

PROJECT NAME

ISOTOPE

BASED ON

Intersound IVP Tube Voice

EFFECT TYPE

Tube-like overdrive

PROJECT SUMMARY

The overdrive channel of the Intersound IVP Preamp, adapted for pedal use.

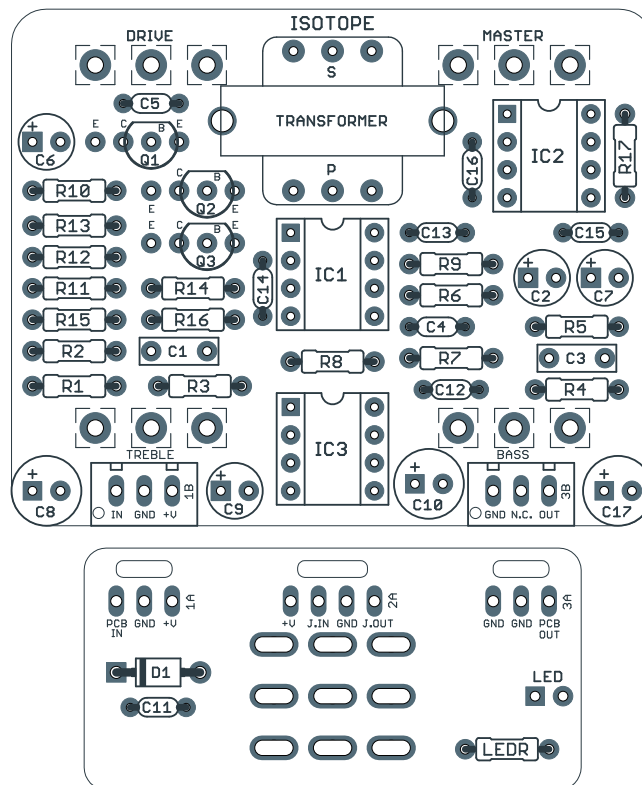


BUILD DIFFICULTY

■■■■□ Intermediate

DOCUMENT VERSION

1.0.1 (2021-03-15)



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

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INTRODUCTION

The Isotope Amp Overdrive is an adaptation of the “Tube Voice” channel of the Intersound Instrument Voicing Preamp, a rack preamp from the late 1970s that was favored by Steve Albini and the Grateful Dead among others.

The IVP’s Tube Sound channel was unique in its method of overdriving the signal. There are no diodes to be found, but rather, the signal is clipped by overloading a miniature transformer. Add in a two-band tone control and you’ve got a really flexible circuit that doesn’t look or sound quite like anything else.

The Isotope Amp Overdrive is a greatly reduced version of the IVP, extracting just the Tube Voice channel which makes up approximately 25% of the whole preamp circuit, which also includes a clean channel and 4-band parametric equalizer. It’s been adapted to run off of +/-9V instead of +/-15V like the original. However, all the character of the drive channel is retained and it makes a great standalone drive pedal if you want something a little different!

One thing to mention: the Treble knob can create oscillations at the very high end of rotation. We tried several things to mitigate this during development, including better power filtering and tweaking the values of the treble control, even a new PCB layout, but nothing really fixed it. However, since it only impacts the last 5-10% of the rotation which is really outside the useful range of the control, we opted to release it as-is.

USAGE

The Isotope has the following controls:

- **Drive** controls the amount of gain in the op-amp stage that is fed into the transformer. Overloading the transformer pushes it into clipping.
- **Treble** is a half of a Baxandall tone stack affecting the high frequencies.
- **Bass** is the other half of a Baxandall tone stack affecting the low frequencies.
- **Master** controls the overall output 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 (most notably potentiometers) so the second tab lists all the non-Mouser parts as well as sources for each.

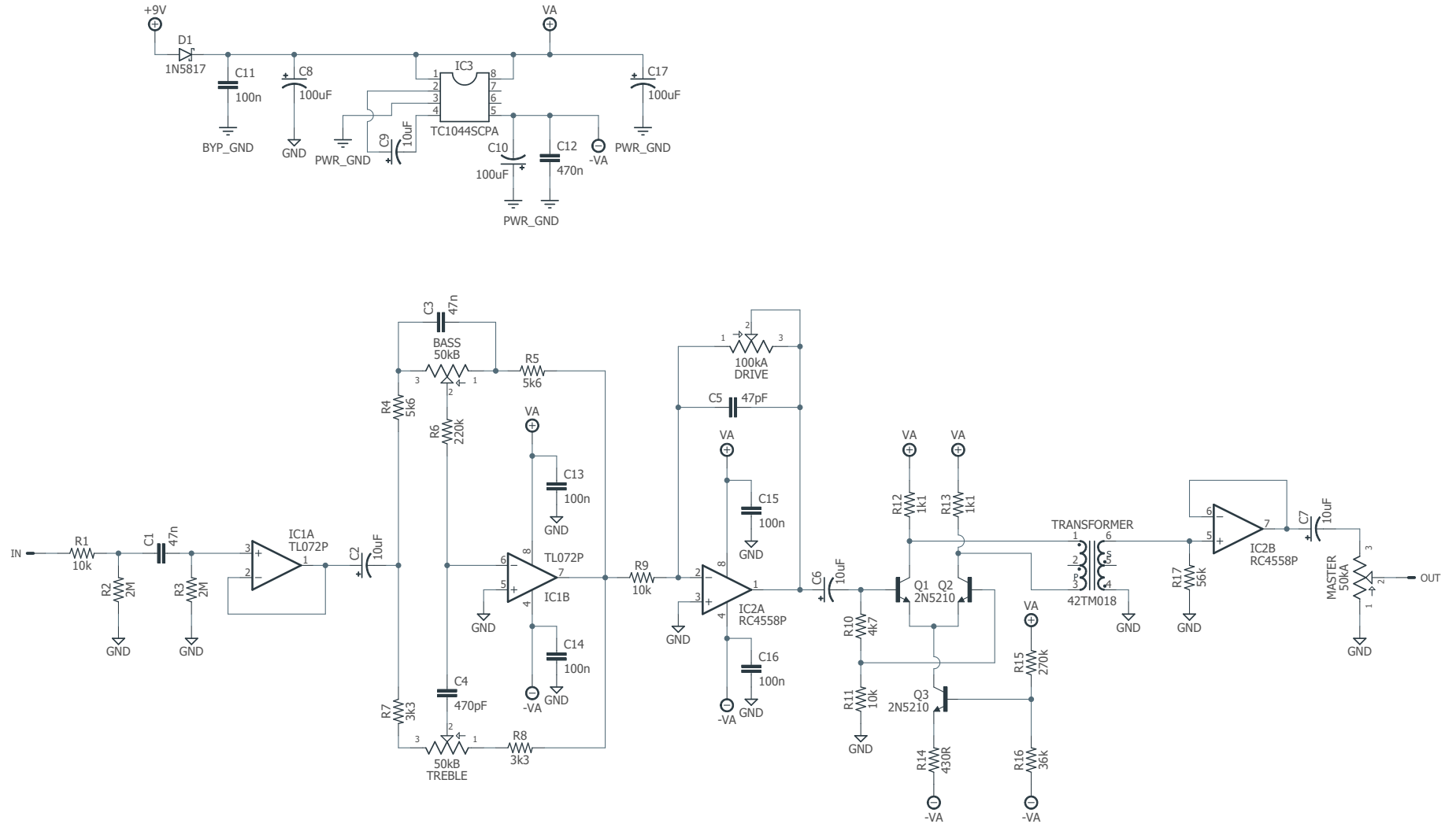
[View parts list spreadsheet](#) →

PART	VALUE	TYPE	NOTES
R1	10k	Metal film resistor, 1/4W	
R2	2M	Metal film resistor, 1/4W	
R3	2M	Metal film resistor, 1/4W	
R4	5k6	Metal film resistor, 1/4W	
R5	5k6	Metal film resistor, 1/4W	
R6	220k	Metal film resistor, 1/4W	
R7	3k3	Metal film resistor, 1/4W	
R8	3k3	Metal film resistor, 1/4W	
R9	10k	Metal film resistor, 1/4W	
R10	4k7	Metal film resistor, 1/4W	
R11	10k	Metal film resistor, 1/4W	
R12	1k1	Metal film resistor, 1/4W	
R13	1k1	Metal film resistor, 1/4W	
R14	430R	Metal film resistor, 1/4W	
R15	270k	Metal film resistor, 1/4W	Original unit uses 430k here, but 270k is the appropriate substitute to keep the bias the same at +/-9V.
R16	36k	Metal film resistor, 1/4W	
R17	56k	Metal film resistor, 1/4W	
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	10uF	Electrolytic capacitor, 5mm	
C3	47n	Film capacitor, 7.2 x 2.5mm	
C4	470pF	MLCC capacitor, NP0/COG	
C5	47pF	MLCC capacitor, NP0/COG	Original uses 22pF here. 47pf helps prevent oscillation.
C6	10uF	Electrolytic capacitor, 5mm	
C7	10uF	Electrolytic capacitor, 5mm	
C8	100uF	Electrolytic capacitor, 6.3mm	Power filter capacitor.
C9	10uF	Electrolytic capacitor, 5mm	
C10	100uF	Electrolytic capacitor, 6.3mm	Charge pump negative supply filter capacitor.
C11	100n	MLCC capacitor, X7R	Main power filter capacitor.
C12	470n	MLCC capacitor, X7R	Charge pump negative supply filter capacitor.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C13	100n	MLCC capacitor, X7R	IC1 positive supply filter capacitor.
C14	100n	MLCC capacitor, X7R	IC1 negative supply filter capacitor.
C15	100n	MLCC capacitor, X7R	IC2 positive supply filter capacitor.
C16	100n	MLCC capacitor, X7R	IC2 negative supply filter capacitor.
C17	100uF	Electrolytic capacitor, 6.3mm	Power filter capacitor.
D1	1N5817	Schottky diode, DO-41	
Q1	2N5210	BJT transistor, NPN, TO-92	Can also substitute 2N3904 or 2N5088.
Q2	2N5210	BJT transistor, NPN, TO-92	Can also substitute 2N3904 or 2N5088.
Q3	2N5210	BJT transistor, NPN, TO-92	Can also substitute 2N3904 or 2N5088.
IC1	TL072	Operational amplifier, DIP-8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	RC4558P	Operational amplifier, DIP-8	
IC2-S	DIP-8 socket	IC socket, DIP-8	
IC3	TC1044SCPA	Charge pump, DIP-8	
IC3-S	DIP-8 socket	IC socket, DIP-8	
TRANS	42TM018	Transformer, audio, 10KCT/10KCT	
TREBLE	50kB	16mm right-angle PCB mount pot	
BASS	50kB	16mm right-angle PCB mount pot	
DRIVE	100kA	16mm right-angle PCB mount pot	Original value is 50kA, but 100k gives more drive range.
MASTER	50kA	16mm right-angle PCB mount pot	
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.

SCHEMATIC



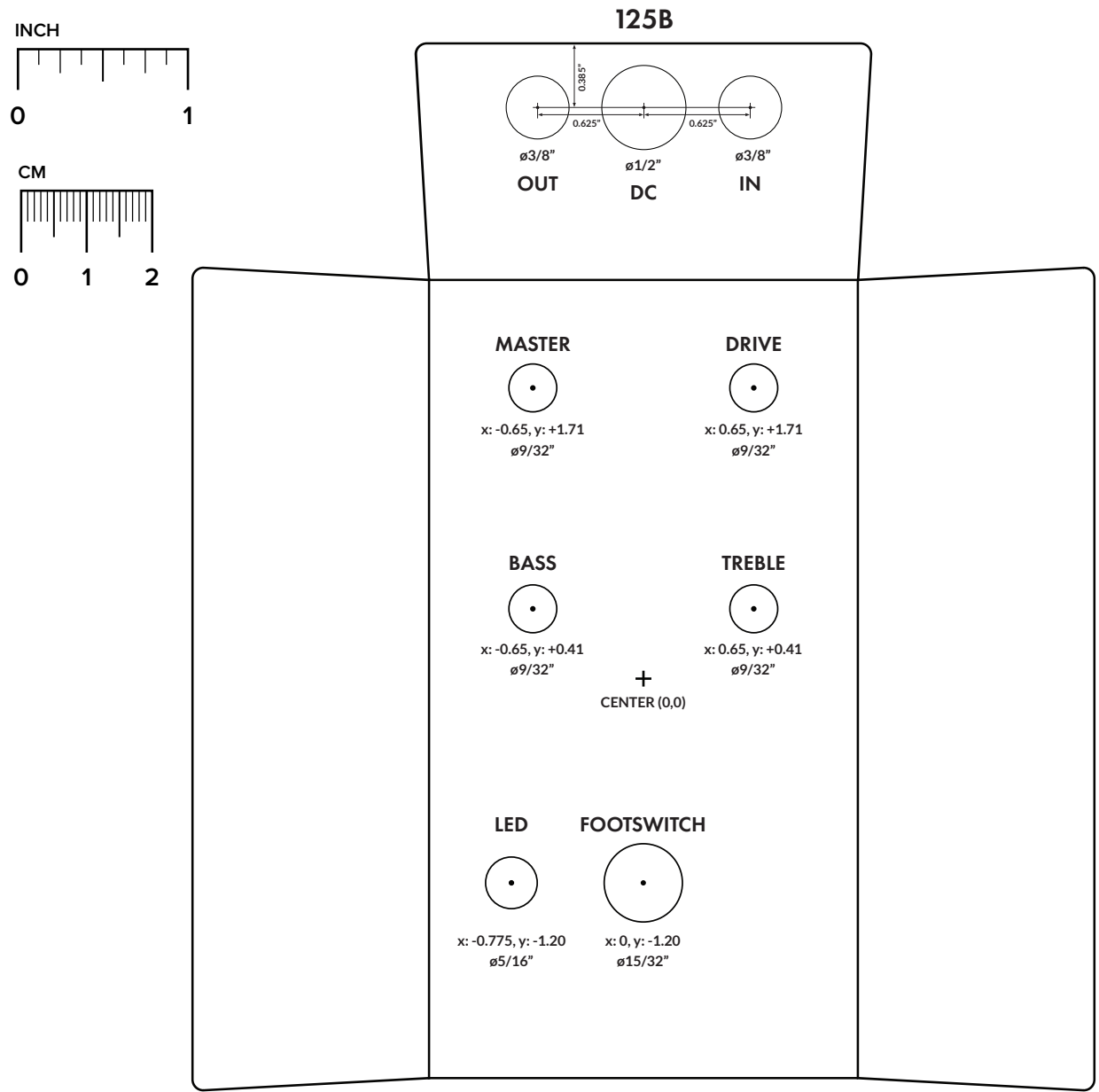
DRILL TEMPLATE

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.

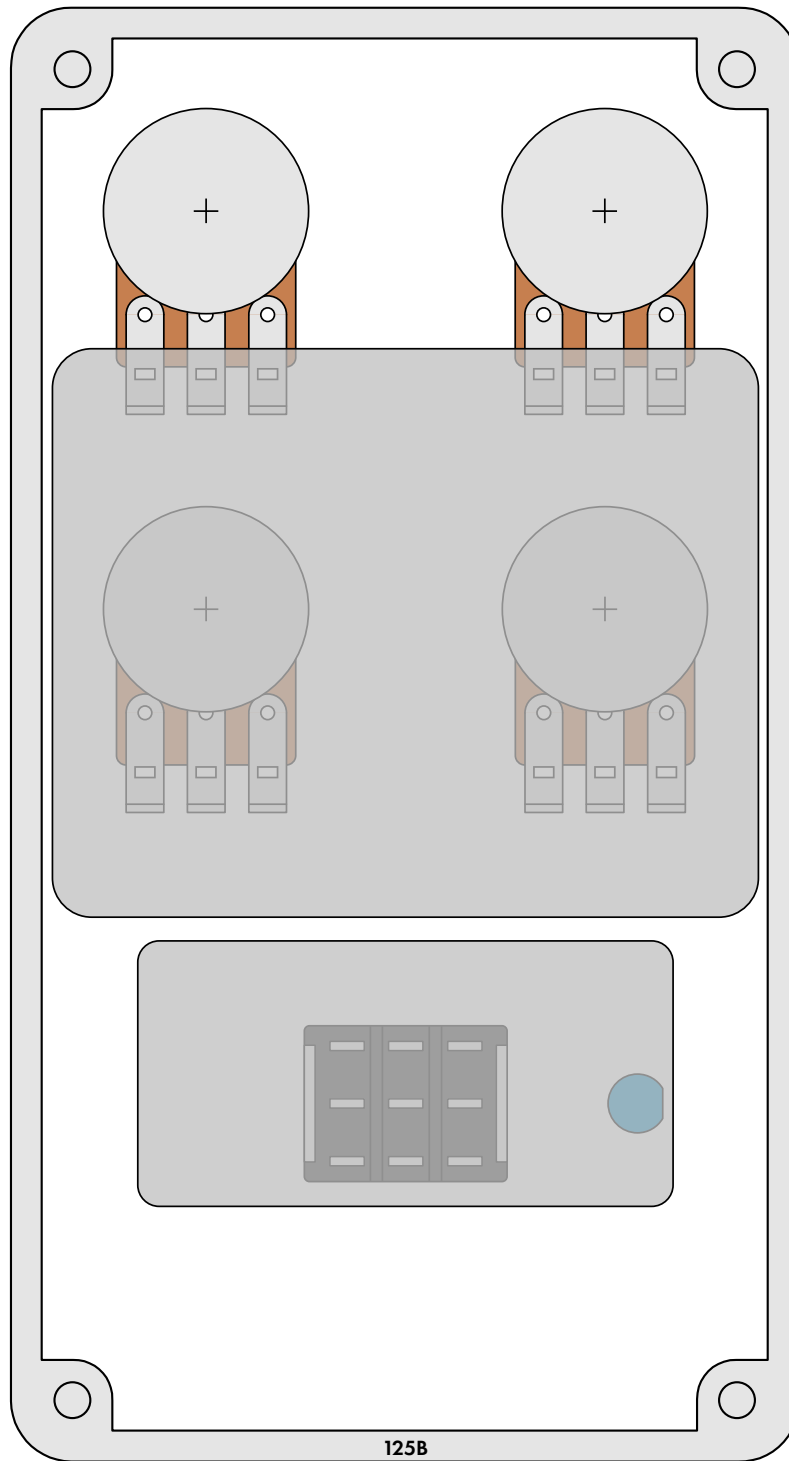
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the [Open-Frame Jack Drill Template](#) for the top side.

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.

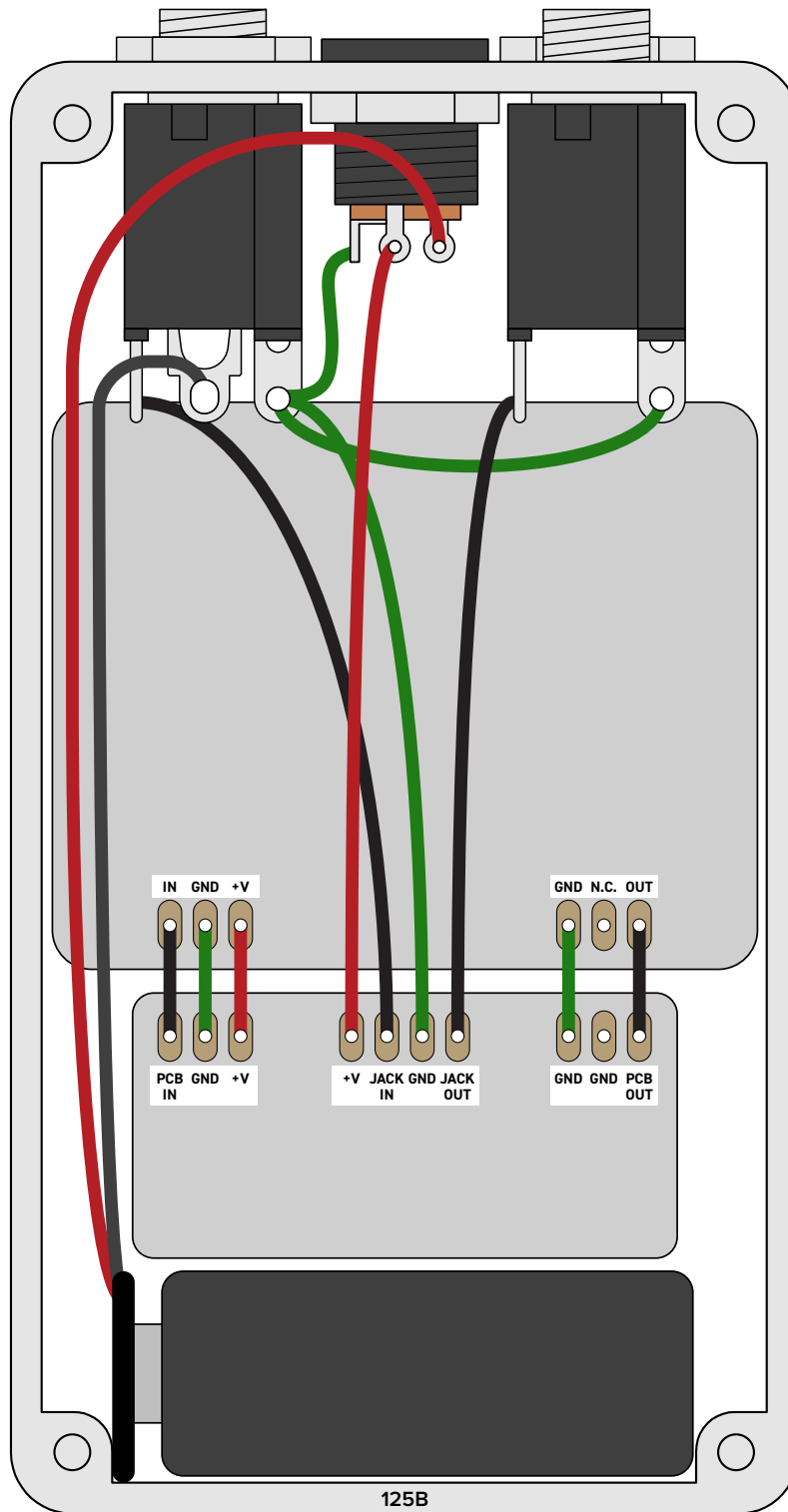


ENCLOSURE LAYOUT

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

1.0.1 (2021-03-15)

Removed RPD from parts list (not present on PCB, included in parts list by mistake).

1.0.0 (2020-06-05)

Initial release.