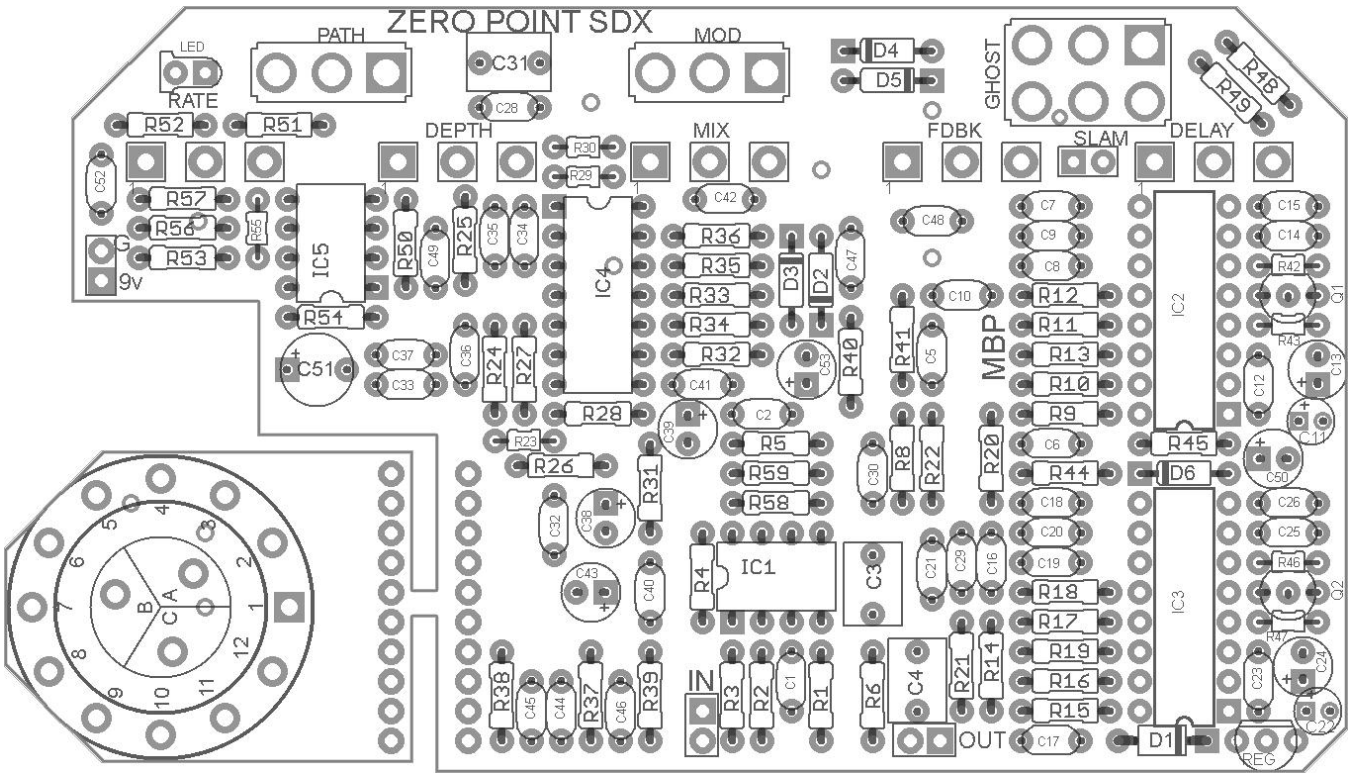
ZERO POINT SUPER DELUXE

FX TYPE: Delay

Updated 02.02.13



4.3” W x 2.58” H

	Zero Point Comparison Chart		
	Micro	**Double Delay**	**Super Deluxe**
Size	1590A	1590B	1590BB
Double Delay	no	yes	yes
Modulation	yes	no	yes
"Ghost" mod	no	yes	yes
"Path" mod	no	no	yes
"Slam" mod	no	no	yes
Repeat modes	1	1	4

02.02.13 - Revision

Omit R45 (1M). This will increase delay time and is not needed.
To reduce the dry volume, change R3 to 470k.

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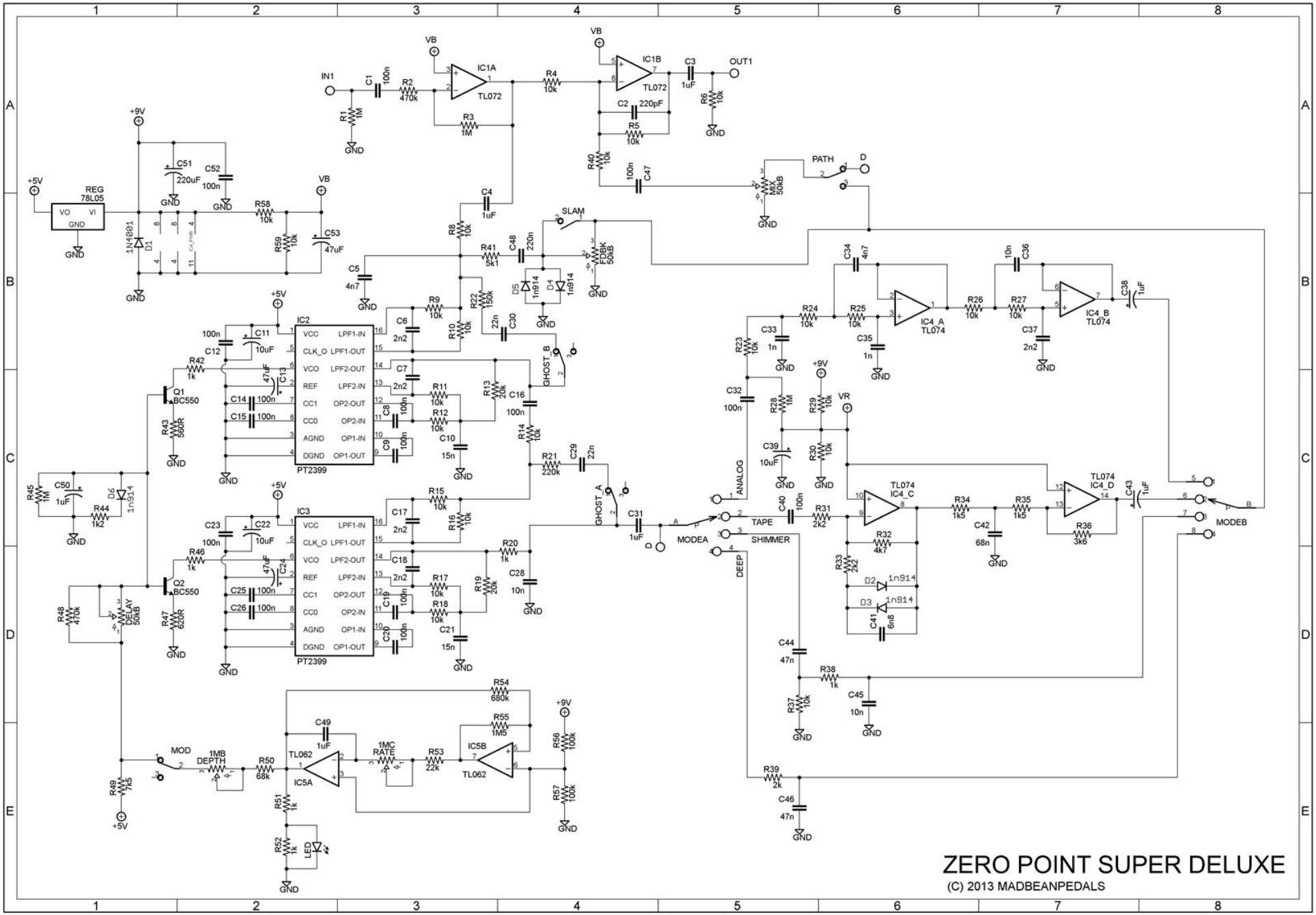
ZERO POINT SUPER DELUXE
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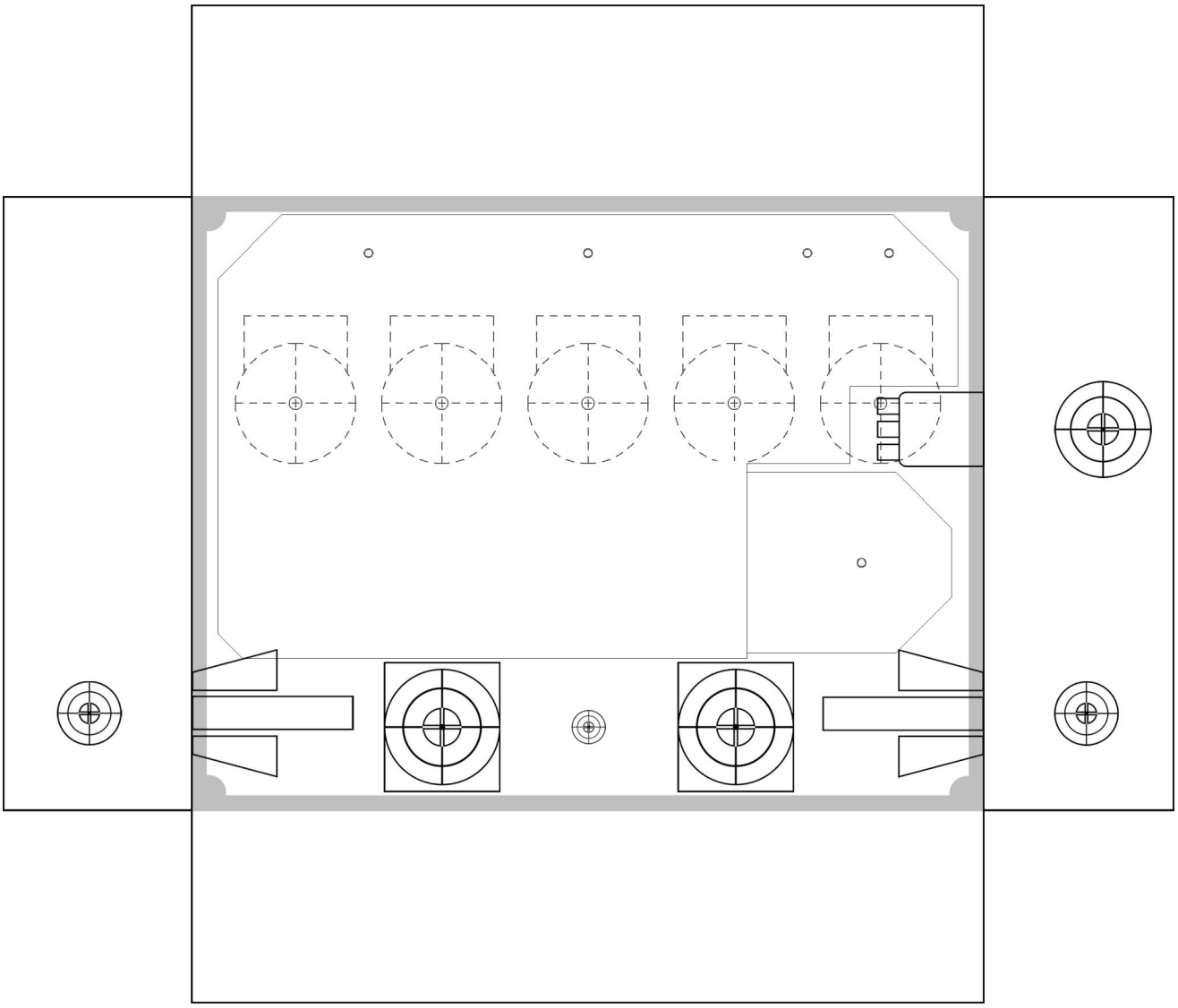
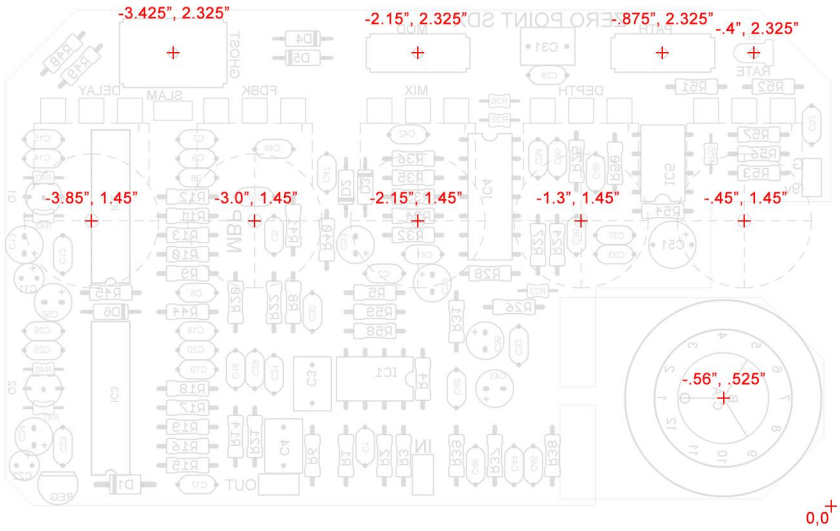
IC1A
TL072
IC1B
TL072
IC2
PT2399
IC3
PT2399
IC4_A
TL074
IC4_B
TL074
IC4_C
TL074
IC4_D
TL074
IC5A
TL062
IC5B
TL062
REG
78L05
PATH
SLAM
GHOST_A
GHOST_B
MODEA
MODEB
ANALOG
TAPE
SHIMMER
DEEP
MOD
1MB
DEPTH
1MC
RATE
MIX
50kB
FDBK
50kB
LED
IN1
OUT1
VB
VR
+9V
+5V
GND

Resistors		Caps		Type
R1	1M	C1	100n	Film
R2	470k	C2	220pF	Ceramic
R3	1M	C3	1uF	Film
R4	10k	C4	1uF	Film
R5	10k	C5	4n7	Film
R6	10k	C6	2n2	Film
R8	10k	C7	2n2	Film
R9	10k	C8	100n	Film
R10	10k	C9	100n	Film
R11	10k	C10	15n	Film
R12	10k	C11	10uF	Tantalum
R13	20k	C12	100n	Film
R14	10k	C13	47uF	Electrolytic
R15	10k	C14	100n	Film
R16	10k	C15	100n	Film
R17	10k	C16	100n	Film
R18	10k	C17	2n2	Film
R19	20k	C18	2n2	Film
R20	1k	C19	100n	Film
R21	220k	C20	100n	Film
R22	150k	C21	15n	Film
R23	10k	C22	10uF	Tantalum
R24	10k	C23	100n	Film
R25	10k	C24	47uF	Electrolytic
R26	10k	C25	100n	Film
R27	10k	C26	100n	Film
R28	1M	C28	10n	Film
R29	10k	C29	22n	Film
R30	10k	C30	22n	Film
R31	2k2	C31	1uF	Film
R32	4k7	C32	100n	Film
R33	2k2	C33	1n	Film
R34	1k5	C34	4n7	Film
R35	1k5	C35	1n	Film
R36	3k6	C36	10n	Film
R37	10k	C37	2n2	Film
R38	1k	C38	1uF	Electrolytic
R39	2k	C39	10uF	Electrolytic
R40	10k	C40	100n	Film
R41	5k1	C41	6n8	Film
R42	1k	C42	68n	Film
R43	560R	C43	1uF	Electrolytic
R44	1k2	C44	47n	Film
R45	1M	C45	10n	Film
R46	1k	C46	47n	Film
R47	620R	C47	100n	Film
R48	470k	C48	220n	Film
R49	7k5	C49	1uF	MLCC
R50	68k	C50	1uF	Electrolytic
R51	1k	C51	220uF	Electrolytic
R52	1k	C52	100n	Film
R53	22k	C53	47uF	Electrolytic
R54	680k			
R55	1M5			
R56	100k			
R57	100k			
R58	10k			
R59	10k			

Diodes	
D1	1N4001
D2 - D6	1n914
LED	LED3MM
Transistors	
Q1, Q2	BC550
Regulator	
REG	78L05
Integrated Circuits	
IC1	TL072
IC2, IC3	PT2399
IC4	TL074
IC5	TL062
Switches	
SLAM	SPST (momentary)
MODE	3P4T (rotary)
MODE	SPDT
PATH	SPDT
GHOST	DPDT
Pots	
DELAY	50kB
FDBK	50kB
MIX	50kB
DEPTH	1MB
RATE	1MC

1590 BB
6.81” W x 5.81” H





The drill guide shows the position of the rotary switch when mounted to the main PCB as described below.

The **Zero Point Super Deluxe** is a feature-rich, analog-modeled digital delay. It utilizes two PT2399 chips for approximately 1 sec. of delay time. There are four repeat modes, Analog, Tape, Shimmer and Deep, selectable by a PCB mounted rotary switch. Additionally, the ZPSDX has modulation (depth and speed), a “Ghost” toggle for extra note divisions on the delayed repeats, a switch to toggle modulation on and off, another switch to select whether or not the first repeat is filtered or not (“Path”). Finally the “Slam” mod gets you instant oscillation.

MIX: Sets the volume of delayed repeats relative to the dry signal.
FDBK: Sets the number of delayed repeats from one to “infinity”.
DELAY: The overall delay time, from slap-back to approximately 1 sec.
DEPTH: The intensity of the modulation applied to the delayed repeats.
SPEED: The rate of modulation applied to the delayed repeats.
GHOST: Adds two additional feedback paths to the repeats for extra note divisions.
PATH: Selects whether the first repeat is sent through one of the four filtering modes or goes straight to the output mixer.
MODE: Four selectable filtering modes: Analog, Tape, Shimmer, and Deep.
MOD: Turns the modulation on and off.
SLAM: Uses a normally off, SPST momentary footswitch for instant oscillation on the repeats.

Modes

Analog: This is an op-amp driven Sallen-Key filter which has a moderate amount of filtering applied to emulate the sound of traditional BBD type delays. This is the “cleanest” sounding filter of the four.
Tape: This is copied from the Ibanez DE-7 and simulates the rapid saturation of tape-based delays. This is the most “granular” filter.
Shimmer: A simple combination of low and high pass filtering for a glassy type tone on the repeats.
Deep: This is also a tape-like filter but not as granular as the Tape mode.

The four repeat modes are a mix of active and passive filtering techniques. As such, there will be some small volume changes to the repeats when the modes are switched between one another. You can easily compensate any volume changes by adjusting the Mix pot to set the delay level against the dry signal.

1n914 is suggested for D2 and D3. BAT41 will also work but will be much dirtier sounding. Feel free to experiment with different diode types.

R36 sets the output level of the Tape mode. It can be reduced to 2k7 or 2k2 if you feel the volume level is too high compared to the other filter modes (a socket is suggested).

Path

This mod lets you change where the first delayed repeat is sent. When the Path switch is in the right position, the first repeat skips whatever filter you have selected in the Modes. This gives you a slightly cleaner first repeat, and subsequently longer decays on the filter curves. It is most noticeable when you are using the Tape mode, but it has at least some effect in every mode.

Ghost

When the Ghost switch is set to the right it adds two additional fixed feedback paths for the repeats. This amounts to extra note divisions underneath the delay. The level of the additional feedback notes is set by R21 and R22. You should consider socketing these two resistors to try different values. Lower values will increase the volume of the divisions.

Mod

When the Mod switch is set to the right position, it turns the modulation on. It's off in the left position.

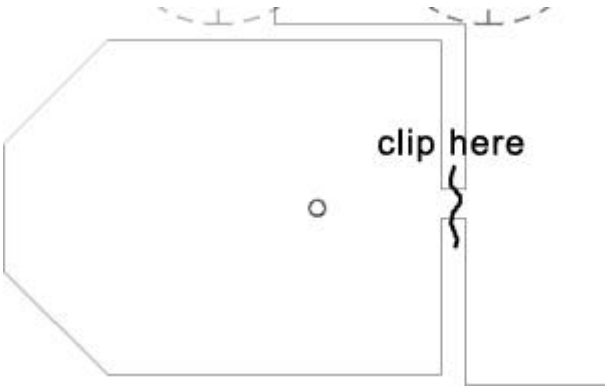
Slam

These pads allow you to hook up a normally off SPST momentary footswitch. When the switch is engaged, it jumpers lug 3 and 2 of the FDBK pot, essentially giving you max feedback and self-oscillation. The oscillation will be clamped somewhat by the 1n914 diodes used in D4 and D5. Note that the Slam mod will behave differently depending where the Path switch is set. When the Path switch is set to the right, the Slam function will be nearly instant. When the Path is set to the left, the Slam will be a bit more gradual.

Basic Assembly Tips

The Mode switch needs to be a 3P4T style rotary switch with pin mounting: http://www.smallbearelec.com/servlet/Detail?no=46

First, you will need to clip off the breakout board from the main PCB. Use some wire clippers to cut the connecting portion between the two PCBs.



The switch should be soldered underneath the breakout PCB and then the assembly soldered to the main PCB. To attach the two PCBs, I highly recommend using 2.54mm (.1") SIL Headers if you can find them. These are like the normal sockets you use but have an extra male pin instead of a socket. The short pin side gets soldered to the main PCB and then the break out PCB is fitted over the longer male pins.

The header pins are similar to this: http://shop.evilmadscientist.com/productsmenu/partsmenu/294

If you cannot find these, then simply use wires to connect the two PCBs together. The holes on the main and breakout PCB should be aligned vertically in order to fit everything properly in the 1590BB enclosure.

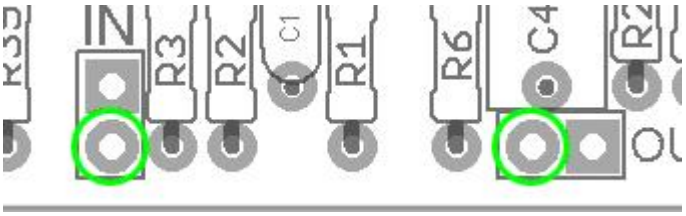
You can use 16mm short-pin PCB mounted pots and solder lug SPDT and DPDT switches soldered directly to the PCB.

http://www.smallbearelec.com/servlet/Detail?no=692
http://www.smallbearelec.com/servlet/Detail?no=38
http://www.smallbearelec.com/servlet/Detail?no=40

The DC jack should be mounted in the enclosure between the breakout PCB and main PCB (see drilling guide). Keep in mind there will be a pot directly underneath the DC jack, so you need to put it high enough on the side wall to clear the pot. The 9v/G connections are also located in the same spot so you can keep the wires short.

These are very slim DC jacks that might make the assembly process easier:
http://www.smallbearelec.com/servlet/Detail?no=1216

There are to other ground pads on the main PCB: the round pad directly below the square IN pad and the round pad to the left of the OUT pad.



This is a tight build for a 1590BB, and I highly recommend using slim style jacks over the open frame metal ones.

http://www.smallbearelec.com/servlet/Detail?no=576

OR
Jack: http://www.mouser.com/Search/ProductDetail.aspx?R=NRJ4HFvirtualkey56810000virtualkey550-10284
Attachement nuts: http://www.mouser.com/ProductDetail/Neutrik/NRJ-NUT-B/?qs=S12Y1JoqO2B/J8w/0QDEXxm4CRfxKYczbewAXgkjeBc=

The LED will flash according the Rate setting on the modulation. You can leave it off if not desired.

R49 can be 6k8 or 8k2 if you do not have 7k5.

The dual delay is controlled by syncing the VCO output pin of each PT2399 to a simple current mirror which is varied by the Delay control (pin6 is fixed voltage, current controlled). The total delay output should go up to about 1 sec., although this can be artificially limited via R48.

It's important to remember that the PT2399, while inexpensive and easy to use, is not ideal for long delay times. A single PT2399 can be run up to 600ms with acceptable results, but there will be some digital artifacts at max delay time. R48 is placed as a parallel resistor with the Delay pot setting and act as an artificial limit. This means less delay time overall, but also little or no noise at max. It is up to you whether or not to use it. A socket is highly suggested to test both ways. You can increase R31 to extend delay times (680k, 750k, etc) or leave it off altogether for the maximum delay possible.