

PROJECT NAME

# QUARK



BASED ON

Maxon® OD-880 Overdrive

BUILD DIFFICULTY

■■■■■ Easy

EFFECT TYPE

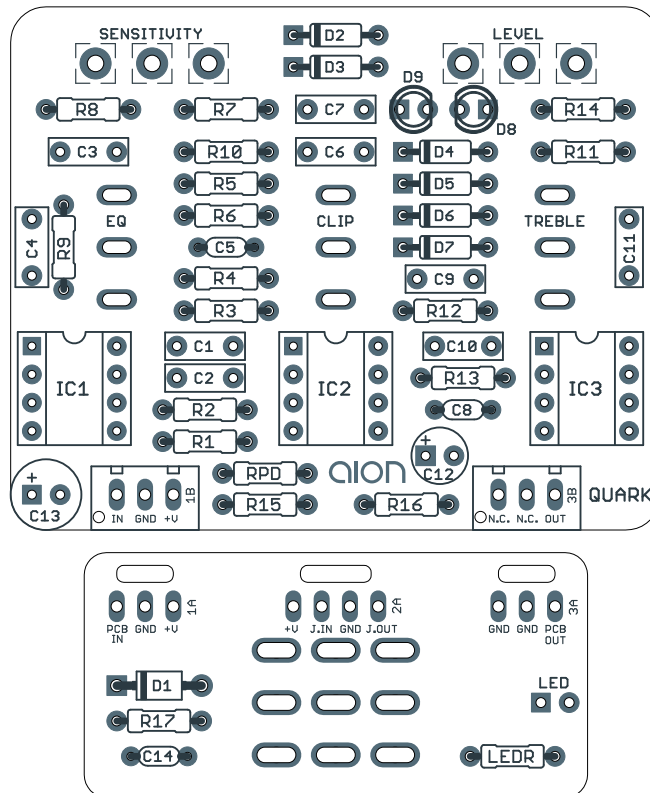
Overdrive

DOCUMENT VERSION

1.0.0 (2021-03-19)

PROJECT SUMMARY

An early overdrive circuit inspired by the MXR Distortion+, but incorporating a few changes that would later evolve into the Tube Screamer a few years later.



Actual size is 2.3" x 1.86" (main board) and 1.78" x 0.86" (bypass board).

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## INTRODUCTION

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The Quark Vintage Overdrive is a clone of the Maxon OD-880 Overdrive / Soft Distortion, originally released in 1976.

This pedal was huge in Japan, being the favored overdrive pedal of Char, one of the country's most popular guitarists, who—like the pedal—never really got noticed out of Japan. It was reissued a few times, notably in the mid-90's as well as more recently.

It's an interesting circuit from a historical perspective, being sort of a "transitional species" between the Distortion+ and the Boss OD-1 OverDrive. It added the input and output buffers and changed the Drive potentiometer to a flat op-amp boost instead of a gain modifier that also affected the bass tone, as in the Dist+. The Boss OD-1 is essentially an OD-880 with feedback clipping diodes instead of diode-to-ground clipping. This diode arrangement turned out to be a very big deal and made way for the Tube Screamer a couple of years later.

The Quark is a direct clone of the OD-880, but with a few additions. A clipping toggle allows switching between three different sets of diodes. An EQ switch engages a second mode with increased gain and more bass. And since the OD-880 lacks a tone control, a Treble switch selects between three different post-clipping hi-cut modes.

The updated version of the Quark is the same as the original 1590B version, but with the addition of the Treble switch which the original Quark did not have.

## USAGE

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The Quark has the following controls:

- **Drive** controls the amount of gain in the op-amp feedback diode clipping stage.
- **Volume** controls the overall output of the effect.
- **Clip** (toggle switch) selects between three sets of diodes: 1x silicon (stock), 2x silicon, and LEDs.
- **EQ** (toggle switch) selects between two different tones: stock mode (similar to the Tube Screamer) and another mode with slightly higher gain and less bass cut.
- **Treble** (toggle switch) selects between three different treble-cut modes. Stock mode has the highest treble cut.

## PARTS LIST

This parts list is also available in a spreadsheet format which can be imported directly into Mouser for easy parts ordering. Mouser doesn't carry all the parts (most notably potentiometers) so the second tab lists all the non-Mouser parts as well as sources for each.

[View parts list spreadsheet](#) →

PART	VALUE	TYPE	NOTES
R1	10k	Metal film resistor, 1/4W	
R2	470k	Metal film resistor, 1/4W	
R3	10k	Metal film resistor, 1/4W	
R4	10k	Metal film resistor, 1/4W	
R5	470k	Metal film resistor, 1/4W	
R6	100R	Metal film resistor, 1/4W	
R7	100k	Metal film resistor, 1/4W	
R8	4k7	Metal film resistor, 1/4W	
R9	3k3	Metal film resistor, 1/4W	Part of EQ mod. See build notes.
R10	10k	Metal film resistor, 1/4W	
R11	10k	Metal film resistor, 1/4W	
R12	9k1	Metal film resistor, 1/4W	
R13	100k	Metal film resistor, 1/4W	
R14	68k	Metal film resistor, 1/4W	
R15	10k	Metal film resistor, 1/4W	
R16	10k	Metal film resistor, 1/4W	
R17	100R	Metal film resistor, 1/4W	Power supply filter resistor.
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor.
LEDR	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	47n	Film capacitor, 7.2 x 2.5mm	
C2	47n	Film capacitor, 7.2 x 2.5mm	
C3	47n	Film capacitor, 7.2 x 2.5mm	
C4	330n	Film capacitor, 7.2 x 2.5mm	Part of EQ mod. See build notes.
C5	47pF	MLCC capacitor, NP0/COG	Not present in original. See build notes.
C6	100n	Film capacitor, 7.2 x 2.5mm	
C7	100n	Film capacitor, 7.2 x 2.5mm	
C8	820pF	MLCC capacitor, NP0/COG	Part of treble mod. See build notes.
C9	3n9	Film capacitor, 7.2 x 2.5mm	Part of treble mod. See build notes.
C10	1n2	Film capacitor, 7.2 x 2.5mm	Part of treble mod. See build notes.
C11	100n	Film capacitor, 7.2 x 2.5mm	Power supply filter capacitor.

## PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C12	47uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C13	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C14	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	1N914	Fast-switching diode, DO-35	
D3	1N914	Fast-switching diode, DO-35	
D4	1N914	Fast-switching diode, DO-35	
D5	1N914	Fast-switching diode, DO-35	
D6	1N914	Fast-switching diode, DO-35	
D7	1N914	Fast-switching diode, DO-35	
D8	3mm LED	LED, 3mm, red diffused	
D9	3mm LED	LED, 3mm, red diffused	
IC1	LM741	Operational amplifier, DIP-8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	LM741	Operational amplifier, DIP-8	
IC2-S	DIP-8 socket	IC socket, DIP-8	
IC3	LM741	Operational amplifier, DIP-8	
IC3-S	DIP-8 socket	IC socket, DIP-8	
SENS.	500kB	16mm right-angle PCB mount pot	
LEVEL	10kB	16mm right-angle PCB mount pot	
CLIP	SPDT cntr off	Toggle switch, SPDT on-off-on	
TREBLE	SPDT cntr off	Toggle switch, SPDT on-off-on	
EQ	SPDT on-on	Toggle switch, SPDT on-on	
LED	5mm	LED, 5mm, red diffused	
IN	1/4" stereo	1/4" phone jack, closed frame	Switchcraft 112BX or equivalent.
OUT	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
DC	2.1mm	DC jack, 2.1mm panel mount	Mouser 163-4302-E or equivalent.
BATT	Battery snap	9V battery snap	Optional. Use the soft plastic type—the hard-shell type will not fit.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

## BUILD NOTES

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### EQ switch

The original OD-880 uses an op-amp low cut arrangement similar to the Tube Screamer. The EQ switch changes the resistor (which sets the gain ratio) and capacitor (which sets the low-cut frequency) for alternate values. The values in the parts list work well as a starting point, but you can tweak if you want.

- For more available gain in the modded EQ mode, reduce the value of R9 (e.g. 2k2).
- For more bass cut (i.e. less bass), reduce the value of C4 (e.g. 100n or 220n).
- For less bass cut (i.e. more bass), increase the value of C4 (e.g. 470n or 1uF).

**Make sure to use an on-on toggle switch for this** since there is no center-off mode as with the other two toggles. The center position of a center-off switch would cut out the signal.

### Treble switch

The original OD-880 has a steep treble cut after the clipping diodes and no discrete tone control. The default treble cut works pretty well, but you may find you need more for certain guitar & amp combos. Or, you may want more treble on tap so you can turn it up and down directly from the guitar.

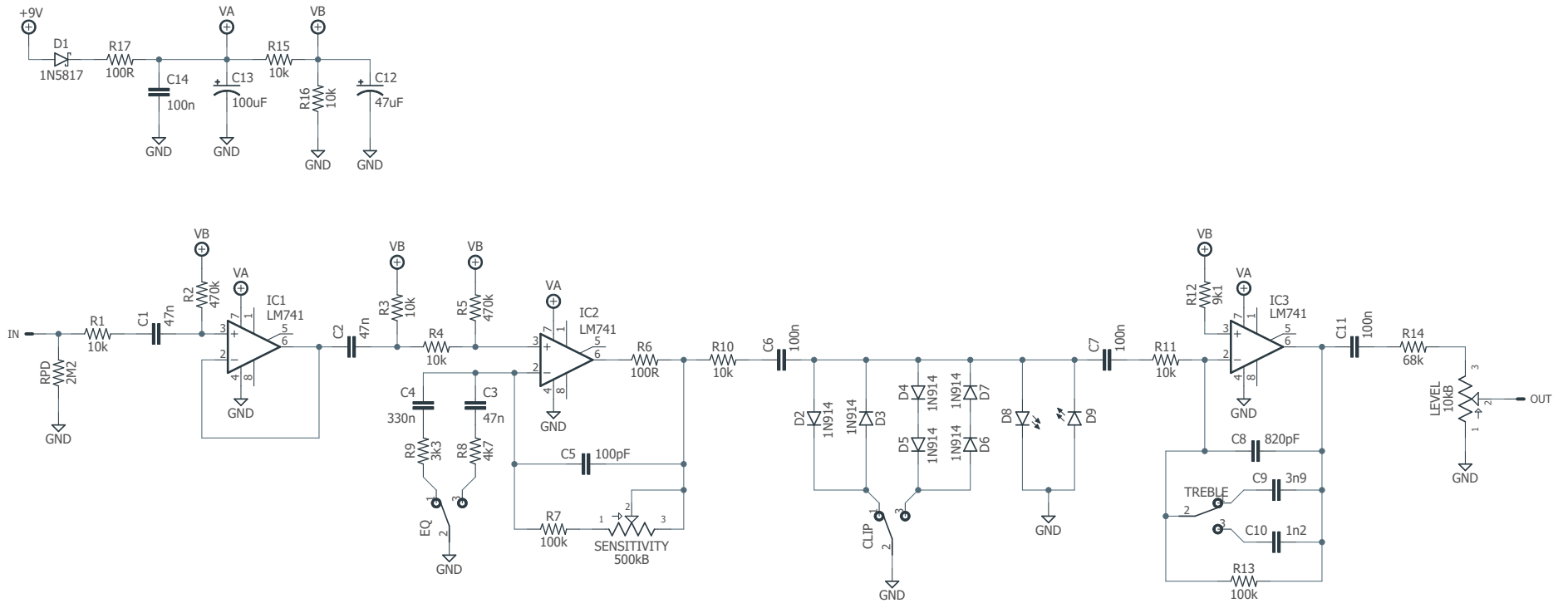
The stock capacitor value is **4n7**. This has been modified so that it has **1n2** and **3n9** capacitors in parallel with an always-on **820pF** capacitor, which creates 3 different settings: 4n7 (stock), 2n2 (less treble cut) and 820pF (least treble cut).

By tweaking these three values, you can end up with different modes. For example, by using a 4n7 capacitor instead of 1n2, you can have one mode with more treble cut, meaning there is one setting above and one setting below the stock mode.

### C5 capacitor

The original OD-880 does not include a feedback capacitor in the op-amp gain stage. This capacitor is found on nearly every similar drive circuit that came afterward and is seen as best practice to limit the bandwidth of the op-amp for better stability. It's extremely subtle and has nearly no impact on the audio frequencies except at higher drive settings.

# SCHEMATIC



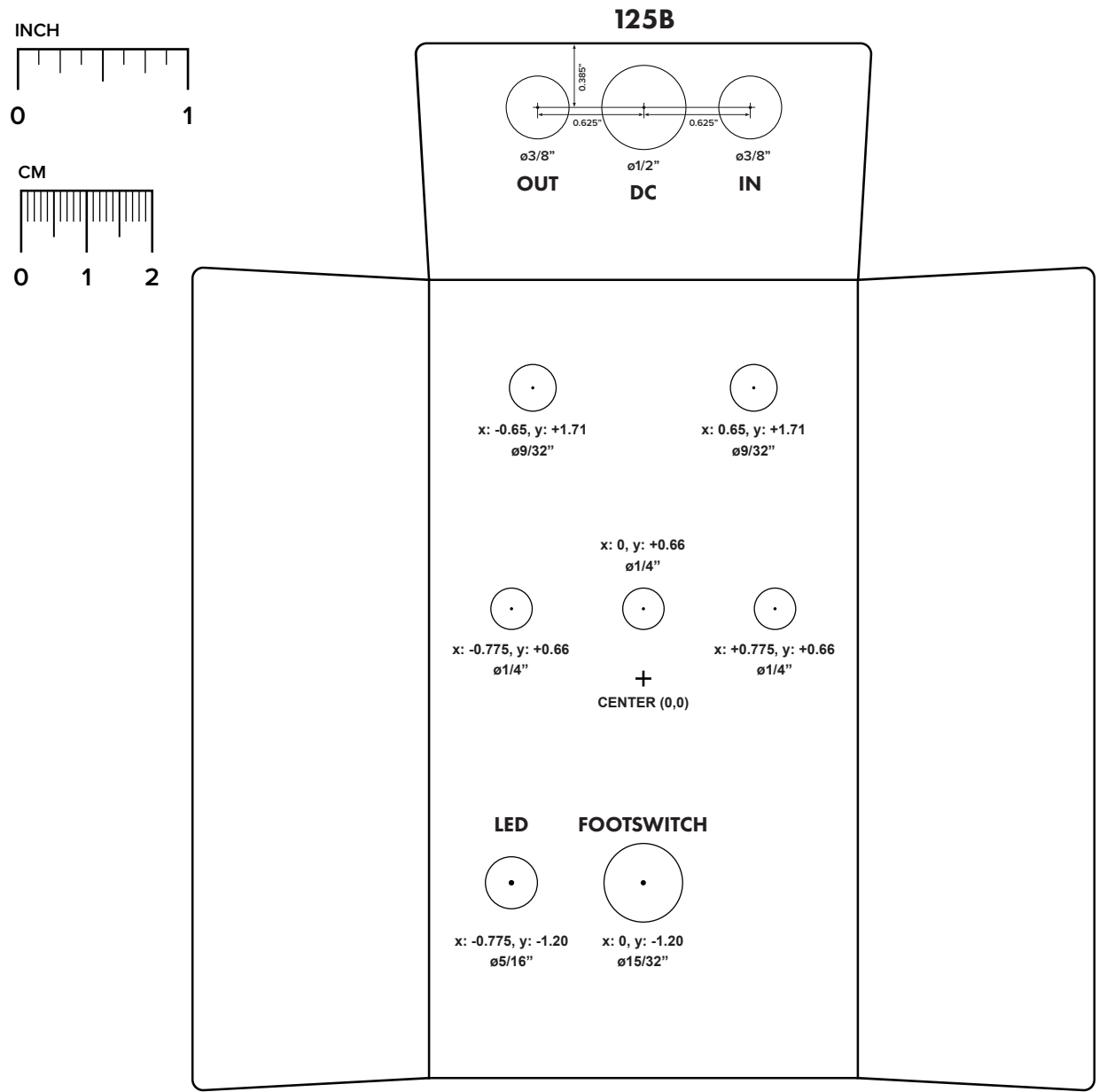
# DRILL TEMPLATE

Cut out this drill template, fold the edges and tape it to the enclosure. Before drilling, it's recommended to first use a center punch for each of the holes to help guide the drill bit.

Ensure that this template is printed at 100% or "Actual Size". You can double-check this by measuring the scale on the printed page.

**Top jack layout** assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the [Open-Frame Jack Drill Template](#) for the top side.

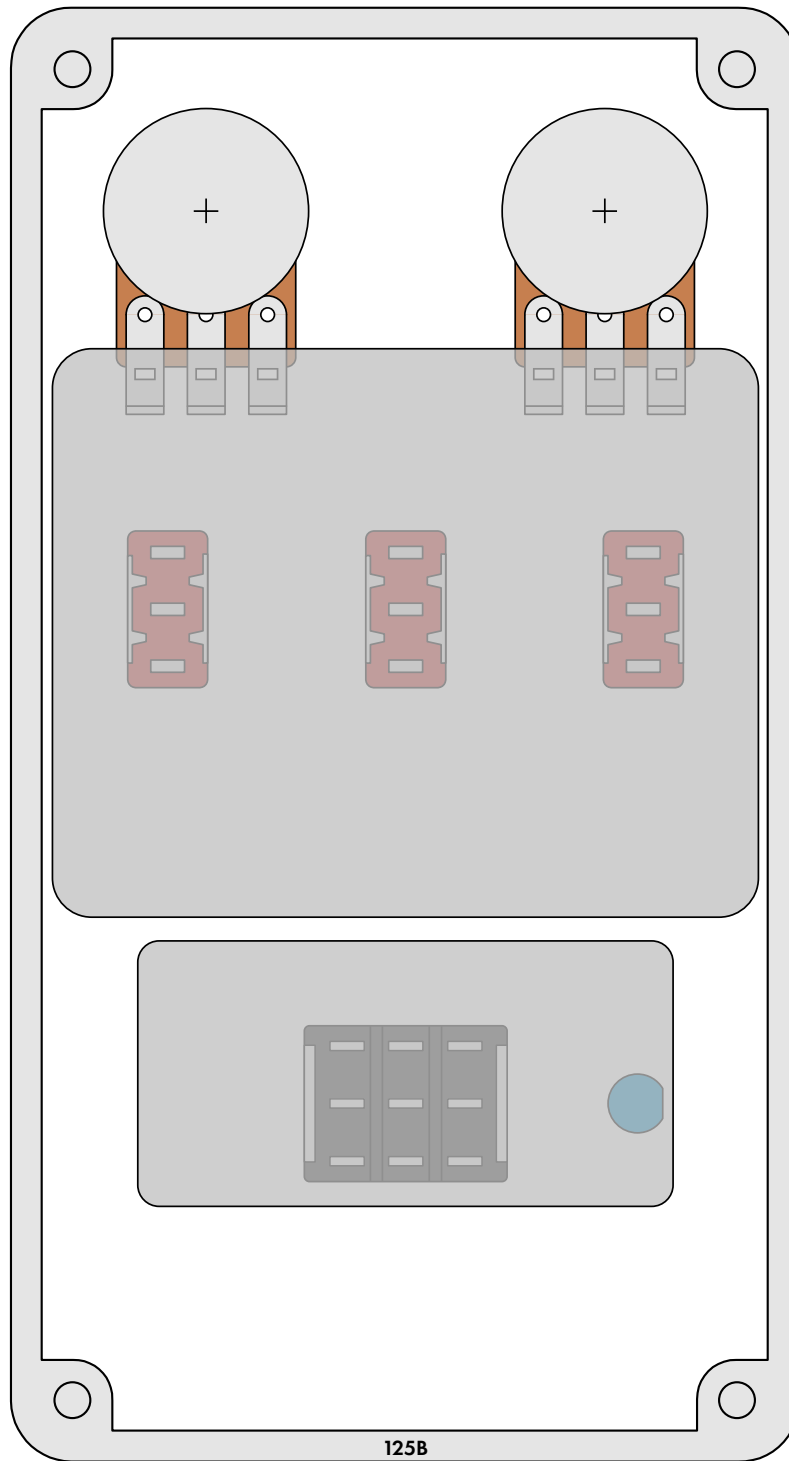
**LED hole drill size** assumes the use of a [5mm LED bezel](#), available from several parts suppliers. Adjust size accordingly if using something different, such as a 3mm bezel, a plastic bezel, or just a plain LED.



# ENCLOSURE LAYOUT

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Enclosure is shown without jacks. See next page for jack layout and wiring.





# WIRING DIAGRAM



*Shown with optional 9V battery. If battery is omitted, both jacks can be mono rather than one being stereo.  
Leave the far-right lug of the DC jack unconnected.*

## LICENSE & USAGE

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**No direct support is offered for these projects beyond the provided documentation.** It's assumed that you have at least some experience building pedals before starting one of these. Replacements and refunds cannot be offered unless it can be shown that the circuit or documentation are in error.

**All of these circuits have been tested in good faith in their base configurations.** However, not all the modifications or variations have necessarily been tested. These are offered only as suggestions based on the experience and opinions of others.

**Projects may be used for commercial endeavors in any quantity** unless specifically noted. No attribution is necessary, though a link back is always greatly appreciated. The only usage restrictions are that **(1) you cannot resell the PCB as part of a kit without prior arrangement, and (2) you cannot “goop” the circuit, scratch off the screenprint, or otherwise obfuscate the circuit to disguise its source.** (In other words: you don't have to go out of your way to advertise the fact that you use these PCBs, but please don't go out of your way to hide it. The guitar effects industry needs more transparency, not less!)

## DOCUMENT REVISIONS

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### 1.0.0 (2021-03-19)

Initial release.