

PROJECT NAME

AURORA



BASED ON

Ross Compressor & MXR Dyna Comp

BUILD DIFFICULTY

■■■■□ Intermediate

EFFECT TYPE

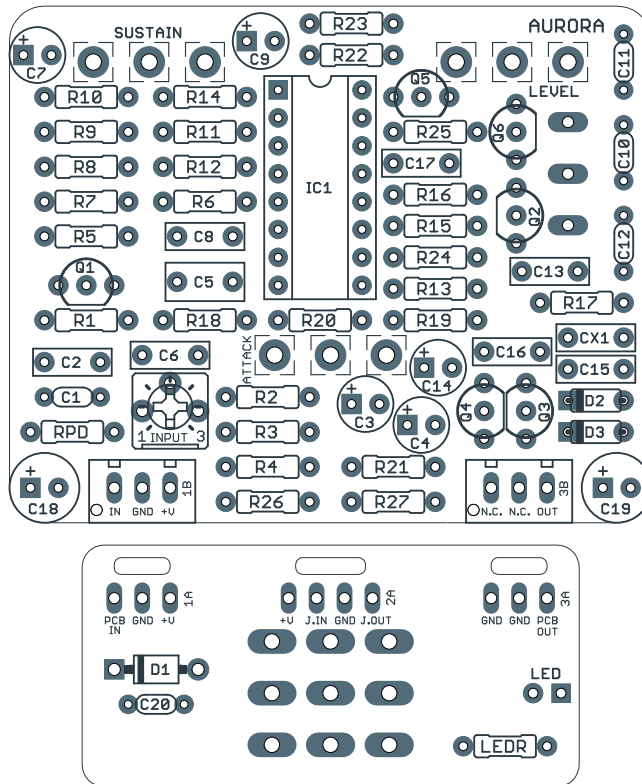
Compressor / Sustainer

DOCUMENT VERSION

1.0.0 (2018-07-04)

PROJECT SUMMARY

The original guitar compressor, still a favorite of guitarists after over 40 years. The Aurora makes several improvements to the original circuit as well as adding a few new features.



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

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INTRODUCTION

The Aurora Compressor/Sustainer is an updated version of the MXR Dyna Comp and the Ross Compressor. One of the first compressor circuits designed for guitar, the MXR Dyna Comp has been a consistent favorite among guitarists, and the circuit is legendary in the DIY community.

The Ross Compressor was an updated clone of the Dyna Comp that got a lot of attention when it was “rediscovered” in the 1990s by Trey Anastasio of Phish. It has better power supply filtering and thus lower noise, but is otherwise very similar to the Dyna Comp.

The Aurora takes things a step further by adding a couple of modifications. First, the obsolete CA3080 has been replaced by the LM13700, which is essentially just a dual CA3080 but with the advantage of still being in production and easy to find.

The output section has also been modified to take the signal from a different part of the envelope detector. This results in drastically reduced ripple (which is perceived as distortion on the otherwise clean signal). Some people like this distortion, so the Aurora was designed so you can still build the “stock” version and use the classic output stage. See the build notes for more details.

USAGE

The Aurora has the following controls:

- **Sustain** controls the amount of compression. As you turn it up, it increases the sustain but also the noise level. If you keep it down lower than 12:00, the effect acts more like a limiter.
- **Release** allows you to set the amount of time after the input signal falls below the threshold before the compressor “resets” and is ready to compress again. It’s also called an “Attack” control in the Boss CS-2 and Keeley Compressor.
- **Level** is the overall output volume of the effect.
- **Treble** controls the amount of treble attenuation immediately after the signal is compressed.
- **Input** is an internal trimmer that attenuates the signal going into the compressor, allowing you to use it with high-output instruments such as keyboards or active pickups.

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—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	470k	Metal film resistor, 1/4W	
R4	10k	Metal film resistor, 1/4W	
R5	10k	Metal film resistor, 1/4W	
R6	1M	Metal film resistor, 1/4W	
R7	1k	Metal film resistor, 1/4W	
R8	1k	Metal film resistor, 1/4W	
R9	220k	Metal film resistor, 1/4W	
R10	220k	Metal film resistor, 1/4W	
R11	1M	Metal film resistor, 1/4W	
R12	15k	Metal film resistor, 1/4W	
R13	150k	Metal film resistor, 1/4W	
R14	27k	Metal film resistor, 1/4W	
R15	10k	Metal film resistor, 1/4W	
R16	10k	Metal film resistor, 1/4W	
R17	1M	Metal film resistor, 1/4W	
R18	100R	Metal film resistor, 1/4W	Use 10k here if using a real 150kC pot for the Release control.
R19	220k	Metal film resistor, 1/4W	Parallel resistors to change the 500kB release pot into 150kC. Jumper R19 and omit R20 if using a real 150kC pot. See build notes for more.
R20	10k	Metal film resistor, 1/4W	
R21	1M	Metal film resistor, 1/4W	
R22	1k	Metal film resistor, 1/4W	Part of Q6 mod. See build notes.
R23	10k	Metal film resistor, 1/4W	Part of Q6 mod. See build notes.
R24	10k	Metal film resistor, 1/4W	Part of Q6 mod. See build notes.
R25	10k	Metal film resistor, 1/4W	
R26	56k	Metal film resistor, 1/4W	
R27	27k	Metal film resistor, 1/4W	
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor. Can be as low as 1M.
LEDR	4k7	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C1	220pF	MLCC capacitor, NP0/C0G	Omit for Dyna Comp. Keeley Compressor uses 150pF.
C2	10n	Film capacitor, 7.2 x 2.5mm	
C3	1uF	Electrolytic capacitor, 4mm	
C4	1uF	Electrolytic capacitor, 4mm	
C5	1uF	Film capacitor, 7.2 x 3.5mm	
C6	2n2	Film capacitor, 7.2 x 2.5mm	
C7	1uF	Electrolytic capacitor, 4mm	
C8	10n	Film capacitor, 7.2 x 2.5mm	
C9	1uF	Electrolytic capacitor, 4mm	
C10	180pF	MLCC capacitor, NP0/C0G	
C11	330pF	MLCC capacitor, NP0/C0G	
C12	820pF	MLCC capacitor, NP0/C0G	
C13	10n	Film capacitor, 7.2 x 2.5mm	
C14	10uF	Electrolytic capacitor, 5mm	
C15	10n	Film capacitor, 7.2 x 2.5mm	
C16	100n	Film capacitor, 7.2 x 2.5mm	Part of Q6 mod. See build notes.
C17	1n	Film capacitor, 7.2 x 2.5mm	Optional. Allows a slight treble boost above 3kHz at the output.
C18	47uF	Electrolytic capacitor, 5mm	Power supply filter capacitor.
C19	10uF	Electrolytic capacitor, 5mm	Voltage reference filter capacitor.
C20	100n	MLCC capacitor, X7R	Power supply filter capacitor.
CX1	OMIT	Film capacitor, 7.2 x 2.5mm	See build notes for when to use this.
D1	1N5817	Schottky diode, DO-41	
D2	1N914	Fast-switching diode, DO-35	
D3	1N914	Fast-switching diode, DO-35	
IC1	LM13700N	Transconductance amplifier, DIP16	
Q1	2N5088	BJT transistor, NPN, TO-92	
Q2	2N5088	BJT transistor, NPN, TO-92	
Q3	2N5088	BJT transistor, NPN, TO-92	
Q4	2N5088	BJT transistor, NPN, TO-92	
Q5	2N5088	BJT transistor, NPN, TO-92	
Q6	2N5088	BJT transistor, NPN, TO-92	Part of Q6 mod. See build notes.
INPUT	100k trimmer	Trimmer, 10%, 1/4"	Allows the input signal to be attenuated for use with high input levels.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
SUS	500kC	16mm right-angle PCB mount pot	Stock Ross/Dyna uses 500kB, but C (reverse audio) works much better.
REL	500kB	16mm right-angle PCB mount pot	Parallel resistors are used to get a final value of 150kC (reverse audio).
LEVEL	50kB	16mm right-angle PCB mount pot	
TREB	SPDT	Toggle switch, SPDT center off	
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

The Q6 Mod

One little-known modification to the Ross/Dyna circuit is to change the output section so it takes its signal from a different place in the envelope detector. By doing this, you eliminate the ripple on the compressed signal which is heard as a slight distortion. It's a vast improvement on the original circuit without changing the characteristic of the tone.

The default configuration of the Aurora is to use this Q6 mod. However, if you do want to build a fully-stock Ross or Dyna Comp, you can use a 47n film capacitor for **CX1** and omit **R22-24** and **Q6**.

The C17 Mod

One way of getting a little more “snappiness” to the circuit is to use a **1n** capacitor for **C17** to bypass the R25 resistor. This will give a slight increase in treble content above 3kHz at the output of the effect. You can increase this value to lower the frequency. For example, 1.5n will increase the treble above 2.2kHz.

Release Control

The default configuration of the Aurora includes a “Release” control which is adapted from the Boss CS-2. (Boss called it “Attack”, which is not entirely wrong, but it's more accurate to say that it controls the release at the decay of the signal rather than the attack at the beginning.) When the pot is turned all the way down, it's the stock Ross/Dyna circuit.

The optimal pot value for this is 150k reverse audio (antilog) taper, but this value has to be custom-ordered and none of the DIY parts suppliers have it in the right-angle type. Instead, this project uses a more common 500kB (linear) pot with parallel resistors to drop the value down to 150k and change the taper to mimic reverse audio.

The one side effect of this is that the pot can't get all the way to zero like a normal pot. As a result, the R18 resistor (normally 10k) has been decreased to 100R.

If you are using a true 150kC pot, you'll need to jumper **R19** and change **R18** to **10k**. Omit **R20** entirely.

Treble Switch

The Treble switch is adapted from the Janglebox. The Janglebox actually omits C10 entirely so there's no treble attenuation after the OTA, but after testing out a number of different combinations, it felt best to have at least a very small capacitor connected at all times. These three capacitor values (180pF, 330pF and 820pF) are the ones that were chosen after testing. With the switch in the “up” position, the result is the stock value of 1n. The “down” position is 510pF (a bit of treble boost) and the center position is 180pF (a bit more treble boost).

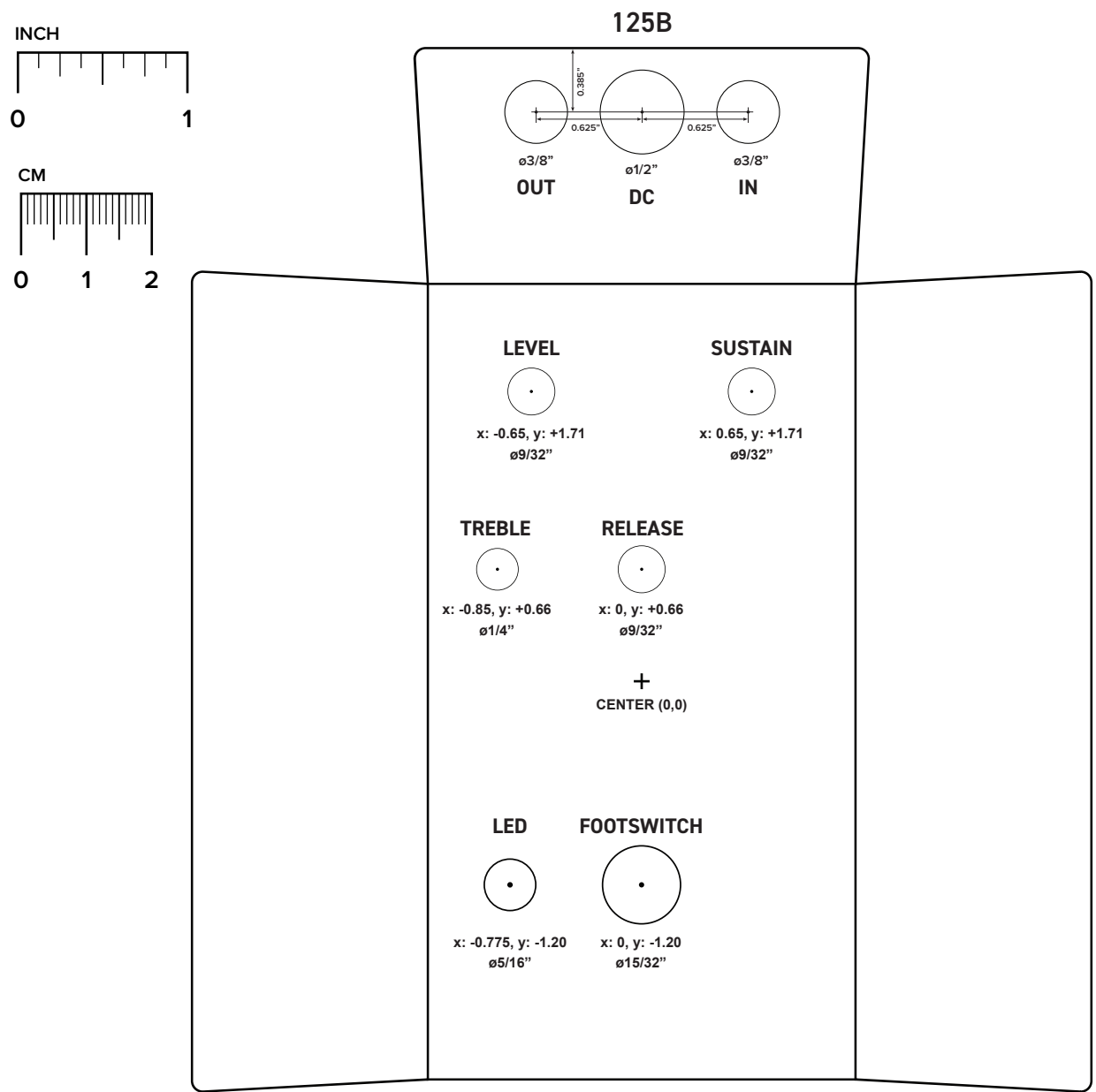
DRILL TEMPLATE

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.

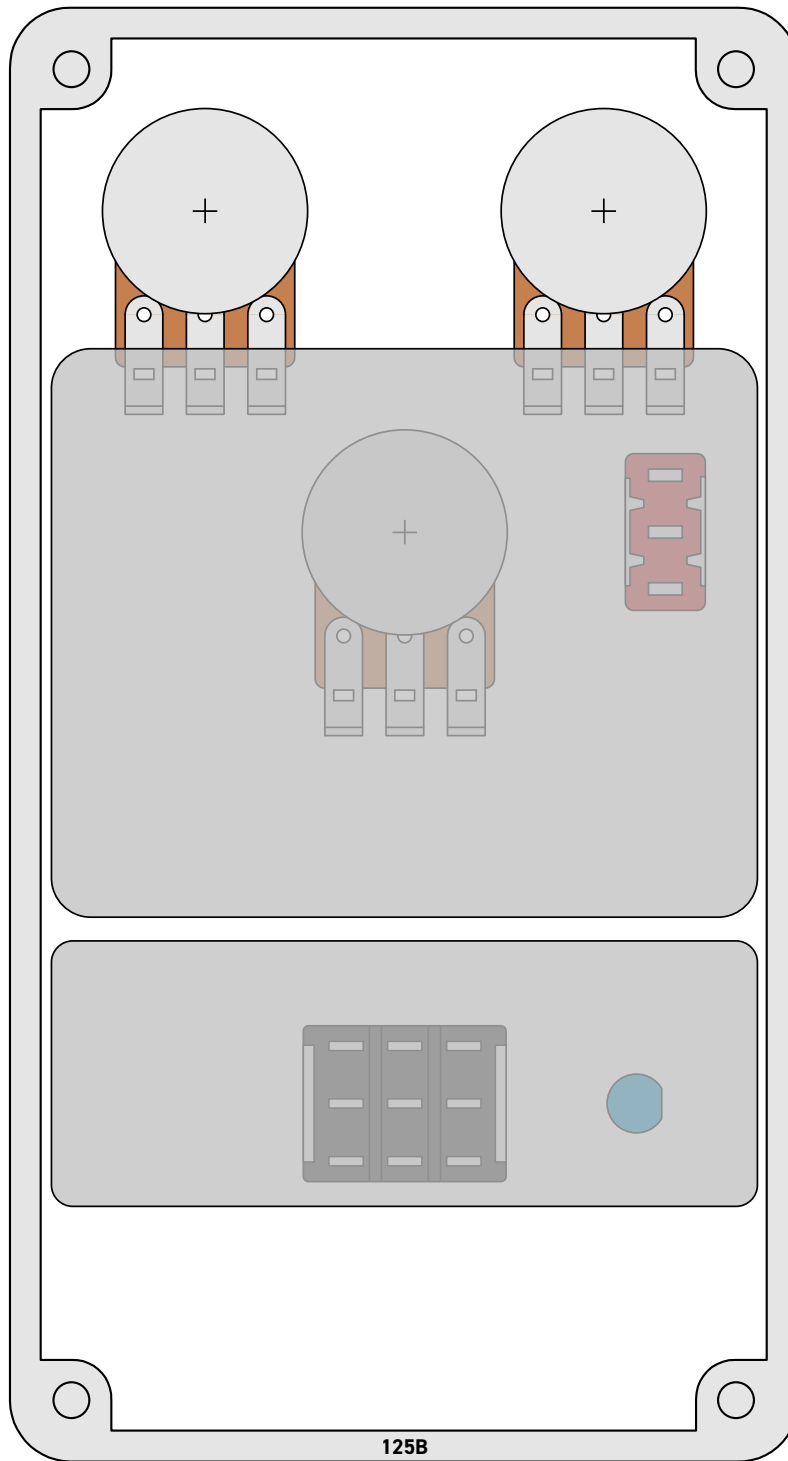
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

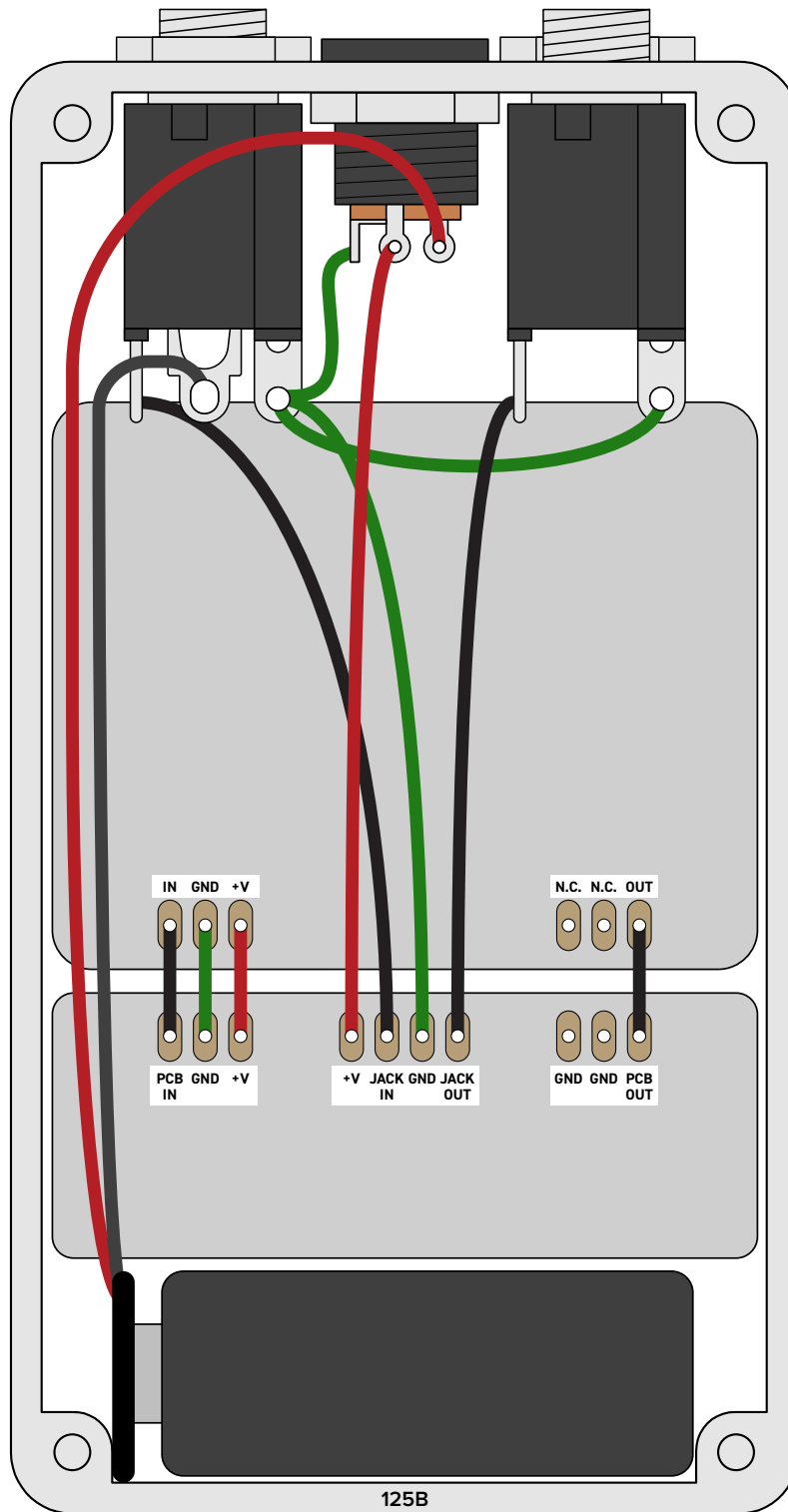


ENCLOSURE LAYOUT

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

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

1.0.0 (2018-07-04)

Initial release.