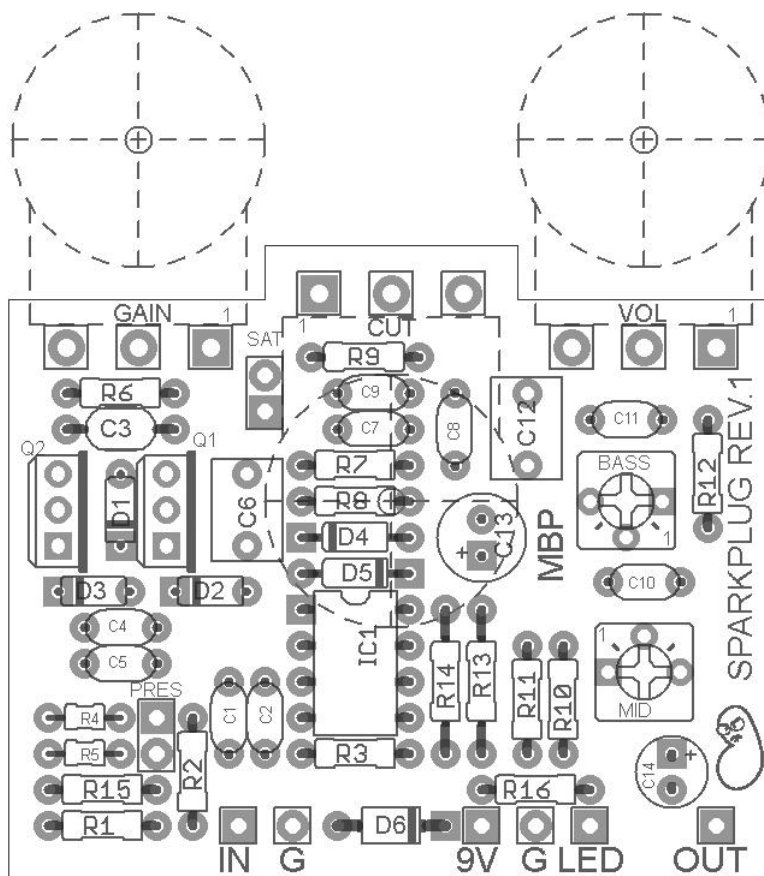
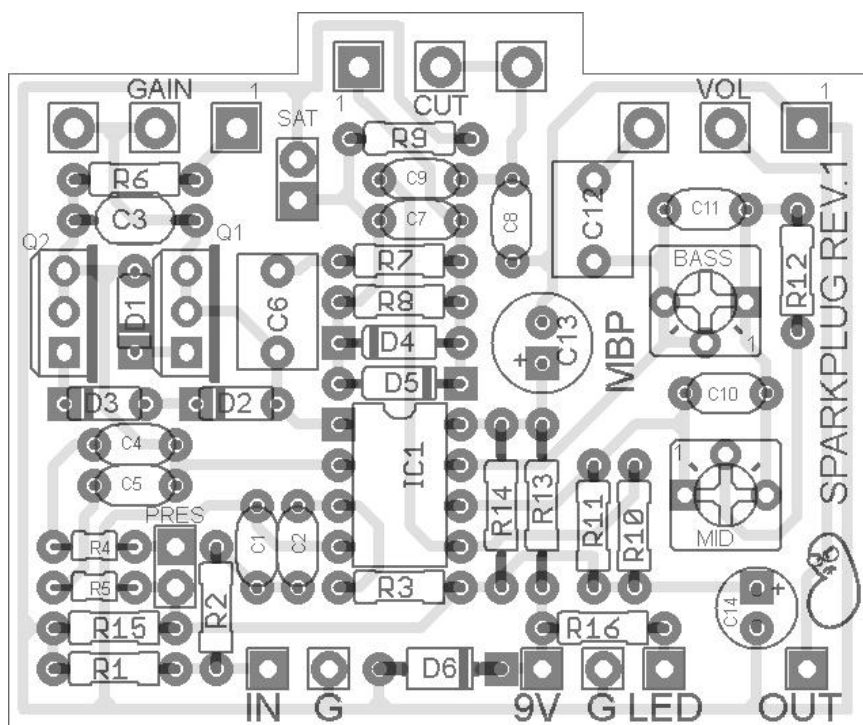


SPARKPLUG REV.1

FX Type: Overdrive

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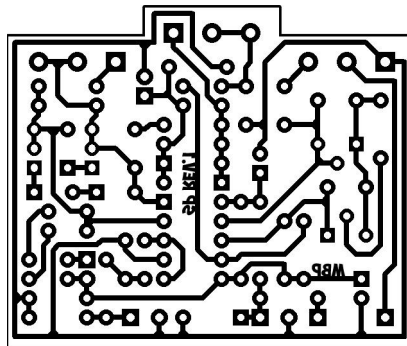
2.14"W x 1.78"H



B.O.M.

Resistors		Caps		Diodes	
R1	1M	C1	100pF	D1 - D3	BAT41
R2	1k	C2	47n	D4, D5	BAT46
R3	1M	C3	100pF	D6	1N4001
R4	5k1	C4	10n	Transistors	
R5	7k5	C5	47n	Q1, Q2	IRF510
R6	22K	C6	1uF	IC's	
R7	680R	C7	4n7	IC1	TLC2262
R8	22k	C8	10n	Switches	
R9	1M	C9	22n	SAT	SPDT
R10	470k	C10	10n	PRES	SPDT
R11	3k	C11	82n	Trimmers	
R12	3k	C12	1uF	MID	20k
R13	100R	C13	100uF	BASS	50k
R14	10k	C14	10uF	Pots	
R15	10k			GAIN	1MA
R16	4k7			VOL	100kA
				CUT	50kA

2.14"W x 1.78"H



The manufactured and single sided layouts for the Sparkplug Rev.1 PCB are identical.

Original Sparkplug documentation can be downloaded here:

<http://www.madbeanpedals.com/projects/Sparkplug/Sparkplug.pdf>

Sparkplug Rev.1 PCBs purchased from madbeanpedals (or etched from the included artwork) may be used for small quantities of commercial pedal building (bulk discounting on PCBs is not offered). You may not, however, offer these PCBs for commercial resale (redistribution) or as part of a "kit".

www.madbeanpedals.com

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Shopping List

Part	Qty	Type	Rating	Spacing	Links
100R	1	Metal/Film	1/4W	7.5mm	
10k	2	Metal/Film	1/4W	7.5mm	
1k	1	Metal/Film	1/4W	7.5mm	
1M	3	Metal/Film	1/4W	7.5mm	
22k	2	Metal/Film	1/4W	7.5mm	
3k	2	Metal/Film	1/4W	7.5mm	http://www.smallbearelec.com/servlet/Categories?category=Resistors+1%2F4+W+1%25+Metal+Film
470k	1	Metal/Film	1/4W	7.5mm	
4k7	1	Metal/Film	1/4W	7.5mm	
5k1	1	Metal/Film	1/4W	5mm	
680R	1	Metal/Film	1/4W	7.5mm	
7k5	1	Metal/Film	1/4W	5mm	
100pF	1	Ceramic	25v	5mm	http://www.smallbearelec.com/servlet/Detail?no=969
100pF	1	Mica	50v	7.5mm	http://www.smallbearelec.com/servlet/Detail?no=181
100uF	1	Electrolytic	25v	2.5mm	
10uF	1	Electrolytic	25v	2.5mm	http://www.smallbearelec.com/servlet/Detail?no=1070
10n	3	Film	25v	5mm	
1uF	2	Film	25v	5mm	
22n	1	Film	25v	5mm	
47n	2	Film	25v	5mm	http://www.smallbearelec.com/servlet/Categories?category=Capacitors+--+Low+Voltage+Film
4n7	1	Film	25v	5mm	
82n	1	Film	25v	5mm	
BAT41	3	Schottky		5mm	http://www.smallbearelec.com/servlet/Detail?no=1136
BAT46	2	Schottky		7.5mm	http://www.mouser.com/ProductDetail/STMicroelectronics/BAT46/?qs=sGAEpiMZZMtQ8nqTKiFS%2fD9SVzsgHTKGnR5ayPNy9%2fc%3d
1N4001	1	Silicon	1W	7.5mm	http://www.smallbearelec.com/servlet/Detail?no=316
IRF510	2	TO-220			http://www.smallbearelec.com/servlet/Detail?no=304
TLC2262	1	DIP8			http://www.mouser.com/ProductDetail/Texas-Instruments/TLC2262CPE4/?qs=sGAEpiMZZMtCHixnSiNA6Dh9CQmOfcFccRiucMe4ViU%3d
SPDT	2	On/On			http://www.smallbearelec.com/servlet/Detail?no=42
20k	1	Bourns 3362P		6mm	http://www.mouser.com/ProductDetail/Bourns/3362P-1-203LF/?qs=sGAEpiMZZMvygUB3GLcD7iDNiz%2fNDK0mhkYgCqD12rc%3d
50k	1	Bourns 3362P		6mm	http://www.mouser.com/ProductDetail/Bourns/3362P-1-503LF/?qs=sGAEpiMZZMvygUB3GLcD7vRbQqL9uMLMZgtO2Ks3Q%2f4%3d
1MA	1	16MM PCB Mount			
100kA	1	16MM PCB Mount			http://www.smallbearelec.com/servlet/Detail?no=692
50kA	1	16MM PCB Mount			

The SPDT switches linked above are super mini SPDTs. These are preferable to allow for the top mounted jacks on the enclosure. It is possible to use the normal SPDT switches...it is just a much tighter fit and may require some fudging.

The TLC2262 is suggested, but by no means the only IC that will work here. Special note: use only a 9v supply with this particular IC! This circuit will run at just over the max supply voltage suggested in the datasheet (8v) but I have not had any problems with IC failures.

REF: <http://www.ti.com/lit/ds/symlink/tlc2262am.pdf>

The **Sparkplug Rev.1** is a modified, although very similar, version of the original Sparkplug project released in fall of 2012. Those of you familiar with the project are probably aware that there was a mistake on the PCB layout in how the mosfet clippers were connected which required a small modification by the builder to work properly. This led me to do some more experimentation on the circuit since I needed to have the error fixed on the next batch of boards. The Rev.1 PCB is the result.

History of the Sparkplug project from the previous doc:

*The **Sparkplug** is modeled after the many great overdrives designed by Dave Barber of Barber Electronics such as the LTD, the Direct Drive and their many variations. While each of these overdrives is unique, they all feature some common design elements such as soft and/or hard clipping, no input or output buffers, and a number of internal trim pots for tone control. The **Sparkplug** is molded along these lines without being a direct clone of any particular design.*

Controls

Gain – Total amount of overdrive.

Cut – Rolls off treble frequencies as it is turned clockwise.

Vol – Total output volume.

Pres – The Presence switch adds an additional bump at around 3 kHz to the clipped frequency.

Sat – Adds two Schottky diodes as hard clippers to create heavily saturated overdrive.

Bass, Mid – Active tone controls that provide subtle, but effective, boost to mid and bass frequencies.

Changes to the Rev.1 circuit

- Fixed incorrect mosfet traces on original PCB. Added two more series BAT41 diodes to one mosfet (this is slightly grittier and more asymmetrical clipping; similar to that of the Zen Drive™).
- Added a “Presence” switch to the clipping. This will add a little more bite to high notes for lead work. I also like it on at lower gain with a neck pickup.
- Changed hard clipping from LEDs to two BAT46 diodes. Also changed the clipping switch from the original to a Saturation switch. IOW, soft clipping is always present in the circuit now, and the Sat. switch adds hard clipping to it.
- Bass and Mid controls are now internal trimmers. These can still be wired externally, if desired.
- A few small value tweaks. Increased total overdrive with a 1MA gain pot.

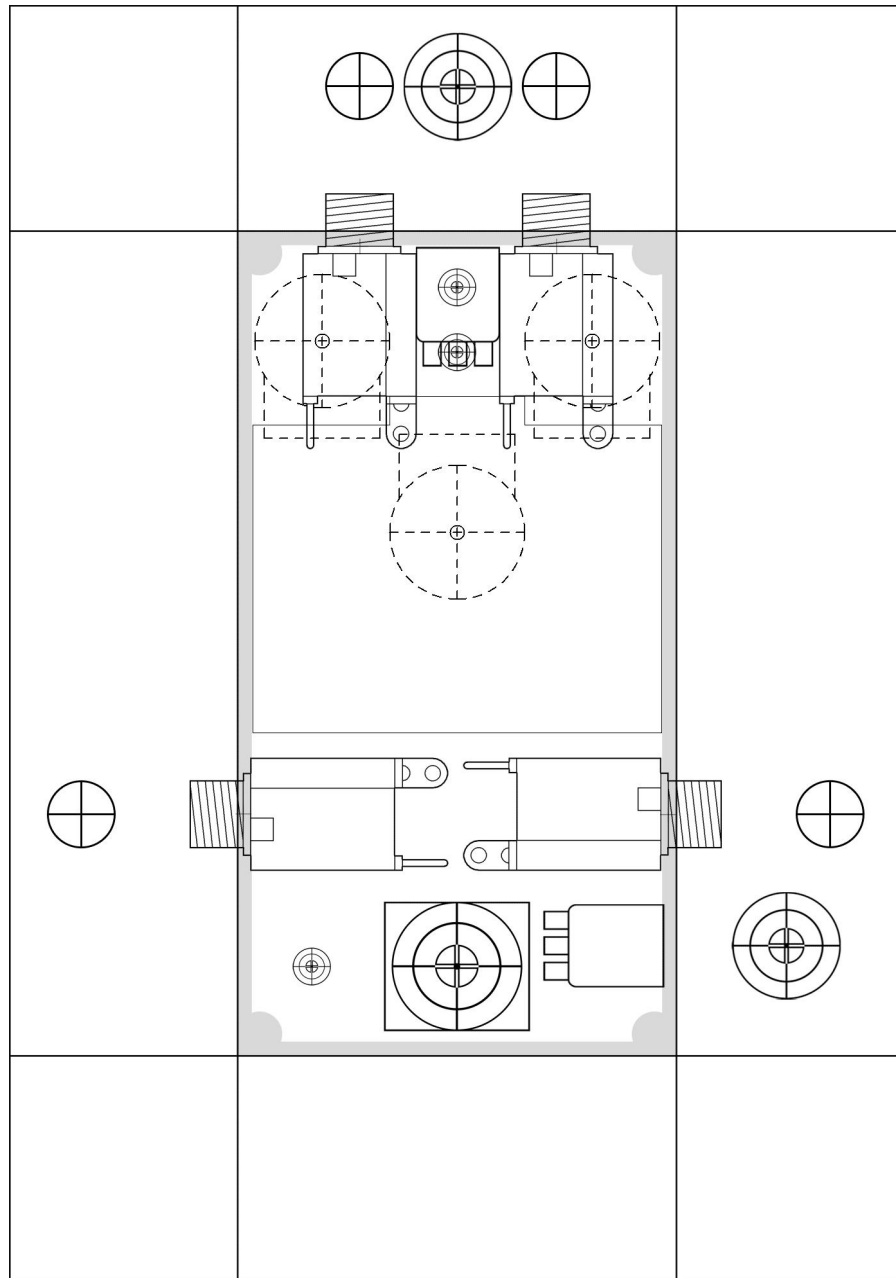
Result: Overall, this is an improved overdrive circuit from the original. Not vastly different, but a very sweet, mid-voiced OD that will work well in different gear set-ups. You can expect some nice shimmer on lead and chord-work with plenty of harmonic content; the kind of thing we can always use more of!

The IRF510 mosfets are physically large (T0-220 style). To ensure they fit properly in a 1590B, clip of the top tabs with a wire clipper as show below.



You can substitute 2n7000 if you cannot get the IRF510s. However, you need to flip those 180° on the PCB since the pin-outs are opposite.

1590B Template
4.64"W x 6.68"H



This template shows two possible layouts. One with top-mounted input/output jacks and a side DC jack. This arrangement will allow for a battery between the 3PDT and the PCB. The other arrangement is for a top mounted DC jack and side input/output jacks. In both cases, the mini SPDT switches should be placed between the two pots at the top. Although I've pictured enclosed type jacks for the top ones, the open frame types are a better choice (or you might be sanding off the lip on the bottom plate like I had to).

As always, this template is approximate. Check carefully before committing to drill!!

