbeanpedals.com/projects/ZeroPoint/ZPMINI_DRILL.zip)