

PROJECT NAME

FRACTAL



BASED ON

Pearl® OD-05 Over Drive

BUILD DIFFICULTY

■■■■□ Intermediate

EFFECT TYPE

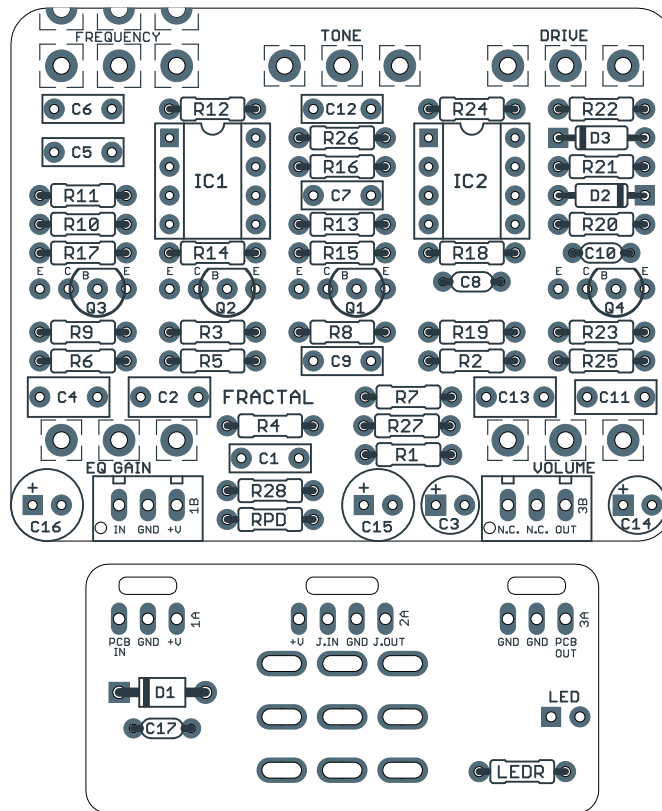
Parametric overdrive

DOCUMENT VERSION

1.0.0 (2022-04-08)

PROJECT SUMMARY

A versatile overdrive with a single-band parametric EQ, allowing adjustable boost or cut from 100 Hz to 4kHz.



Actual size is 2.3" x 1.86" (main board) and 1.78" x 0.87" (bypass board).

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INTRODUCTION

The Fractal Parametric Overdrive is based on the Pearl OD-05 Over Drive, a curiously obscure effect from the early 80's when Pearl (yes, the drum company!) briefly dipped into the guitar effects pedal business. The result was a line of very well-engineered pedals that unfortunately never got the attention they deserved.

Even 40 years later, this pedal still is relatively unknown. There are no commercial clones and it's relatively unexplored in the DIY scene. But those who have played through one universally praise it for its tonal flexibility.

The OD-05 has a standard feedback-diode clipping stage like a Tube Screamer, but the magic is what comes in front of it: a parametric equalizer that allows either a cut or boost of up to 15dB in a range from 100 Hz to 4 KHz.

With this flexible preclipping EQ, you can get some incredible sounds out of it. You can crank the mids for a cocked-wah sound, or tune the circuit to enhance the resonant peak of your specific guitar and amp. You can even get a scooped-mids sound if that's what you're after, something that's pretty rare in an overdrive.

The updated version of the Fractal includes one new feature: the fixed post-clipping treble cut can be dialed out for a slight treble boost. Since the parametric EQ only affects a single frequency band, this can allow for control over a second frequency, albeit with reduced functionality. Turned to zero, it's identical to the stock circuit.

USAGE

The Fractal has five controls:

- **Drive** controls the amount of gain from the op amp that is fed through the feedback clipping diodes.
- **Frequency** sweeps through the midrange from 100Hz to 4kHz, setting the frequency that is either boosted or cut by the EQ Gain control.
- **EQ Gain** is the boost or cut of the frequency set with the Frequency knob. It provides up to +/-15dB gain. At the center position, the response is flat and the Frequency knob has no effect.
- **Tone** adds back some of the treble via a passive filter. At zero, it's equivalent to a stock OD-05.
- **Level** is the output level of the effect.

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	1k	Metal film resistor, 1/4W	
R2	1M	Metal film resistor, 1/4W	
R3	10k	Metal film resistor, 1/4W	
R4	680k	Metal film resistor, 1/4W	
R5	270k	Metal film resistor, 1/4W	
R6	22k	Metal film resistor, 1/4W	
R7	22k	Metal film resistor, 1/4W	
R8	22k	Metal film resistor, 1/4W	
R9	3k3	Metal film resistor, 1/4W	
R10	2k2	Metal film resistor, 1/4W	
R11	2k2	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	22k	Metal film resistor, 1/4W	
R16	10k	Metal film resistor, 1/4W	
R17	10k	Metal film resistor, 1/4W	
R18	10k	Metal film resistor, 1/4W	
R19	1M	Metal film resistor, 1/4W	
R20	1k	Metal film resistor, 1/4W	
R21	1k	Metal film resistor, 1/4W	
R22	10k	Metal film resistor, 1/4W	
R23	1k	Metal film resistor, 1/4W	
R24	470R	Metal film resistor, 1/4W	
R25	10k	Metal film resistor, 1/4W	
R26	10k	Metal film resistor, 1/4W	
R27	10k	Metal film resistor, 1/4W	
R28	470R	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.
C1	33n	Film capacitor, 7.2 x 2.5mm	
C2	1uF	Film capacitor, 7.2 x 3.5mm	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C3	10uF	Electrolytic capacitor, 5mm	
C4	1uF	Film capacitor, 7.2 x 3.5mm	
C5	4n7	Film capacitor, 7.2 x 2.5mm	
C6	68n	Film capacitor, 7.2 x 2.5mm	
C7	100n	Film capacitor, 7.2 x 2.5mm	
C8	470pF	MLCC capacitor, NP0/C0G	
C9	100n	Film capacitor, 7.2 x 2.5mm	
C10	47pF	MLCC capacitor, NP0/C0G	
C11	220n	Film capacitor, 7.2 x 2.5mm	
C12	15n	Film capacitor, 7.2 x 2.5mm	
C13	1uF	Film capacitor, 7.2 x 3.5mm	
C14	47uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C15	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C16	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C17	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	
Q1-Q4	2N5088	BJT transistor, NPN, TO-92	Substitute. Original uses 2SC2240-GR.
IC1	JRC4558D	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	JRC4558D	Operational amplifier, DIP8	
IC2-S	DIP-8 socket	IC socket, DIP-8	
DRIVE	100kB	16mm right-angle PCB mount pot	
FREQ.	100kC dual	16mm dual-gang PCB mount pot	
EQ	10kB	16mm right-angle PCB mount pot	Original OD-05 uses center detent, which is useful if you can find it.
TONE	10kB	16mm right-angle PCB mount pot	
VOL.	10kA	16mm right-angle PCB mount pot	Original OD-05 uses 10kB, but audio taper provides better control.
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.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

Treble tone control

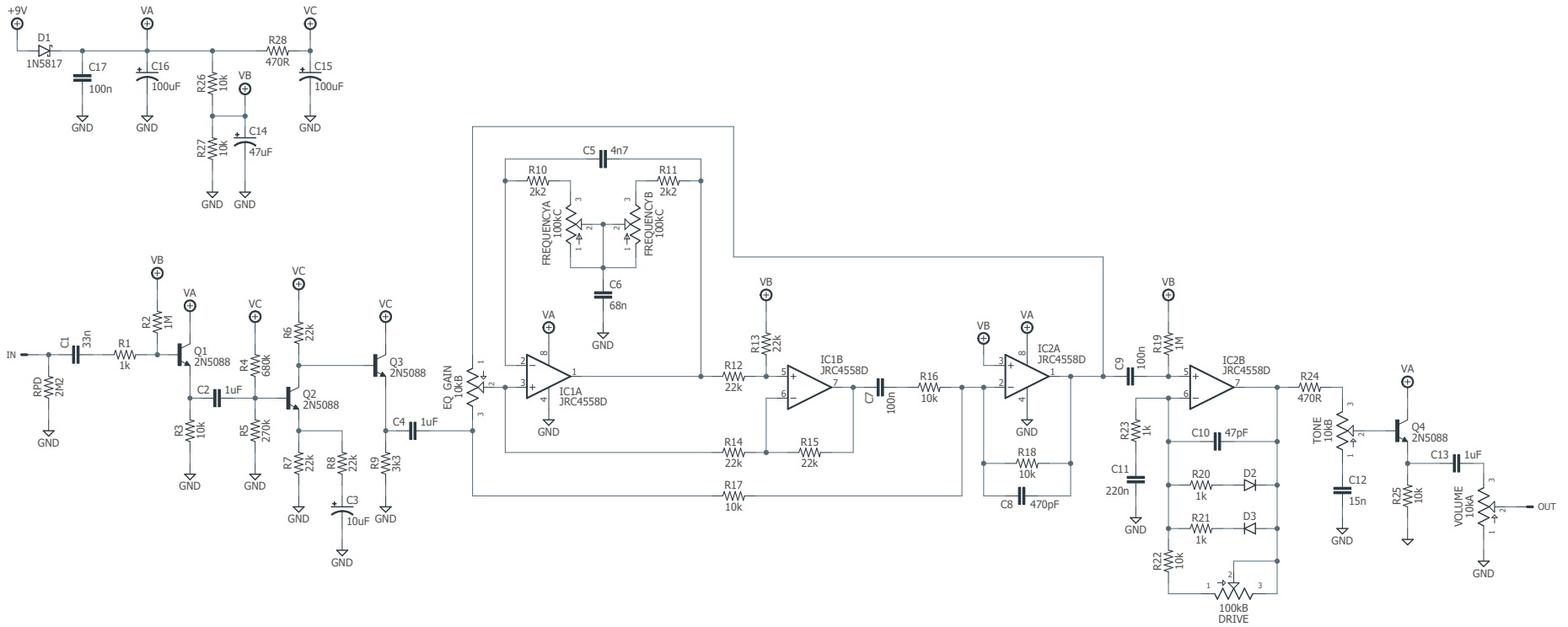
The original OD-05 has a steep 1kHz treble cut after the clipping stage to compensate for boosted treble earlier in the circuit and round out the tone.

By making this treble cut adjustable, we can allow some of the treble to be restored, which can be useful with some EQ settings—for example, using the parametric EQ to cut the midrange, and then boosting the treble for a more pronounced scooped-mids sound.

This is a new modification that has been added to the updated version of the Fractal. It replaces the clipping diode switch from the legacy version, which is not very useful in this particular circuit.

At zero, it's identical to the stock circuit, so there's no good reason to leave it off—but if you do want to omit it, use **10k** for R24 and then jumper all three pads of the Tone pot together.

SCHEMATIC



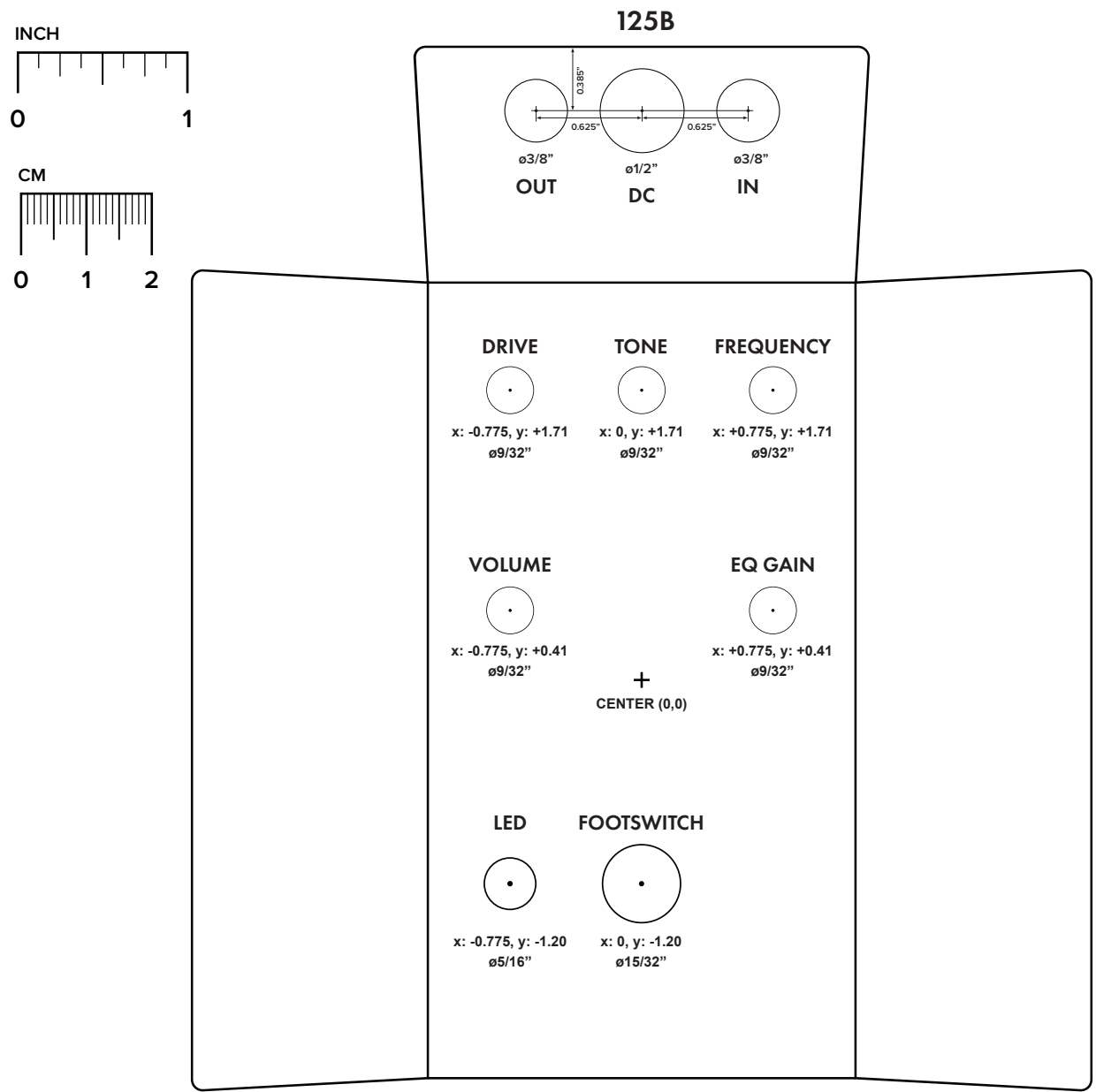
DRILL TEMPLATE

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.

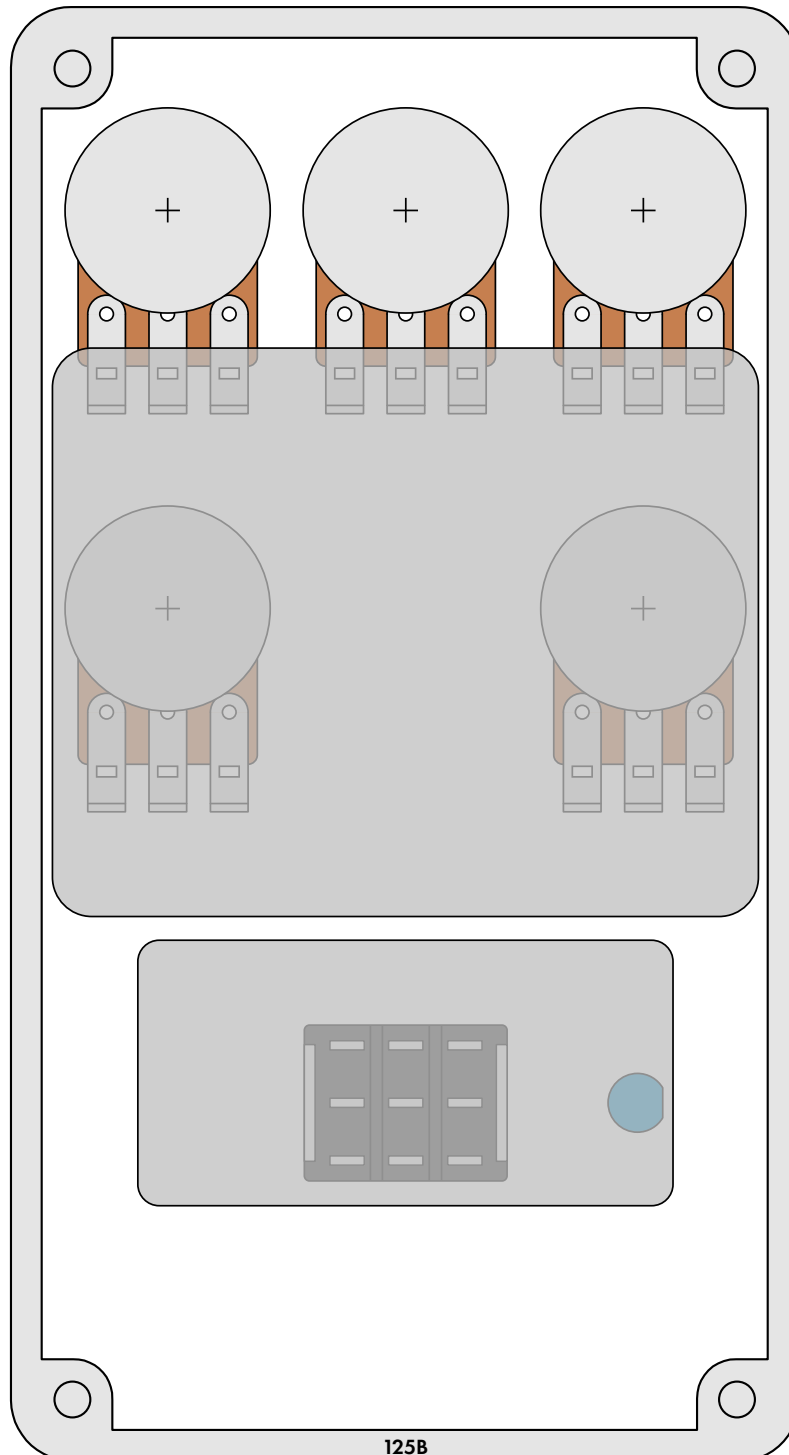


ENCLOSURE LAYOUT

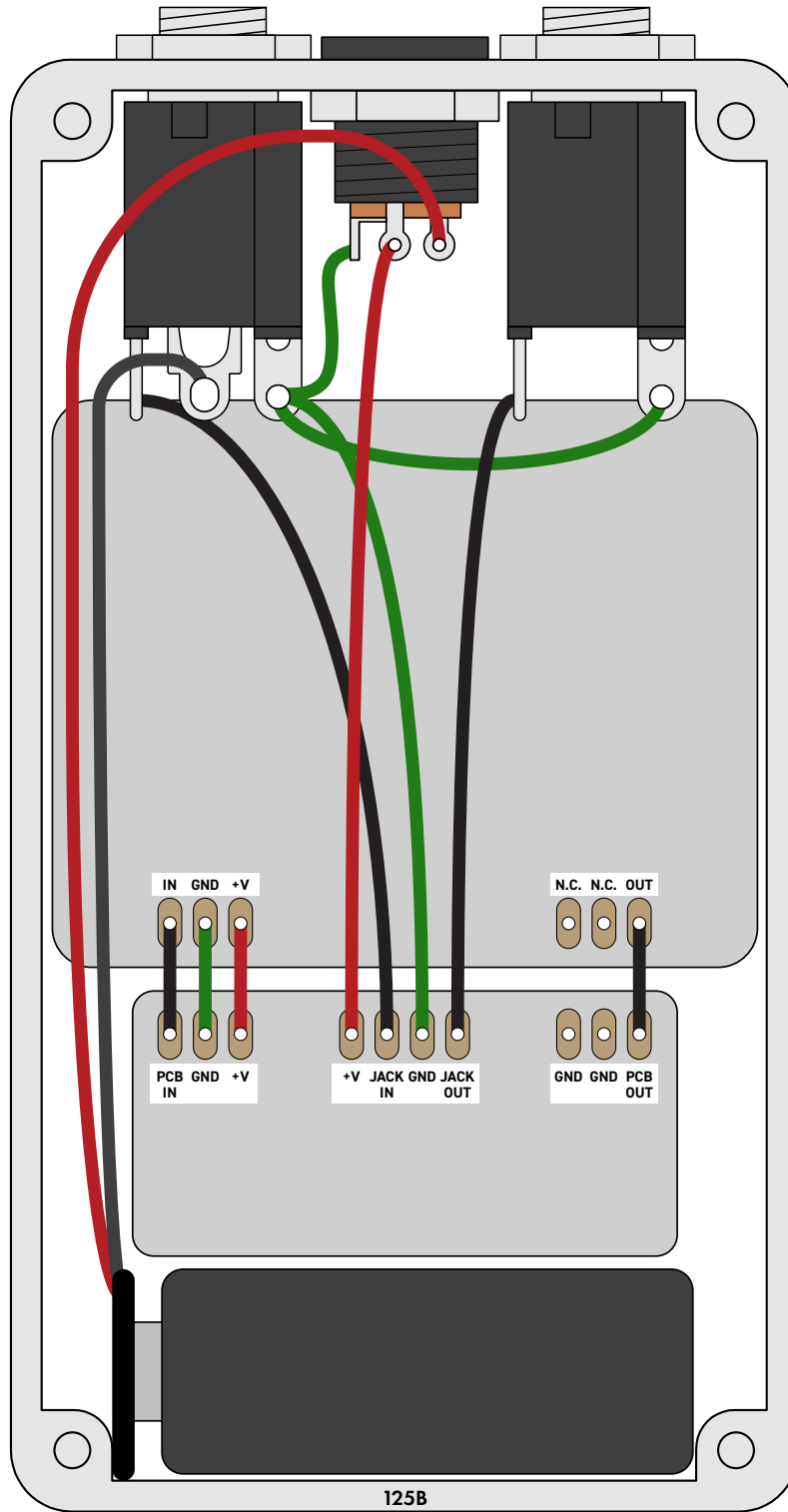
Enclosure is shown without jacks. See next page for jack layout and wiring.

Note: The upper pads for the dual-gang frequency potentiometer appear to be cut in half. **This is intentional!** These are called a *plated half-holes* or *castellated holes*, and they are used so that the PCB can lay flat across the pots instead of angling upward for the dual pot.

Solder it like you would if they were normal pads, but bend the top pins forward slightly so they make contact with the edge of the pads.



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

1.0.0 (2022-04-08)

Initial release.