

PROJECT NAME
LUMIN

BASED ON
BBE Sonic Stomp

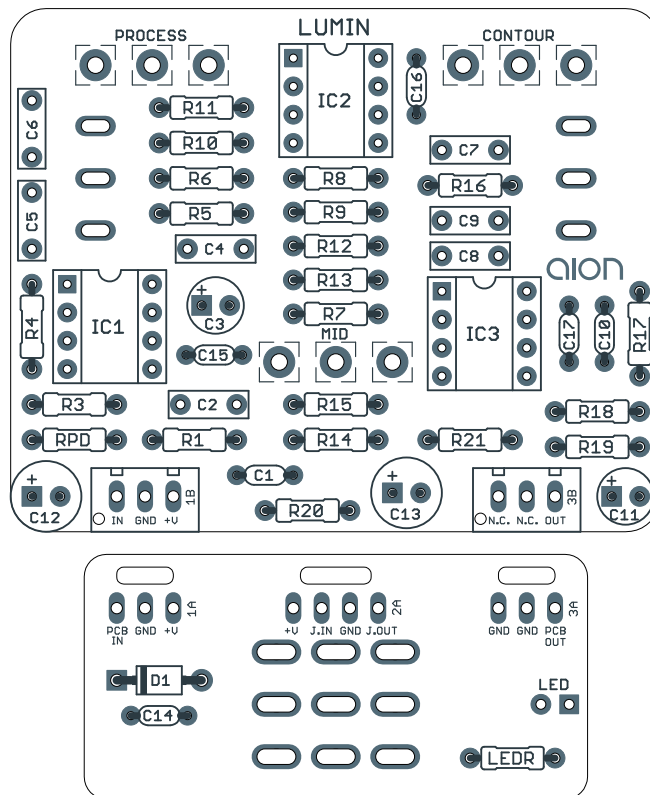
BUILD DIFFICULTY
■■■■■ Easy

EFFECT TYPE
EQ / Sonic Enhancer

DOCUMENT VERSION
1.0.3 (2021-04-28)

PROJECT SUMMARY

A unique tone-shaping tool that allows you to enhance the clarity of your signal by phase-correcting the low, mid and high frequencies separately.



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

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INTRODUCTION

The Lumin Sonic Enhancer is a work-alike of the BBE Sonic Stomp, the single-channel stompbox version of the rackmounted Sonic Maximizer first released in the late 1980s. Its sound is often described as like taking a blanket off your speaker. It adds clarity and definition to your tone and can be adjusted to suit a wide variety of rigs and settings.

Categorically speaking, it's an EQ pedal, but one that primarily affects the frequencies above and below the range of normal EQ pedals. Its purpose is less about changing the voice of the instrument and more about changing its relationship to the overall mix.

The original unit uses a proprietary analog IC manufactured by New Japan Radio that contains the core of the circuit. The Lumin is a reverse-engineered expansion of the circuit on that chip, but it should be stressed that it is not a clone, because the chip implementation is patented. A midrange knob has been added along with switches to set the frequencies of the Process and Contour knobs.

The updated 125B version of the Lumin adds some additional power filtering on the ICs, but otherwise nothing has been changed from the older 1590B version.

USAGE

The Lumin has the following controls:

- **Contour** adjusts the phase response of the split signal below the frequency set by the Lo Frequency toggle (low pass).
- **Process** adjusts the phase response of the split signal above the frequency set by the Hi Frequency toggle (high pass). This is similar to a “presence” control often seen in professional audio equipment.
- **Midrange** adjusts the phase response of the split signal between the low and high frequencies (bandpass).
- **Hi Frequency** (toggle switch) changes the frequency at which the “Process” knob operates. The default frequencies are 10 kHz (center position), 7.3 kHz (up), and 5.1 kHz (down).
- **Low Frequency** (toggle switch) changes the frequency at which the “Contour” knob operates. The default frequencies are 50 Hz (down position), 74 Hz (up), and 105 Hz (center).

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	1k	Metal film resistor, 1/4W	
R3	1M	Metal film resistor, 1/4W	
R4	1k	Metal film resistor, 1/4W	
R5	1k	Metal film resistor, 1/4W	
R6	1M	Metal film resistor, 1/4W	
R7	22k	Metal film resistor, 1/4W	
R8	22k	Metal film resistor, 1/4W	
R9	22k	Metal film resistor, 1/4W	
R10	10k	Metal film resistor, 1/4W	
R11	22k	Metal film resistor, 1/4W	
R12	22k	Metal film resistor, 1/4W	
R13	22k	Metal film resistor, 1/4W	
R14	22k	Metal film resistor, 1/4W	
R15	15k	Metal film resistor, 1/4W	
R16	10k	Metal film resistor, 1/4W	
R17	62k	Metal film resistor, 1/4W	
R18	100k	Metal film resistor, 1/4W	
R19	1k	Metal film resistor, 1/4W	
R20	47k	Metal film resistor, 1/4W	
R21	47k	Metal film resistor, 1/4W	
RPD	2M2	Metal film resistor, 1/4W	Input pulldown resistor.
LED R	4k7	Metal film resistor, 1/4W	LED current-limiting resistor.
C1	100pF	MLCC capacitor, NP0/COG	
C2	4n7	Film capacitor, 7.2 x 2.5mm	
C3	10uF	Electrolytic capacitor, 5mm	
C4	2n7	Film capacitor, 7.2 x 2.5mm	
C5	2n2	Film capacitor, 7.2 x 2.5mm	See build notes for details on modifications.
C6	6n8	Film capacitor, 7.2 x 2.5mm	See build notes for details on modifications.
C7	18n	Film capacitor, 7.2 x 2.5mm	
C8	15n	Film capacitor, 7.2 x 2.5mm	See build notes for details on modifications.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C9	56n	Film capacitor, 7.2 x 2.5mm	See build notes for details on modifications.
C10	100pF	MLCC capacitor, NP0/COG	
C11	10uF	Electrolytic capacitor, 5mm	
C12	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C13	100uF	Electrolytic capacitor, 6.3mm	Reference voltage filter capacitor.
C14	100n	MLCC capacitor, X7R	Power supply filter capacitor.
C15	100n	MLCC capacitor, X7R	Power supply filter capacitor. (IC1)
C16	100n	MLCC capacitor, X7R	Power supply filter capacitor. (IC2)
C17	100n	MLCC capacitor, X7R	Power supply filter capacitor. (IC3)
D1	1N5817	Schottky diode, DO-41	
IC1	TL072	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	TL072	Operational amplifier, DIP8	
IC2-S	DIP-8 socket	IC socket, DIP-8	
IC3	TL072	Operational amplifier, DIP8	
IC3-S	DIP-8 socket	IC socket, DIP-8	
CONT.	50kB	16mm right-angle PCB mount pot	
PROC.	50kB	16mm right-angle PCB mount pot	
MID	50kB	16mm right-angle PCB mount pot	
L.FREQ	SPDT cntr off	Toggle switch, SPDT on-off-on	
H.FREQ	SPDT cntr off	Toggle switch, SPDT on-off-on	
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

Basic theory

The legendary “BBE process” is a textbook usage of something called a state variable filter. The signal is split into three parts (low, medium and high) that can be controlled & modified separately before being mixed back together. The idea is that it phase-corrects the frequencies before they are amplified and sent to the speakers and this results in optimized speaker performance.

Unity gain, flat response

The baseline setting for the Lumin is as follows: Midrange 12:00, Contour 8:00, Process 8:00, Low Frequency toggle in the down position (50 Hz), Hi Frequency toggle in the center position (10kHz). There is a very slight roll-off above the high frequency and below the low frequency, but otherwise the effect signal should be indistinguishable from the bypass signal.

Midrange knob

The midrange is a bandpass filter, so it controls all the frequencies in between the high and low settings. It is highly interactive with the Contour and Process controls. The higher those knobs are set, the less of an impact the midrange knob will have, controlling a narrower frequency band. Conversely, if those knobs are turned all the way down, the midrange knob will affect a very wide frequency spectrum and act almost as a level control.

Adjusting the frequencies

If you follow the parts list, the frequencies of the toggle switches are those shown at the bottom of page 2. These settings can be adjusted by changing C4/C5/C6 (high frequencies) and C7/C8/C9 (low frequencies). For each of the six positions, the capacitor value can be reduced to raise the frequency, or increased to lower the frequency.

Hi Frequency switch

This sets the frequency for the Process control.

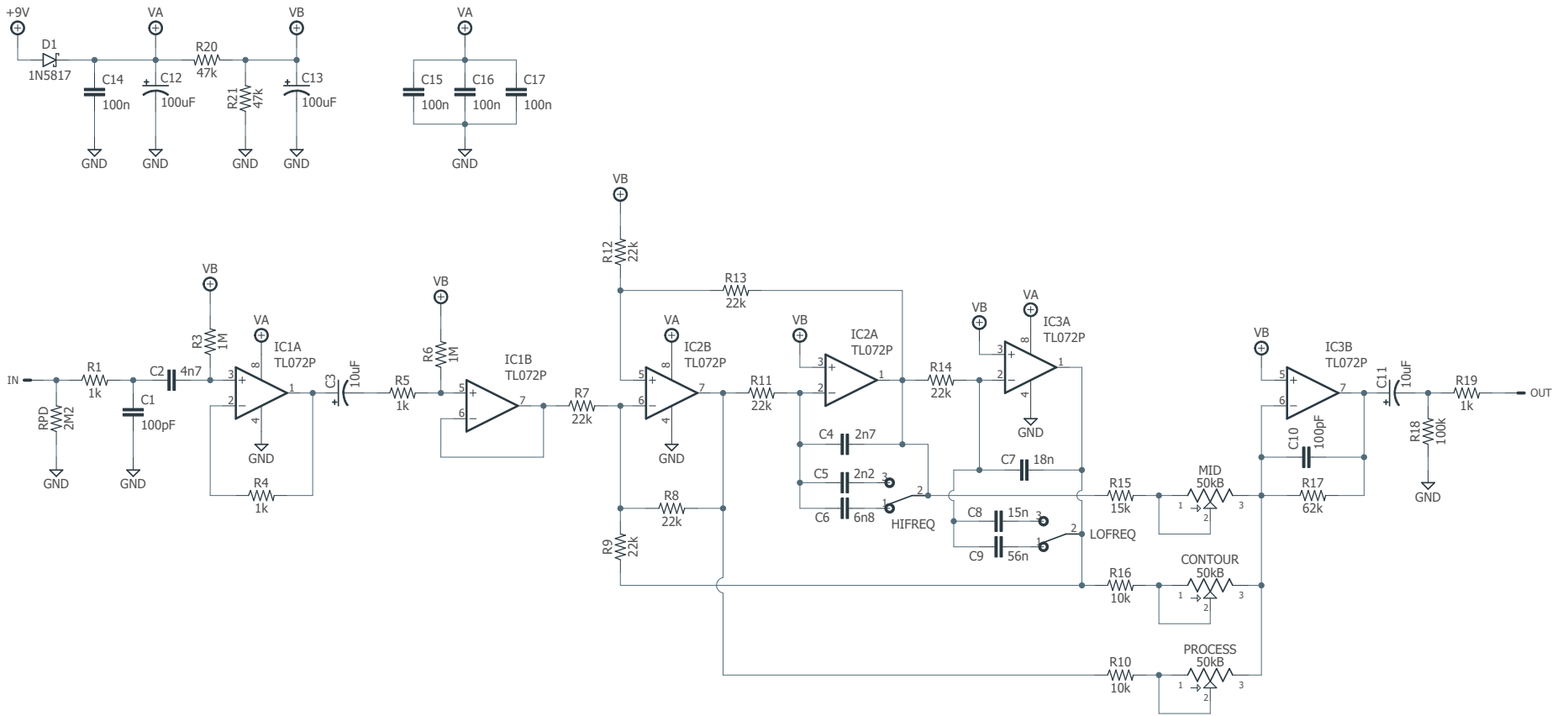
- **C4:** 2n7 (10kHz). This capacitor is always engaged, so it adds to the value of C5 or C6 in the other two settings and will impact their frequencies if it is changed.
- **C5:** 2n2 (7.3kHz). Added to C4 when engaged.
- **C6:** 6n8 (5.1kHz). Added to C4 when engaged.

Low Frequency switch

This sets the frequency for the Contour control.

- **C7:** 18n (105 Hz). This capacitor is always engaged, so it adds to the value of C8 or C9 in the other two settings and will impact their frequencies if it is changed.
- **C8:** 15n (74 Hz). Added to C7 when engaged.
- **C9:** 56n (50 Hz). Added to C7 when engaged.

SCHEMATIC



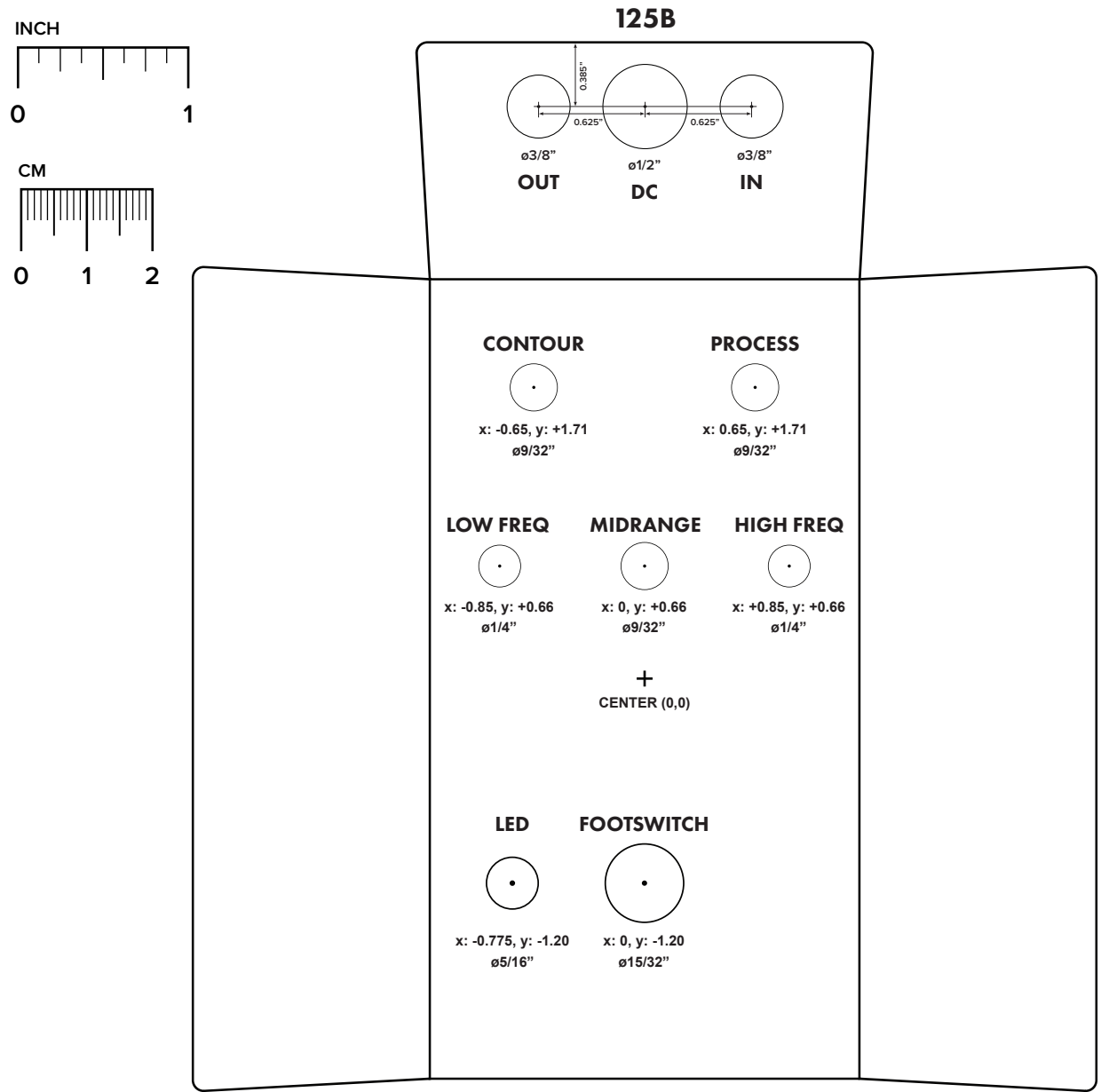
DRILL TEMPLATE

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.

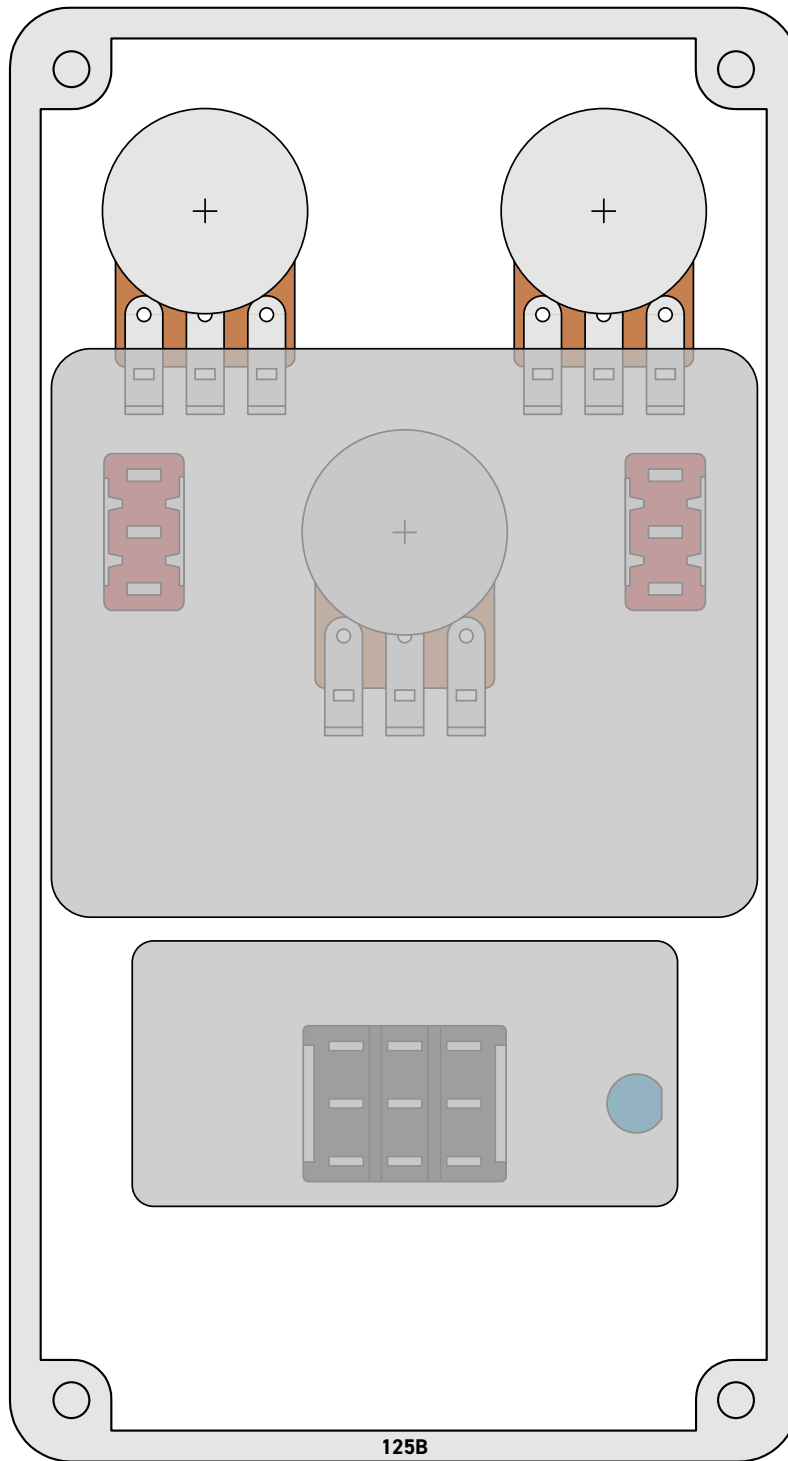
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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

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

1.0.3 (2021-04-28)

Updated recommended frequency capacitors for better flexibility, and revised build notes with more detailed information. No PCB revisions.

1.0.2 (2020-10-16)

Added missing RPD and LEDR to parts list.

1.0.1 (2019-11-21)

Added note about changing R17 to get closer to unity gain.

1.0.0 (2019-03-03)

Initial release.