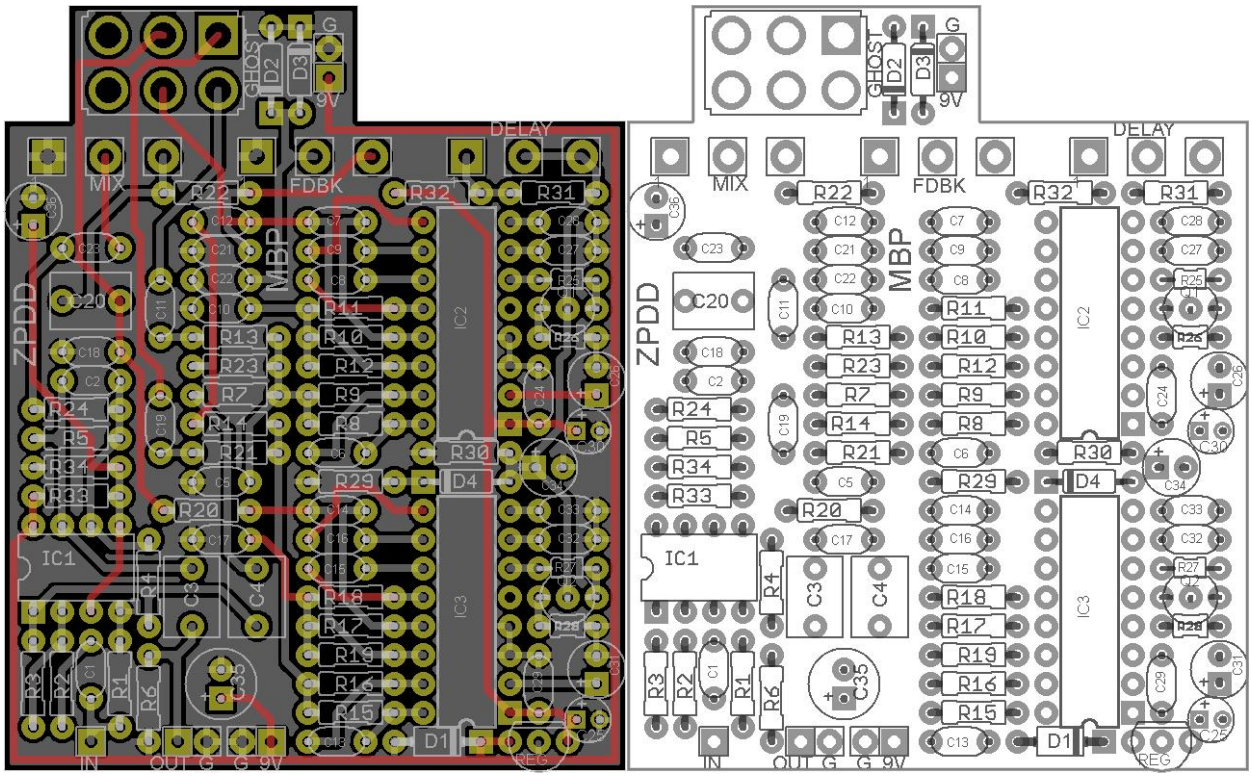
ZERO POINT DUAL DELAY

FX TYPE: Delay

Update 02.02.13



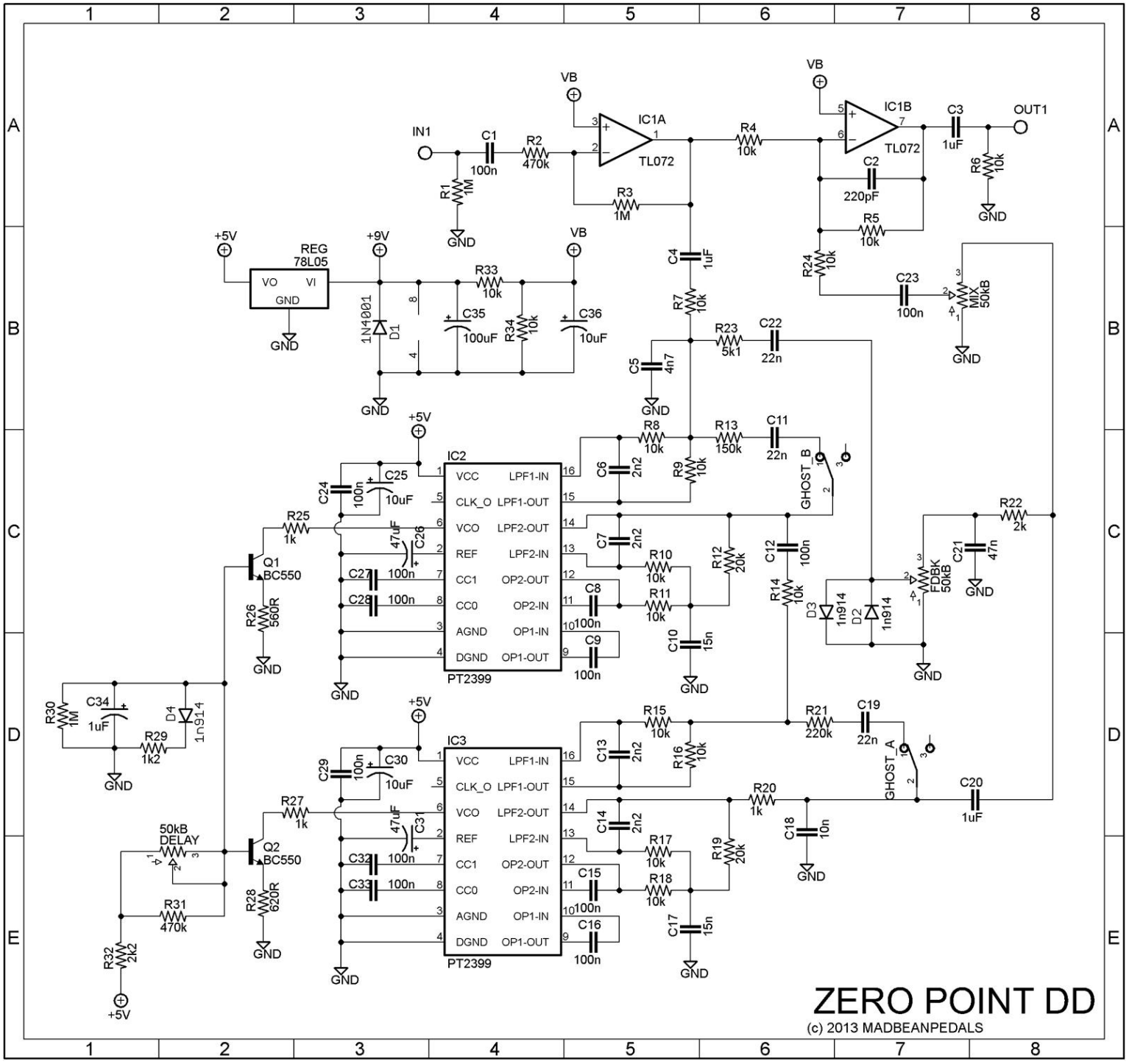
2.15” W x 2.65” H

The **Zero Point Dual Delay** meets the need for an analog-modeled digital delay with extended delay times. It offers up 1sec. of delay, a tape-like filter for the repeats and fits in a 1590B enclosure.

MIX: Sets the volume of the delayed repeats relative to the dry signal.
FDK: Sets the number of repeats from one to “infinity”.
TIME: Sets the amount of delay from slapback to around 1sec.
GHOST: When toggled on, Ghost inserts two additional fixed feedback paths for note divisions on the repeats.

02.02.13 - Revision

Omit R30 (1M). This will increase delay time and is not needed.
To reduce the dry volume, change R3 to 470k.


ZERO POINT DD
(c) 2013 MADBEANPEDALS
IC1A
IC1B
TL072
IC2
IC3
PT2399
REG
78L05
VO
VI
GND
IN1
OUT1
VB
+5V
+9V
1N4001
D1
1n914
D2
D3
D4
Q1
BC550
Q2
BC550
GHOST_A
GHOST_B
MIX
50kB
FDBK
50kB
50kB
DELAY
VCC
CLK_O
VCO
REF
CC1
CC0
AGND
DGND
LPF1-IN
LPF1-OUT
LPF2-IN
LPF2-OUT
OP2-OUT
OP2-IN
OP1-IN
OP1-OUT
R1 1M
R2 470k
R3 1M
R4 10k
R5 10k
R6 10k
R7 10k
R8 10k
R9 10k
R10 10k
R11 10k
R12 20k
R13 150k
R14 10k
R15 10k
R16 10k
R17 10k
R18 10k
R19 20k
R20 1k
R21 220k
R22 2k
R23 5k1
R24 10k
R25 1k
R26 560R
R27 1k
R28 620R
R29 1k2
R30 1M
R31 470k
R32 2k2
R33 10k
R34 10k
C1 100n
C2 220pF
C3 1uF
C4 1uF
C5 4n7
C6 2n2
C7 2n2
C8 100n
C9 100n
C10 15n
C11 22n
C12 100n
C13 2n2
C14 2n2
C15 100n
C16 100n
C17 15n
C18 10n
C19 22n
C20 1uF
C21 47n
C22 22n
C23 100n
C24 100n
C25 10uF
C26 47uF
C27 100n
C28 100n
C29 100n
C30 10uF
C31 47uF
C32 100n
C33 100n
C34 1uF
C35 100uF
C36 10uF

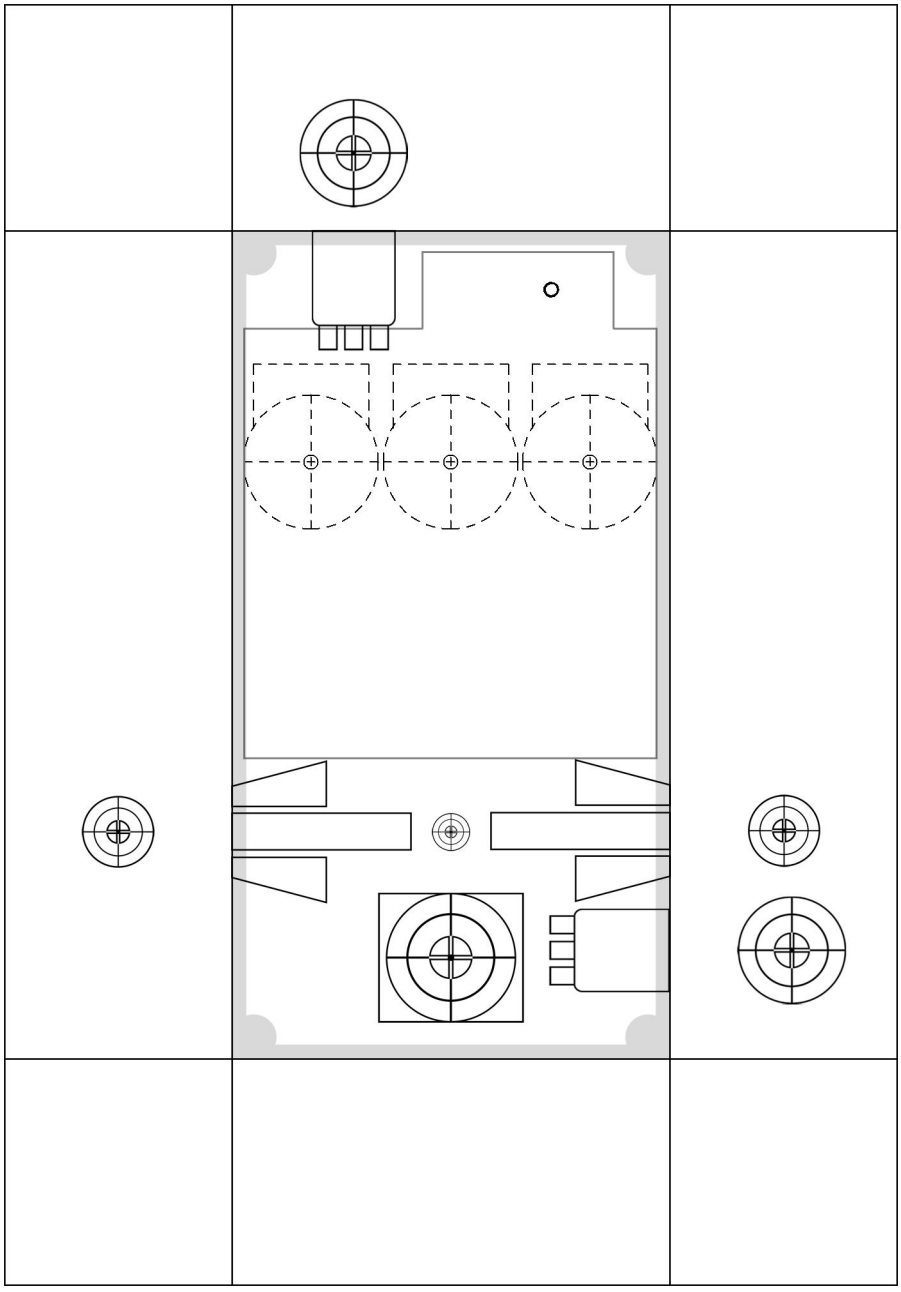
Resistors		Caps		Type
R1	1M	C1	100n	Film
R2	470k	C2	220pF	Ceramic
R3	1M	C3	1uF	Film
R4	10k	C4	1uF	Film
R5	10k	C5	4n7	Film
R6	10k	C6	2n2	Film
R7	10k	C7	2n2	Film
R8	10k	C8	100n	Film
R9	10k	C9	100n	Film
R10	10k	C10	15n	Film
R11	10k	C11	22n	Film
R12	20k	C12	100n	Film
R13	150k	C13	2n2	Film
R14	10k	C14	2n2	Film
R15	10k	C15	100n	Film
R16	10k	C16	100n	Film
R17	10k	C17	15n	Film
R18	10k	C18	10n	Film
R19	20k	C19	22n	Film
R20	1k	C20	1uF	Film
R21	220k	C21	47n	Film
R22	2k	C22	22n	Film
R23	5k1	C23	100n	Film
R24	10k	C24	100n	Film
R25	1k	C25	10uF	Tantalum
R26	560R	C26	47uF	Electrolytic
R27	1k	C27	100n	Film
R28	620R	C28	100n	Film
R29	1k2	C29	100n	Film
R30	1M	C30	10uF	Tantalum
R31	470k	C31	47uF	Electrolytic
R32	2k2	C32	100n	Film
R33	10k	C33	100n	Film
R34	10k	C34	1uF	Electrolytic
		C35	100uF	Electrolytic
		C36	10uF	Electrolytic

Diodes	
D1	1N4001
D2 - D4	1n914
Transistors	
Q1, Q2	BC550
Regulator	
REG	78L05
Integrated Circuits	
IC1	TL072
IC2, IC3	PT2399
Switch	
GHOST	DPDT (On/On)
Pots	
DELAY	50kB
FDBK	50kB
MIX	50kB

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

1590 B
4.65” W x 6.67” H



You can place your DC Jack at the top left or the bottom right depending on your preference.

This template is approximate! Please plan carefully before committing to drill.

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 R31.

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. R31 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.

Sockets are also suggested for the two fixed feedback resistors used in "Ghost" mode, R13 and R21. A 150k and 220k are suggested here, resp. but smaller values will increase the volume level of the secondary divisions. Experimentation here is encouraged. The Ghost mode is engaged when the switch is toggled to the right side (looking top-down on the enclosure).

If possible, use 1/8W resistors for R25, R26, R27 and R28. These will fit under the two adjoining transistors more easily.

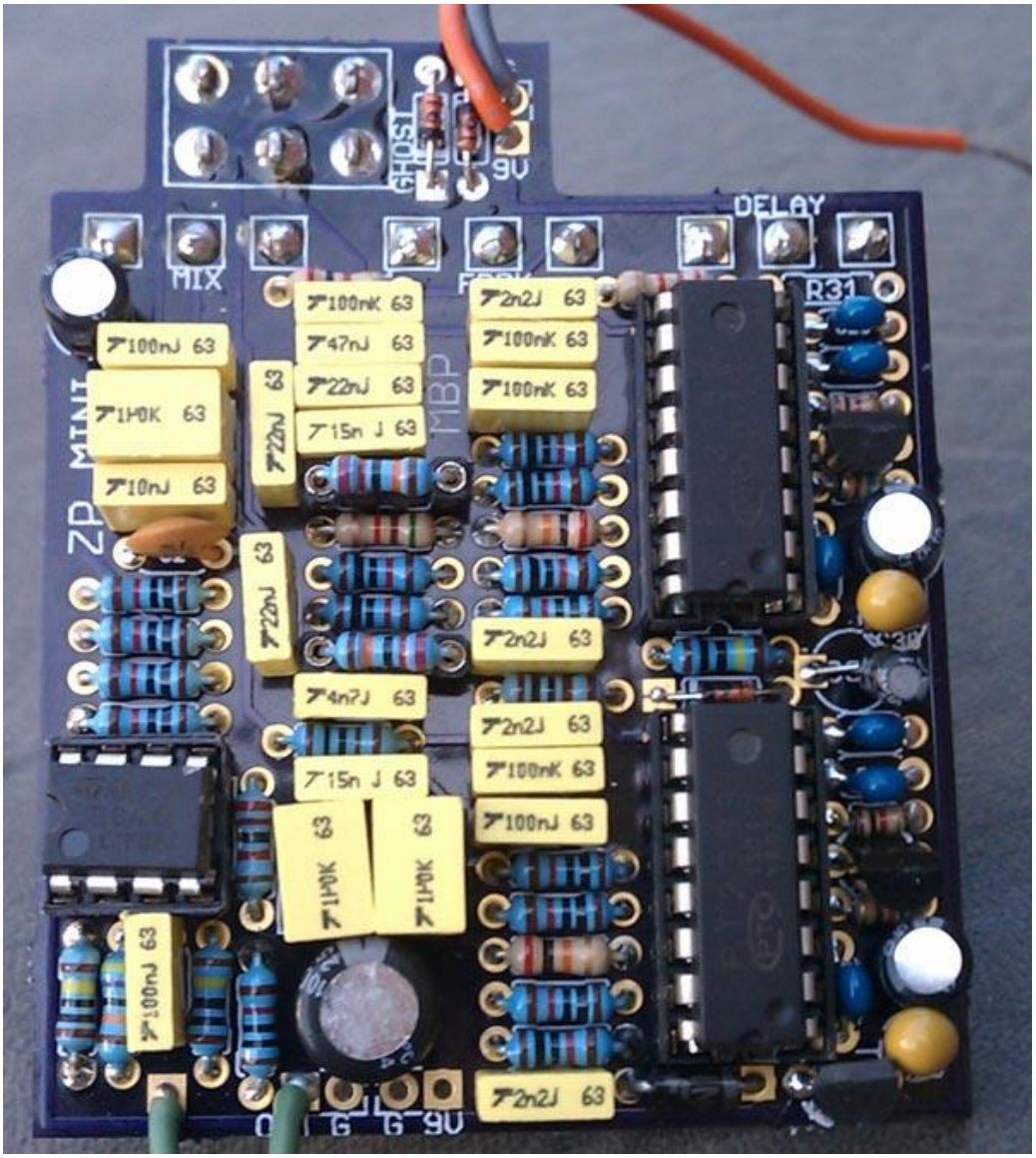
There are two sets of 9V/G pads on the PCB for hooking up your DC jack. You only need to use one of these sets. Use the appropriate set according to where you place your DC jack on the enclosure; the top left or bottom right (see drill guide).

D2 and D3 are optional back to back diodes between the main feedback path and ground. These will limit the volume of the repeats when the FDBK pot is at maximum and act as a "clamp".

You can use 16mm short-pin PCB mounted pots for the three controls. The pots go underneath the PCB. The normal "Mountain" DPDT switches will mount directly to the PCB underneath.

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

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


GHOST
9V
DELAY
MIX
R31
100nK 63
100nJ 63
47nJ 63
22nJ 63
15n J 63
1M0K 63
10nJ 63
2n2J 63
4n7J 63
ZP
MBP
G G 9V