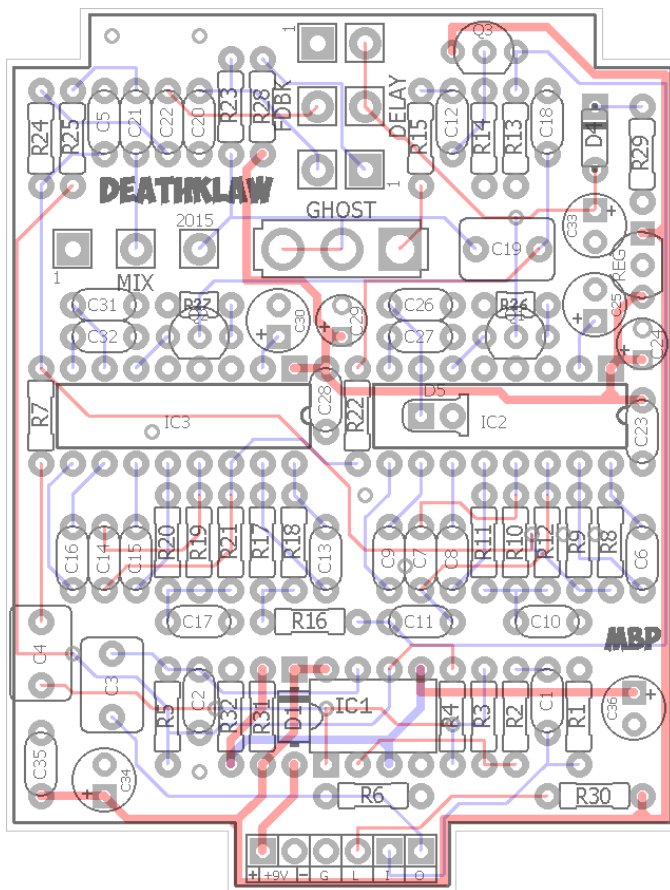
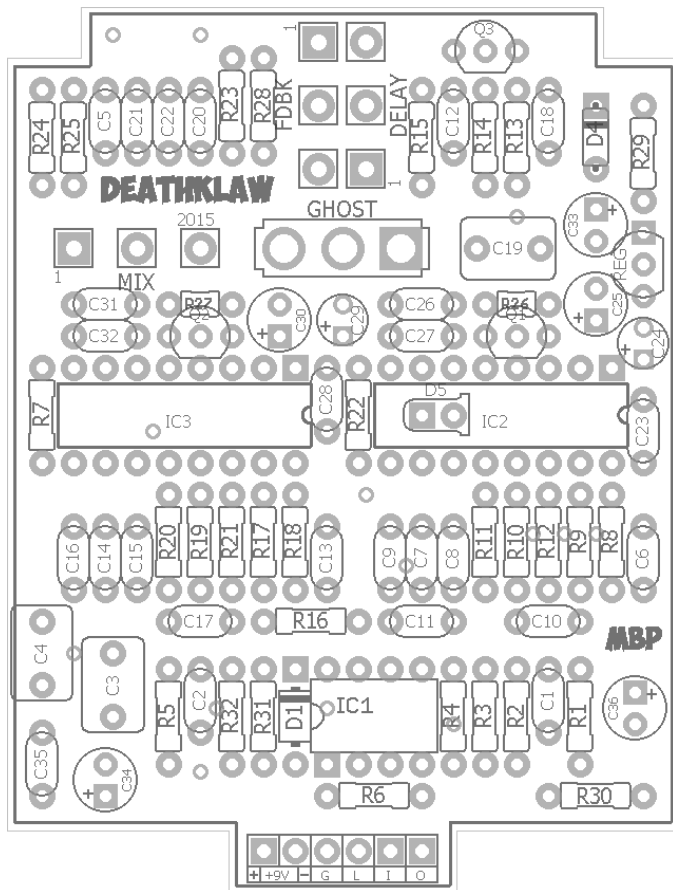


# DEATHKLAW

FX TYPE: DELAY

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2.12" W x 2.795" H

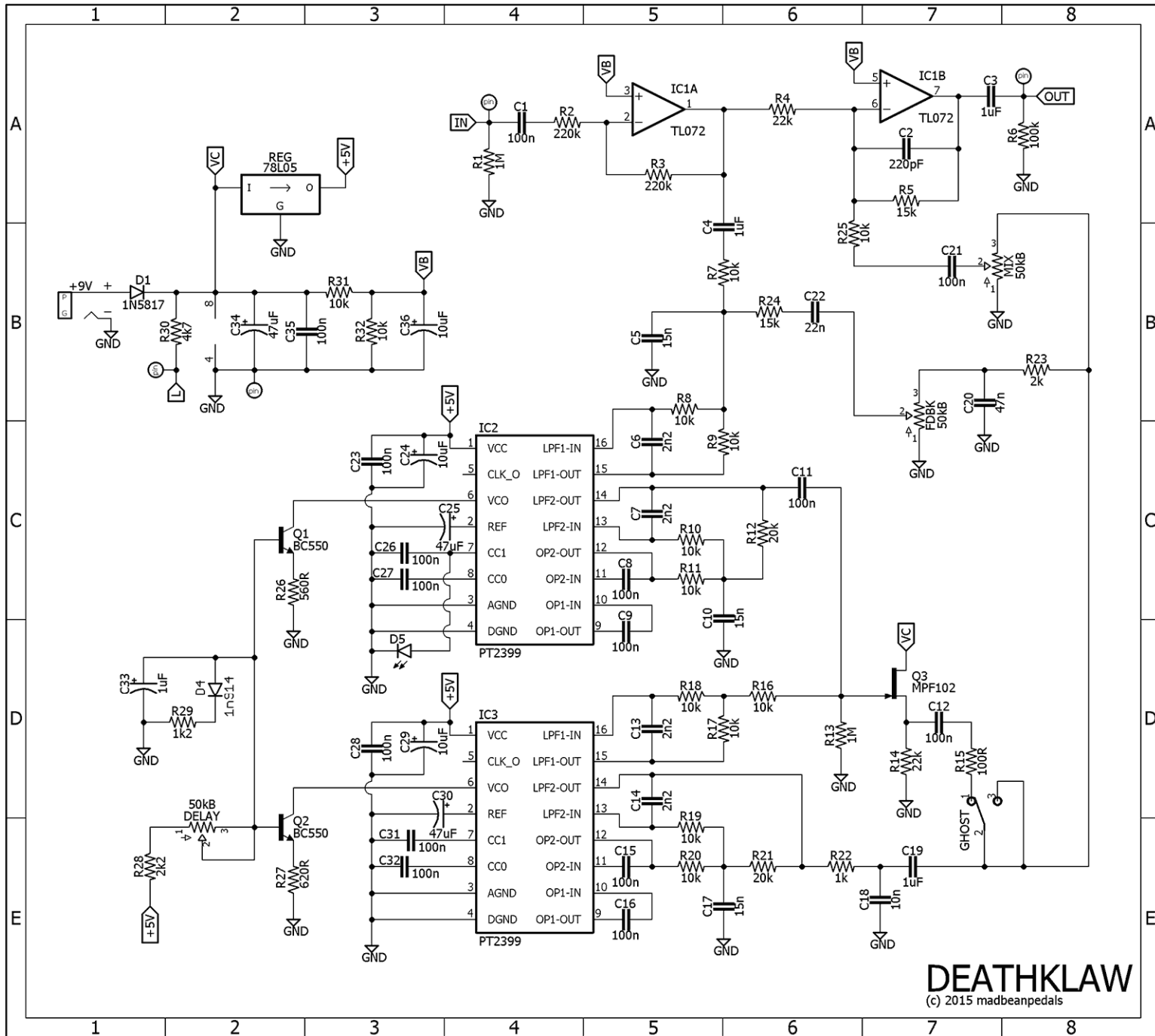


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<b>B.O.M.</b>					
<b>Resistors</b>		<b>Caps</b>		<b>Diodes</b>	
R1	1M	C1	100n	D1	1N5817
R2	220k	C2	220pF	D4	1n914
R3	220k	C3	1uF	D5	LED
R4	22k	C4	1uF	<b>Transistors</b>	
R5	15k	C5	15n	Q1	BC550
R6	100k	C6	2n2	Q2	BC550
R7	10k	C7	2n2	Q3	MPF102
R8	10k	C8	100n	<b>I.C.</b>	
R9	10k	C9	100n	IC1	TL072
R10	10k	C10	15n	IC2	PT2399
R11	10k	C11	100n	IC3	PT2399
R12	20k	C12	100n	<b>Regulator</b>	
R13	1M	C13	2n2	REG	LM78L05
R14	22k	C14	2n2	<b>Switch</b>	
R15	100R	C15	100n	GHOST	SPDT
R16	10k	C16	100n	<b>Pots</b>	
R17	10k	C17	15n	DELAY	50kB
R18	10k	C18	10n	FDBK	50kB
R19	10k	C19	1uF	MIX	50kB
R20	10k	C20	47n		
R21	20k	C21	100n		
R22	1k	C22	22n		
R23	2k	C23	100n		
R24	15k	C24	10uF		
R25	10k	C25	47uF		
R26	560R	C26	100n		
R27	620R	C27	100n		
R28	2k2	C28	100n		
R29	1k2	C29	10uF		
R30	4k7	C30	47uF		
R31	10k	C31	100n		
R32	10k	C32	100n		
		C33	1uF		
		C34	47uF		
		C35	100n		
		C36	10uF		

## Shopping List

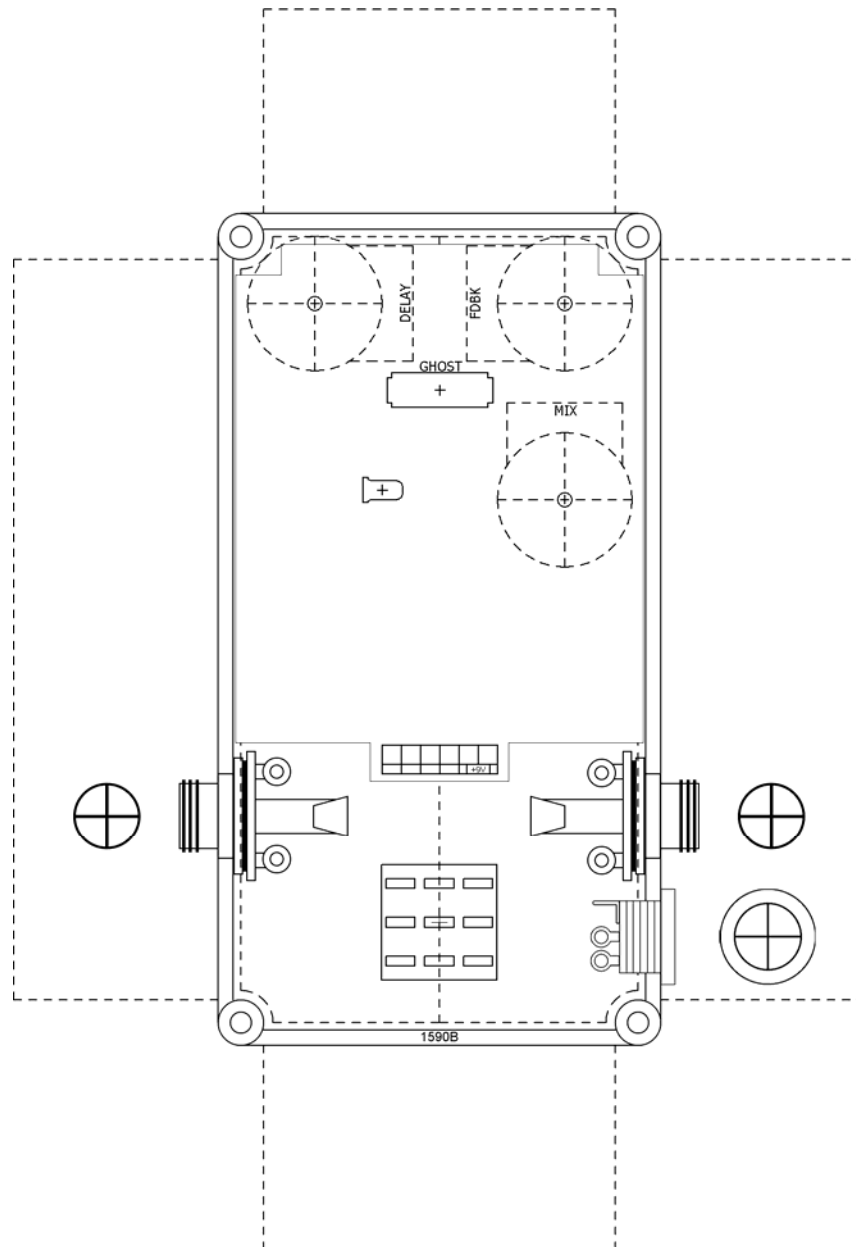
Value	QTY	Type	Rating
100R	1	Metal / Carbon Film	1/4W
560R	1	Metal / Carbon Film	1/8 or 1/4W
620R	1	Metal / Carbon Film	1/8 or 1/4W
1k	1	Metal / Carbon Film	1/4W
1k2	1	Metal / Carbon Film	1/4W
2k	1	Metal / Carbon Film	1/4W
2k2	1	Metal / Carbon Film	1/4W
4k7	1	Metal / Carbon Film	1/4W
10k	13	Metal / Carbon Film	1/4W
15k	2	Metal / Carbon Film	1/4W
20k	2	Metal / Carbon Film	1/4W
22k	2	Metal / Carbon Film	1/4W
100k	1	Metal / Carbon Film	1/4W
220k	2	Metal / Carbon Film	1/4W
1M	2	Metal / Carbon Film	1/4W
220pF	1	Ceramic	16v min.
2n2	4	Film	16v min.
10n	1	Film	16v min.
15n	3	Film	16v min.
22n	1	Film	16v min.
47n	1	Film	16v min.
100n	15	Film	16v min.
1uF	3	Film	16v min.
1uF	1	Electrolytic	16v min.
10uF	3	Electrolytic	16v min.
47uF	3	Electrolytic	16v min.
1N5817	1		
1n914	1		
LED	1	Green	5mm
BC550	2		
MPF102	1		
TL072	1		
PT2399	2		
LM78L05	1	TO-92 style	
SPDT	1	Solder Lug or PCB Pin	On/On
50kB	3	PCB Right Angle	16mm



**DEATHKLAW**  
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# 1590B Drill Guide

6.46" H x 4.43" W

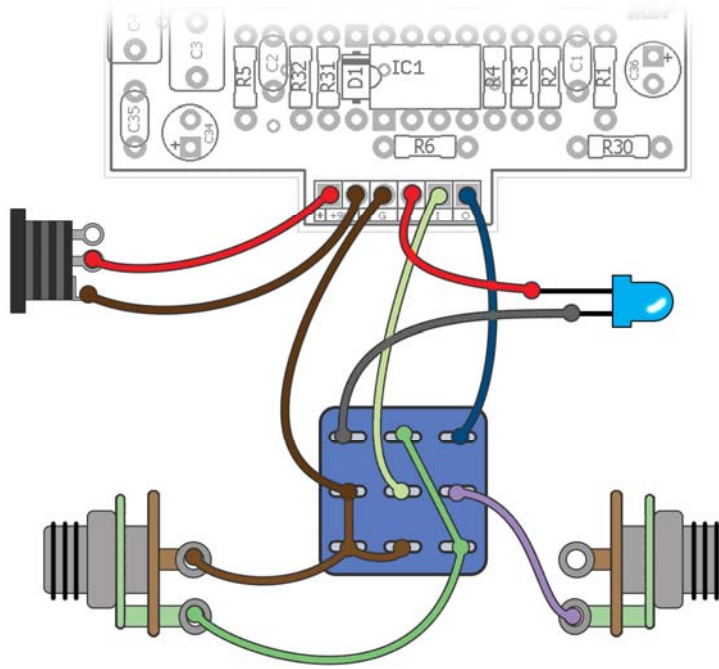


*This template is approximate*

Photoshop file: [http://www.madbeanpedals.com/projects/Deathklaw/Deathklaw\\_DRILL.zip](http://www.madbeanpedals.com/projects/Deathklaw/Deathklaw_DRILL.zip)

This is a tight fit for the 1590B. If possible, use the "Lumberg" style DC jack:  
<http://smallbear-electronics.mybigcommerce.com/dc-power-jack-all-plastic-unswitched/>

## Wiring Guide



- The output jack is grounded via the enclosure. If testing the circuit outside of an enclosure with the jacks wired to the switch as shown, you will need to ground the sleeve of the output jack.

The **Deathklaw** is a redesign of the older Zero Point Dual Delay project which is a PT2399-based delay circuit. It features two PT2399 chips in series for longer delay times and fits in a 1590B size enclosure. There were several design objectives mapped out for the update:

- **Change the dry signal-through from non-inverted to inverted stages.** This makes the design similar to all the other PT2399 designs I've done, and brings the output volume of the circuit closer to unity.
- **Increase the filtering.** The biggest complaint with PT2399 designs is noise and with two of these chips in series the potential for noise at longer delay times increases. The Deathklaw has increased low-pass filtering without compromising the overall feel of the delay (which is akin to a tape delay).
- **Re-arrange the controls.** The pot controls on the ZPDD were below the "Ghost" switch which is something I never liked. The Deathklaw moves the pots to a better location on the enclosure.
- **Simplify to the Ghost switch.** This switch has been changed from a DPDT to and SPDT, and a buffer is used to isolate the subdivision delay from the main delay. The ghost repeats are lower in volume than the main delay and are used to add texture to the delay circuit.

All these changes improve upon what was already a very popular project at madbeanpedals and is, no doubt, one of the more feature packed 1590B delay projects out there.

## Controls

**Mix** - The amount of delayed signal mixed in with the dry guitar sound.

**Feedback** - The number of delay repeats from one to "infinity".

**Delay** - The total amount of time delay from slap-back to around 1sec.

**Ghost** - Adds an eighth note subdivision to the delay repeats.

## Notes

- D5 (the green LED) needs to be soldered to the bottom of the PCB. This should be done *before* installing and soldering a socket for IC2. The use of the LED is a mod invented by forum member **midwayfair**. It's purpose is to prevent the input of the PT2399 circuit from overloading/clipping with high amplitude signals. You can substitute other colors for the green, but I have found that green seems to have the least impact on the output of the PT2399.
- If you don't want to use the Ghost switch, omit R13, R14, R15, C12, Q3 and the switch.
- You should be able to substitute other transistors for the two BC550, but mind the pinouts.
- You can sub other JFET transistors for the MPF102 such as the J201 or 2N5457, if needed.
- The FDBK pot should give you "endless" repeats around 3/4 of the way up. After that, the delay will go into self-oscillation.
- Mod idea: try substituting (or socketing) a higher value for C22 (100n). This may alter the character of the delay repeats slightly.

## Voltages

		9.42v Supply				
IC1	TL072	IC2	PT2399	IC3	PT2399	
1	4.57	1	4.98	1	4.98	
2	4.57	2	2.51	2	2.5	
3	4.57	3	2.2mV	3	2.2mV	
4	1.7mV	4	2mV	4	2.1mV	
5	4.57	5	2.9	5	2.93	
6	4.57	6	2.49	6	2.49	
7	4.57	7	0.71	7	0.61	
8	9.15	8	0.82	8	0.64	
		9	2.53	9	2.5	
REG	LM78L05	10	2.51	10	2.5	
In	9.15	11	2.51	11	2.5	
Gnd	2mV	12	2.59	12	2.5	
Out	4.98	13	2.5	13	2.5	
		14	2.45	14	2.5	
Q1/Q2	Min	Max	15	2.53	15	2.5
E	1.94	2.5	16	2.51	16	2.5
B	2.51	0.59				
C	1.85	39mV				

The voltages on the two BC550 transistors will change depending on where the Delay pot is set. The list above shows the range to be expected on both when the Delay pot is set at its extremes.