

PROJECT NAME

EMBER



BASED ON

Amptweaker Tight Metal / Tight Rock

BUILD DIFFICULTY

■■■■□ Advanced

EFFECT TYPE

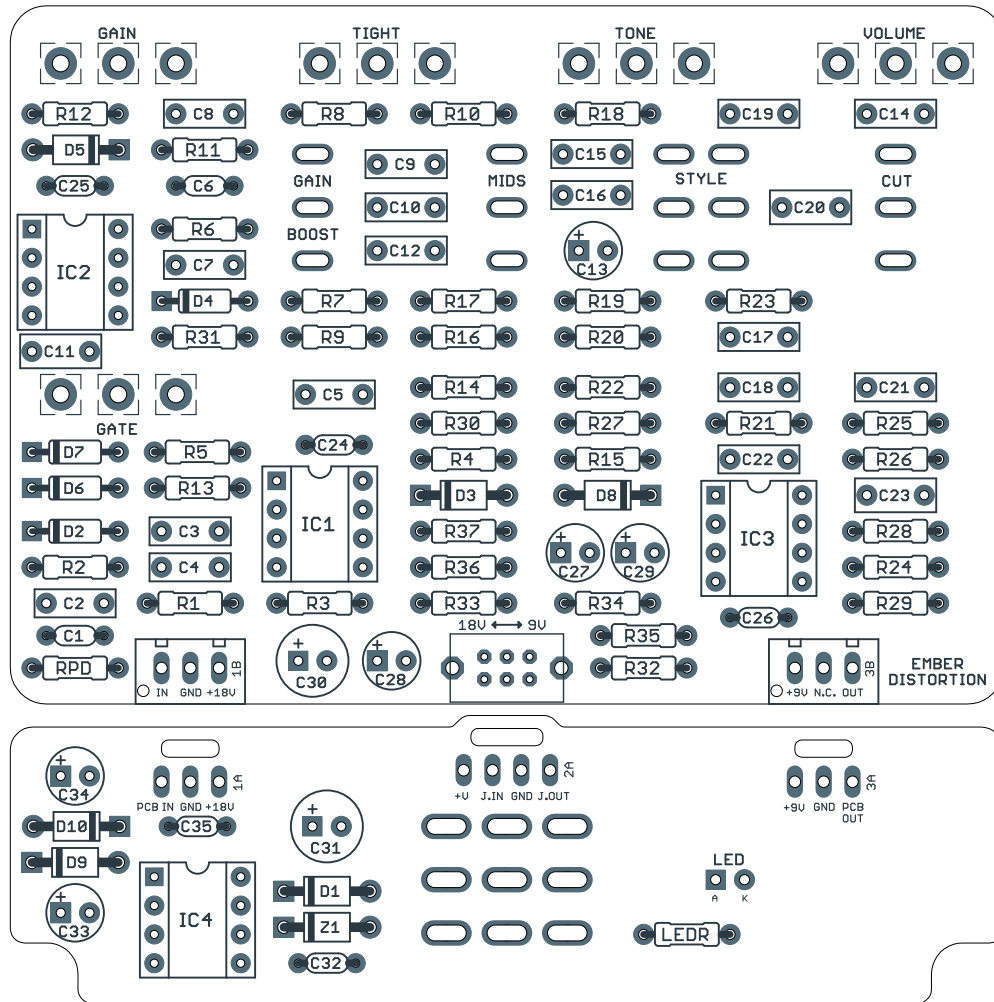
Distortion

DOCUMENT VERSION

1.0.1 (2023-07-05)

PROJECT SUMMARY

A high-gain metal & hard rock distortion pedal by James Brown, formerly of Peavey where he designed Eddie Van Halen's 5150 and Joe Satriani's JSX amps.



Actual size is 3.44" x 2.42" (main board) and 3.44" x 0.97" (bypass board).

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INTRODUCTION

The Ember Metal Distortion is based on the Amptweaker Tight Metal. From 2009 to 2019, Amptweaker was the creative outlet of James Brown, the designer of several legendary Peavey amplifiers such as the 5150 and JSX as well as others for companies such as Kustom and Bad Cat.

In 2020, James Brown sold the Amptweaker company and took a job with Fender as the lead designer of their EVH-branded amplifiers. The Amptweaker lineup was fully redesigned under the new ownership, with a different enclosure style and artwork.

The Tight Metal gets its namesake “tightness” from a low-cut filter that comes before the distortion stages, a trick also used by the [Friedman BE-OD / Dirty Shirley](#) pedals and a number of classic high-gain amplifiers. Bass frequencies often have a flabby or boomy character especially when palm-muting, so by dampening these frequencies, the tone is more percussive and cutting.

The Tight Metal is very similar to another Amptweaker circuit, the Tight Rock, with only a few differences. The Ember project incorporates these changes as toggle switches, so with a little bit of tweaking, you can have all of the tones of both pedals as well as several new combinations. The only features omitted from this version are the two effects loops: one that was engaged when the pedal was on, and a second that is engaged in bypass mode).

The Ember project is based on the final version of the original Tight Metal (called the “ST”) and Tight Rock before the company changed hands. We also added an optional charge pump so it can be run at either 18V or 9V, with an internal slide switch to select the voltage. The noise gate functionality has also been modified slightly, which is described in the build notes.

USAGE

The Ember Distortion has the following controls:

- **Tight** cuts low frequencies before the first gain stage.
- **Gain** controls the amount of gain in the first stage, before the EQ and drive section.
- **Gain Boost** (toggle switch) increases the gain when in the “Down” position.
- **Gate** sets the threshold of the noise gate, or disables it when turned all the way down.
- **Tone** is a Big Muff-style balance control that pans between a bass emphasis on the left and a treble emphasis to the right, with the 12:00 position being roughly flat.
- **Style** (toggle) switches between Rock and Metal modes.
- **Mids** (toggle) engages a midrange scoop mode that depends on the position of the Style switch. Metal mode has a steeper scoop is called “Thrash”. Rock mode has a milder scoop is called “PlexEQ”.
- **Volume** sets the output volume of the effect.
- **Cut** (toggle) cuts the highs slightly after the volume control.

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	100k	Metal film resistor, 1/4W	
R2	330k	Metal film resistor, 1/4W	
R3	47k	Metal film resistor, 1/4W	
R4	1M	Metal film resistor, 1/4W	
R5	470k	Metal film resistor, 1/4W	
R6	47k	Metal film resistor, 1/4W	
R7	15k	Metal film resistor, 1/4W	
R8	1k5	Metal film resistor, 1/4W	
R9	220k	Metal film resistor, 1/4W	
R10	475k	Metal film resistor, 1/4W	
R11	22k	Metal film resistor, 1/4W	
R12	10k	Metal film resistor, 1/4W	
R13	10k	Metal film resistor, 1/4W	
R14	10k	Metal film resistor, 1/4W	
R15	470k	Metal film resistor, 1/4W	
R16	3k3	Metal film resistor, 1/4W	
R17	4k7	Metal film resistor, 1/4W	
R18	1k5	Metal film resistor, 1/4W	
R19	10k	Metal film resistor, 1/4W	
R20	3k3	Metal film resistor, 1/4W	
R21	3k3	Metal film resistor, 1/4W	
R22	330R	Metal film resistor, 1/4W	
R23	3k3	Metal film resistor, 1/4W	
R24	220k	Metal film resistor, 1/4W	
R25	100k	Metal film resistor, 1/4W	
R26	470k	Metal film resistor, 1/4W	
R27	47k	Metal film resistor, 1/4W	
R28	1k	Metal film resistor, 1/4W	
R29	33k	Metal film resistor, 1/4W	
R30	100R	Metal film resistor, 1/4W	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
R31	100R	Metal film resistor, 1/4W	
R32	100R	Metal film resistor, 1/4W	
R33	6k8	Metal film resistor, 1/4W	
R34	18k	Metal film resistor, 1/4W	
R35	47k	Metal film resistor, 1/4W	
R36	100k	Metal film resistor, 1/4W	
R37	150k	Metal film resistor, 1/4W	
RPD	1M	Metal film resistor, 1/4W	Input pulldown resistor.
LEDR	10k	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	470pF	MLCC capacitor, NP0/COG	
C2	33n	Film capacitor, 7.2 x 2.5mm	
C3	100n	Film capacitor, 7.2 x 2.5mm	
C4	4n7	Film capacitor, 7.2 x 2.5mm	
C5	100n	Film capacitor, 7.2 x 2.5mm	
C6	100pF	MLCC capacitor, NP0/COG	
C7	33n	Film capacitor, 7.2 x 2.5mm	
C8	47n	Film capacitor, 7.2 x 2.5mm	
C9	100n	Film capacitor, 7.2 x 2.5mm	
C10	3n3	Film capacitor, 7.2 x 2.5mm	
C11	220n	Film capacitor, 7.2 x 2.5mm	
C12	100n	Film capacitor, 7.2 x 2.5mm	
C13	22uF	Electrolytic capacitor, 5mm	
C14	100n	Film capacitor, 7.2 x 2.5mm	
C15	22n	Film capacitor, 7.2 x 2.5mm	
C16	100n	Film capacitor, 7.2 x 2.5mm	
C17	47n	Film capacitor, 7.2 x 2.5mm	
C18	100n	Film capacitor, 7.2 x 2.5mm	
C19	22n	Film capacitor, 7.2 x 2.5mm	
C20	220n	Film capacitor, 7.2 x 2.5mm	
C21	1n2	Film capacitor, 7.2 x 2.5mm	
C22	100n	Film capacitor, 7.2 x 2.5mm	
C23	220n	Film capacitor, 7.2 x 2.5mm	
C24	100n	MLCC capacitor, X7R	
C25	100n	MLCC capacitor, X7R	
C26	100n	MLCC capacitor, X7R	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C27	22uF	Electrolytic capacitor, 5mm	
C28	22uF	Electrolytic capacitor, 5mm	
C29	22uF	Electrolytic capacitor, 5mm	
C30	100uF	Electrolytic capacitor, 6.3mm	
C31	100uF	Electrolytic capacitor, 6.3mm	
C32	470n	MLCC capacitor, X7R	
C33	10uF	Electrolytic capacitor, 5mm	
C34	10uF	Electrolytic capacitor, 5mm	
C35	470n	MLCC capacitor, X7R	
Z1	1N4742A	Zener diode, 12V, DO-41	
D1	1N5817	Schottky diode, DO-41	
D2	1N914	Fast-switching diode, DO-35	
D3	1N4733A	Zener diode, 5.1V, DO-41	
D4	1N914	Fast-switching diode, DO-35	
D5	1N4733A	Zener diode, 5.1V, DO-41	
D6	1N914	Fast-switching diode, DO-35	
D7	1N914	Fast-switching diode, DO-35	
D8	1N4733A	Zener diode, 5.1V, DO-41	
D9	1N5817	Schottky diode, DO-41	
D10	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	
IC4	LT1054CP	Charge pump / voltage converter, DIP-8	
IC4-S	DIP-8 socket	IC socket, DIP-8	
VOLTAGE	DPDT slide	Slide switch, DPDT	E-Switch EG2207
GAIN	500kA	16mm right-angle PCB mount pot	
TIGHT	100kC	16mm right-angle PCB mount pot	
TONE	10kB	16mm right-angle PCB mount pot	
GATE	500kA	16mm right-angle PCB mount pot	
VOLUME	10kA	16mm right-angle PCB mount pot	
STYLE	DPDT	Toggle switch, DPDT on-on	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
CUT	SPDT	Toggle switch, SPDT on-on	
GAIN BOOST	SPDT	Toggle switch, SPDT on-on	
MIDS	SPDT	Toggle switch, SPDT on-on	
LED	5mm	LED, 5mm, red diffused	
DC	2.1mm	DC jack, 2.1mm panel mount	Mouser 163-4302-E or equivalent.
IN	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
OUT	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
BYPASS	3PDT	Stomp switch, 3PDT	
ENCLOSURE	1590BBS	Enclosure, die-cast aluminum	

BUILD NOTES

Tight Rock / Tight Metal modes

The Tight Rock and Tight Metal are very closely related, with only a few small changes between the two. The Tight Rock came after the original Tight Metal, but some of its features such as the gain boost switch were back-ported into the Tight Metal for its next revision, which makes a unified version a lot more straightforward.

Comparing the final revisions of the Tight Rock and Tight Metal, there are only two real differences:

- The mids section after the tone control has different values between the two circuits, both the Bridged-T mid-scoop and the capacitor value of the mids switch (called “Thrash” or “PlexEQ” when engaged, depending on the circuit).
- The Tight Rock removes the hi-cut at the end of the circuit and adjusts the gain of this stage slightly.

We’ve included a “Style” switch to go between Tight Rock and Tight Metal midrange modes. Note that the “Cut” control also switches between the Tight Rock and Tight Metal settings—so both of these switches will need to be in the same position for it to be identical to either of the original circuits. However, the effect of the Cut switch is minimal compared to the Style switch.

Gate design

In the original pedal, the noise gate was tied to the drive control. A dual potentiometer controlled both the gain level and the gate threshold, so as the gain was turned up the gating was more aggressive. Separate from this, the gate could be disabled entirely with a slide switch.

In this project, we split out the gate and gain controls, which improves the flexibility as well as simplifying the control scheme. To mimic the original, just set the gate to the same position as the gain control. And by turning the gate control to zero, it’s identical to the gate bypass switch in the original.

9V/18V operation

The Ember Distortion includes a charge pump for 18V operation as well as an internal slide switch to go between 9V and 18V mode. If you want to hard-wire it at either 9V or 18V, you can omit the switch by jumpering the pads as shown:



If you do decide to hardwire it to 9V mode, you can leave out IC4, D9-10, and C34-35. They can just be omitted entirely—nothing else needs to be jumpered except the slide switch pads.

BUILD NOTES, CONT.

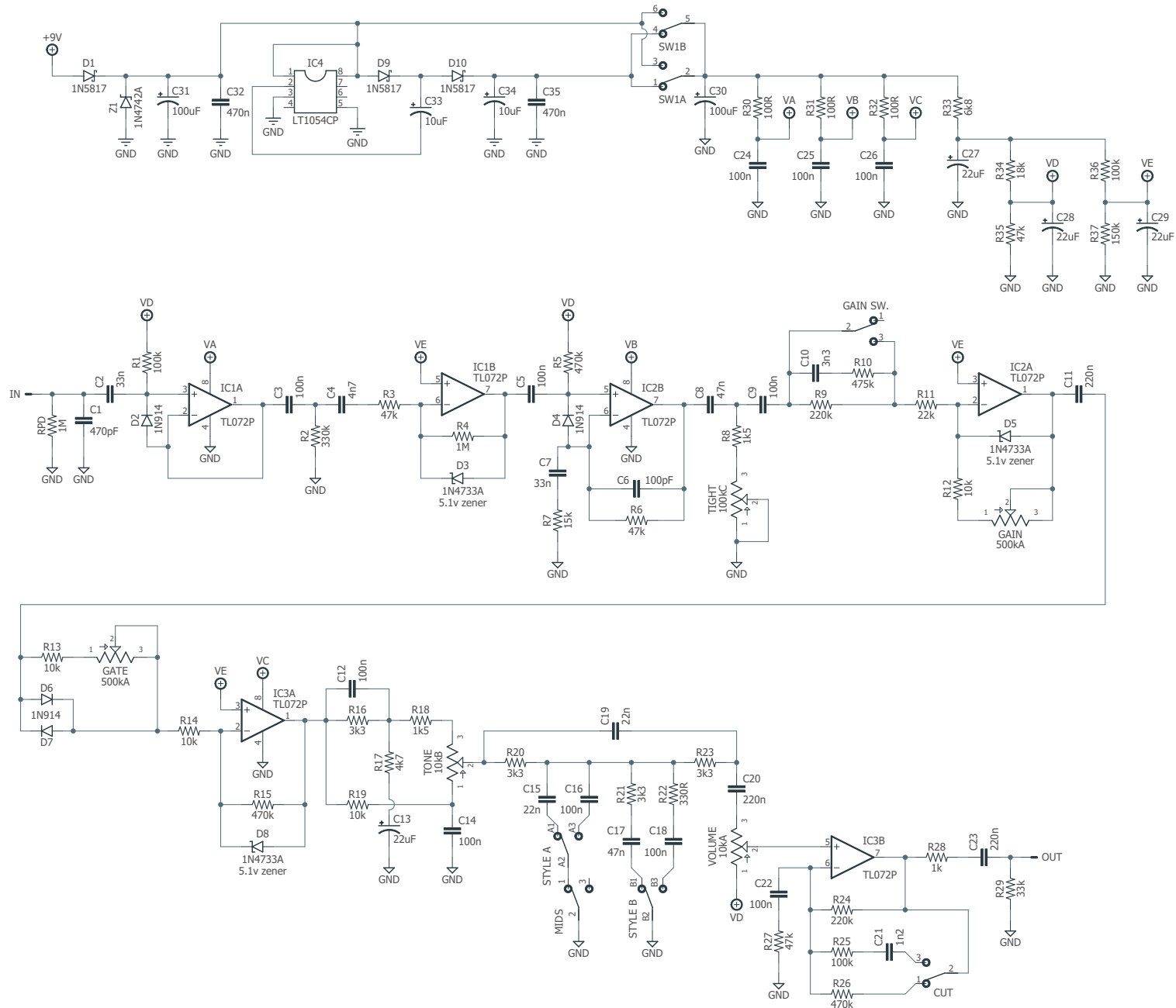
Enclosure size

This project was designed for the **Hammond 1590BBS** enclosure, which has the same height as the 125B or 1590N1. If you don't use the Hammond brand, be careful—not all 1590BBS enclosures are the same. For example, Love My Switches sells two different types, and the [CNC Pro](#) version is correct while the standard one is too short.

The 1590BB2 seems like a close equivalent, but it's about 4mm shorter. It may be possible to fit this circuit in a 1590BB2, but we have not tested it, so you're on your own!

The 1590C has almost the same dimensions around the base, but due to the increased height and the draft angle of the walls, the dimensions at the bottom of the enclosure are a bit too small and the PCB won't fit.

SCHEMATIC

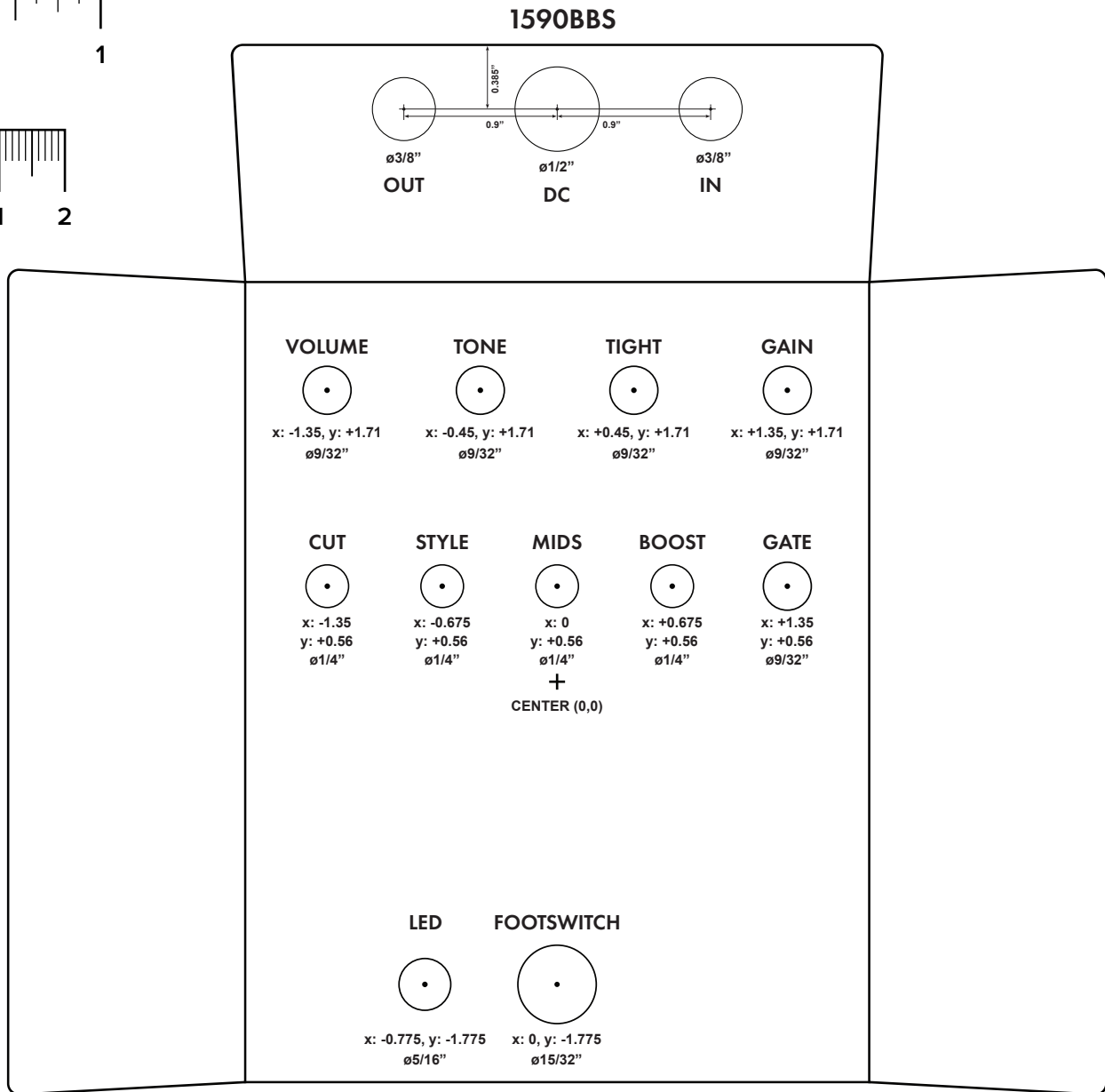
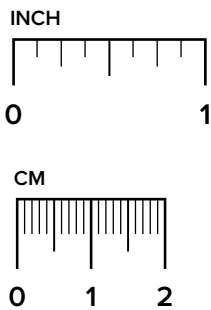


DRILL TEMPLATE

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.

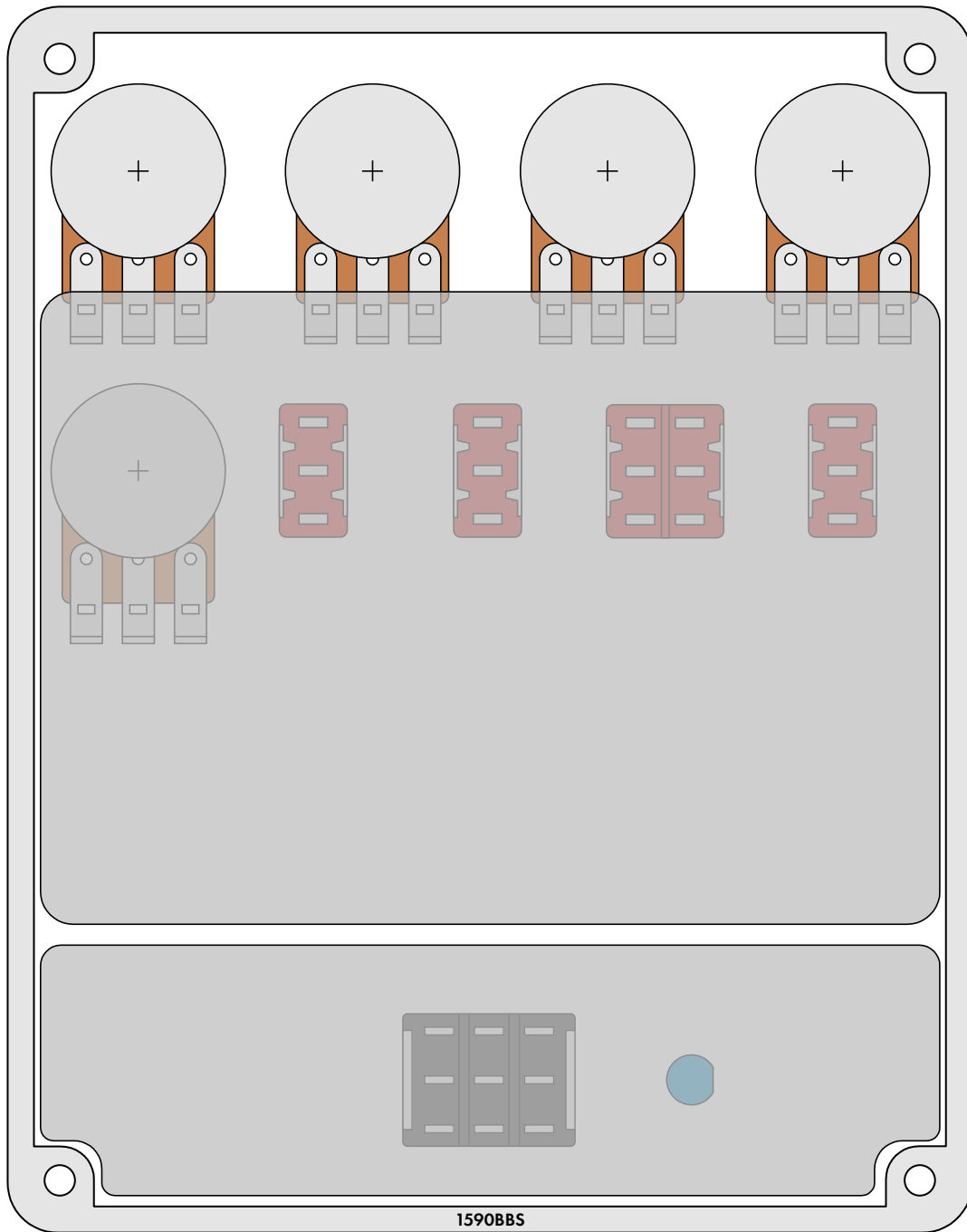
Ensure that this template is printed at 100% or "Actual Size". You can double-check this by measuring the scale on the printed page.

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.

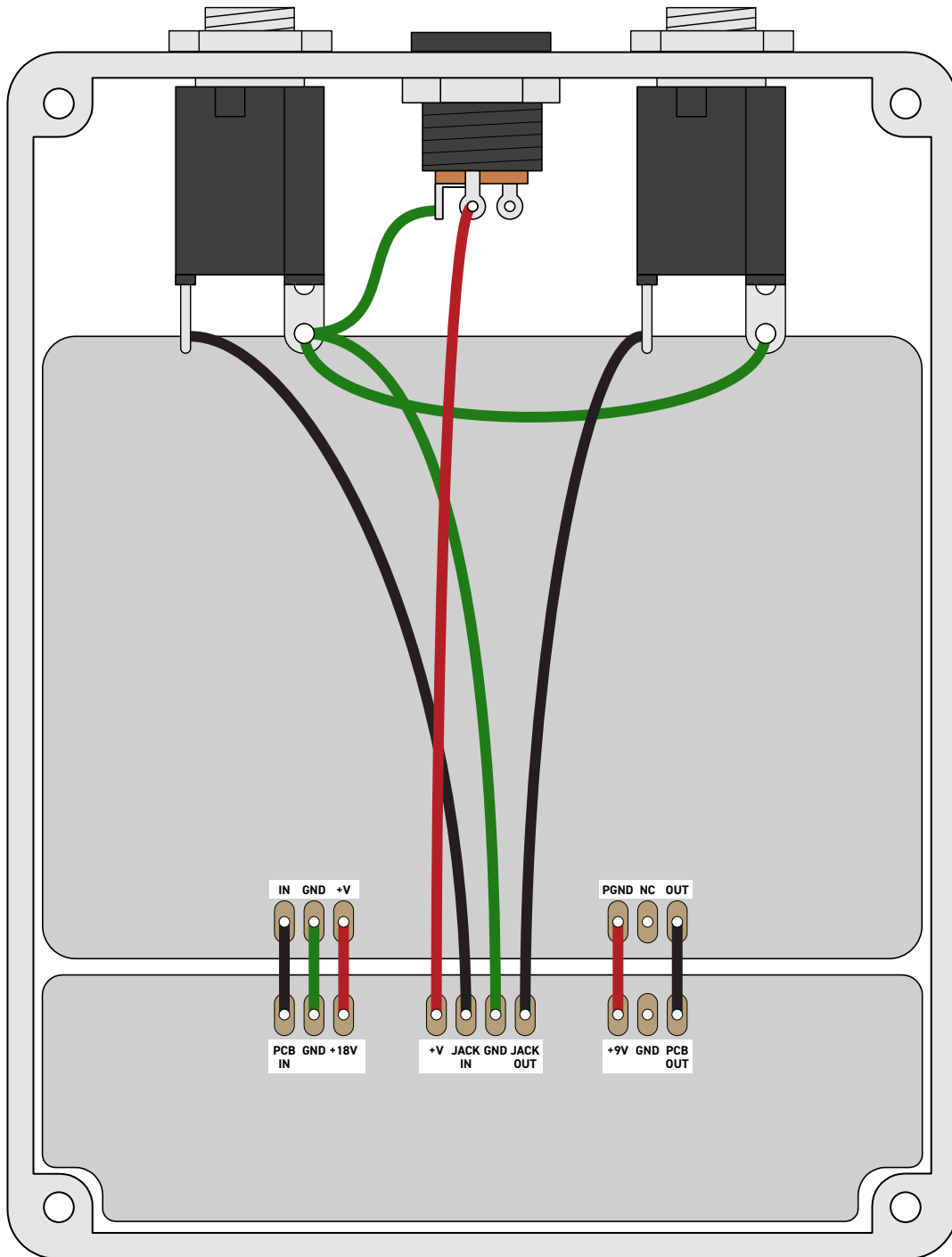


ENCLOSURE LAYOUT

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



WIRING DIAGRAM



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

1.0.1 (2023-07-05)

Corrected R19 to 10k.

1.0.0 (2022-11-25)

Initial release.