PROJECT NAME

METEOR

DIY GUITAR EFFECTS

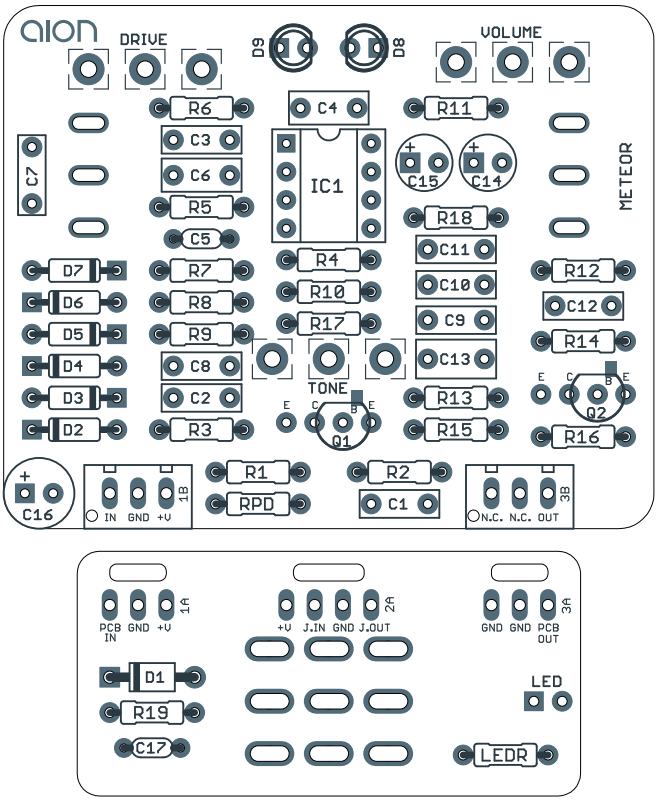
BASED ON
Ibanez® SD-9 Sonic Distortion

BUILD DIFFICULTY
Easy

EFFECT TYPE
Distortion

DOCUMENT VERSION
1.0.1 (2024-04-05)

PROJECT SUMMARY
A hard-edged distortion pedal from the early 1980s, notably used by Scott Henderson and John Shanks.



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

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INTRODUCTION

The Meteor Vintage Distortion project is a clone of the Maxon/Ibanez® SD-9 Sonic Distortion, which first hit stores around 1983. Advertised as a heavier Tube Screamer, in reality it shares nothing at all in common with the classic TS-9 circuit. It has more similarities to hard-clipping circuits such as the BOSS® DS-1 or MXR Distortion+.

In 2012, Ibanez released an updated reissue of the SD-9 called the SD-9M, which was one of the first traces we ever did back in 2014. It includes two modifications: a switchable +10x gain stage and a midrange toggle switch that changes the EQ of the tone control.

The Meteor is based on the original SD-9, but with the midrange mod from the SD-9M. Since the SD-9M's gain stage mod is not original to the circuit and is always partially in the audio path even when it's switched off, we have not included this modification in the Meteor project, opting to keep it 100% the same as the vintage unit. However, since the midrange switch has one position identical to the original circuit, we included this switch along with a third position not found in the SD-9M for even more tonal flexibility. There is also a toggle switch to select between three different sets of clipping diodes, two of which will significantly increase the available output volume.

The updated version of the Meteor is the same as the original legacy project, with no new or changed features aside from being redesigned for the 125B enclosure.

USAGE

The Meteor has three controls and two toggles:

- **Drive** controls the amount of gain from the op-amp stage that is clipped by the diodes.
- **Tone** pans between a bass emphasis and a treble emphasis. The center position is roughly flat if the Mid toggle switch is in the center (stock) position.
- **Volume** sets the overall output of the effect.
- **Clipping** (toggle switch) selects between three different sets of hard-clipping diodes. This will directly impact the maximum volume of the effect. The down position is the stock SD-9 circuit and has the lowest volume. The center position is the loudest.
- **Mid** (toggle switch) selects between three different midrange contours for the tone control. The stock setting is the down position, with a steep mid-scoop centered around 500 Hz when the tone control is at 12:00. In the up position, the mid-scoop is shallower and shifted to around 650 Hz. In the up position, the frequency response at 12:00 is roughly flat.

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	510k	Metal film resistor, 1/4W	
R3	10k	Metal film resistor, 1/4W	
R4	100k	Metal film resistor, 1/4W	
R5	33k	Metal film resistor, 1/4W	
R6	470R	Metal film resistor, 1/4W	
R7	2k2	Metal film resistor, 1/4W	
R8	2k2	Metal film resistor, 1/4W	
R9	6k8	Metal film resistor, 1/4W	
R10	6k8	Metal film resistor, 1/4W	
R11	1k	Metal film resistor, 1/4W	
R12	10k	Metal film resistor, 1/4W	
R13	1M	Metal film resistor, 1/4W	
R14	10k	Metal film resistor, 1/4W	
R15	470R	Metal film resistor, 1/4W	
R16	100k	Metal film resistor, 1/4W	
R17	22k	Metal film resistor, 1/4W	
R18	22k	Metal film resistor, 1/4W	
R19	100R	Metal film resistor, 1/4W	
RPD	2M2	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	47n	Film capacitor, 7.2 x 2.5mm	
C2	47n	Film capacitor, 7.2 x 2.5mm	
C3	220pF	MLCC capacitor, NP0/C0G	Some units also used 1n. Reissue SD-9M uses 1n2. See build notes.
C4	220n	Film capacitor, 7.2 x 2.5mm	
C5	OMIT	MLCC capacitor, NP0/C0G	100pF in the SD-9M (not present in the original).
C6	470n	Film capacitor, 7.2 x 3mm	
C7	10n	Film capacitor, 7.2 x 2.5mm	
C8	27n	Film capacitor, 7.2 x 2.5mm	
C9	33n	Film capacitor, 7.2 x 2.5mm	
C10	33n	Film capacitor, 7.2 x 2.5mm	
C11	68n	Film capacitor, 7.2 x 2.5mm	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C12	100n	Film capacitor, 7.2 x 3mm	
C13	1uF	Film capacitor, 7.2 x 2.5mm	
C14	47uF	Film capacitor, 7.2 x 2.5mm	Reference voltage filter capacitor.
C15	47uF	Film capacitor, 7.2 x 2.5mm	Reference voltage filter capacitor.
C16	100uF	Film capacitor, 7.2 x 2.5mm	Power supply filter capacitor.
C17	100n	Film capacitor, 7.2 x 3.5mm	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	1N914	Fast-switching diode, DO-35	
D3	1N914	Fast-switching diode, DO-35	
D4	1N914	Fast-switching diode, DO-35	
D5	1N914	Fast-switching diode, DO-35	
D6	1N914	Fast-switching diode, DO-35	
D7	1N914	Fast-switching diode, DO-35	
D8	3mm LED	LED, 3mm, red diffused	
D9	3mm LED	LED, 3mm, red diffused	
Q1	2N5088	BJT transistor, NPN, TO-92	Substitute. Original uses 2SC1815-BL.
Q2	2N5088	BJT transistor, NPN, TO-92	Substitute. Original uses 2SC1815-BL.
IC1	JRC4558D	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
DRIVE	250kA	16mm right-angle PCB mount pot	Original uses linear taper, but audio taper works better here.
TONE	25kB	16mm right-angle PCB mount pot	The original uses 20kB if you can find it, but 25kB is much more common and will work the same.
VOL.	100kA	16mm right-angle PCB mount pot	Original uses linear taper, but audio taper works better here.
CLIP	SPDT cntr off	Toggle switch, SPDT center off	
MIDS	SPDT cntr off	Toggle switch, SPDT center off	
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.

C3 feedback capacitor

In the original SD-9, the C3 capacitor was either 220pF or 1n. In the SD-9M, it was 1n2. We opted for the 220pF value in the parts list since 1n or 1n2 cuts too much treble on the upper end of the gain range. Note that the outline on the PCB is a rectangular box film rather than ceramic.

C5 op-amp input capacitor

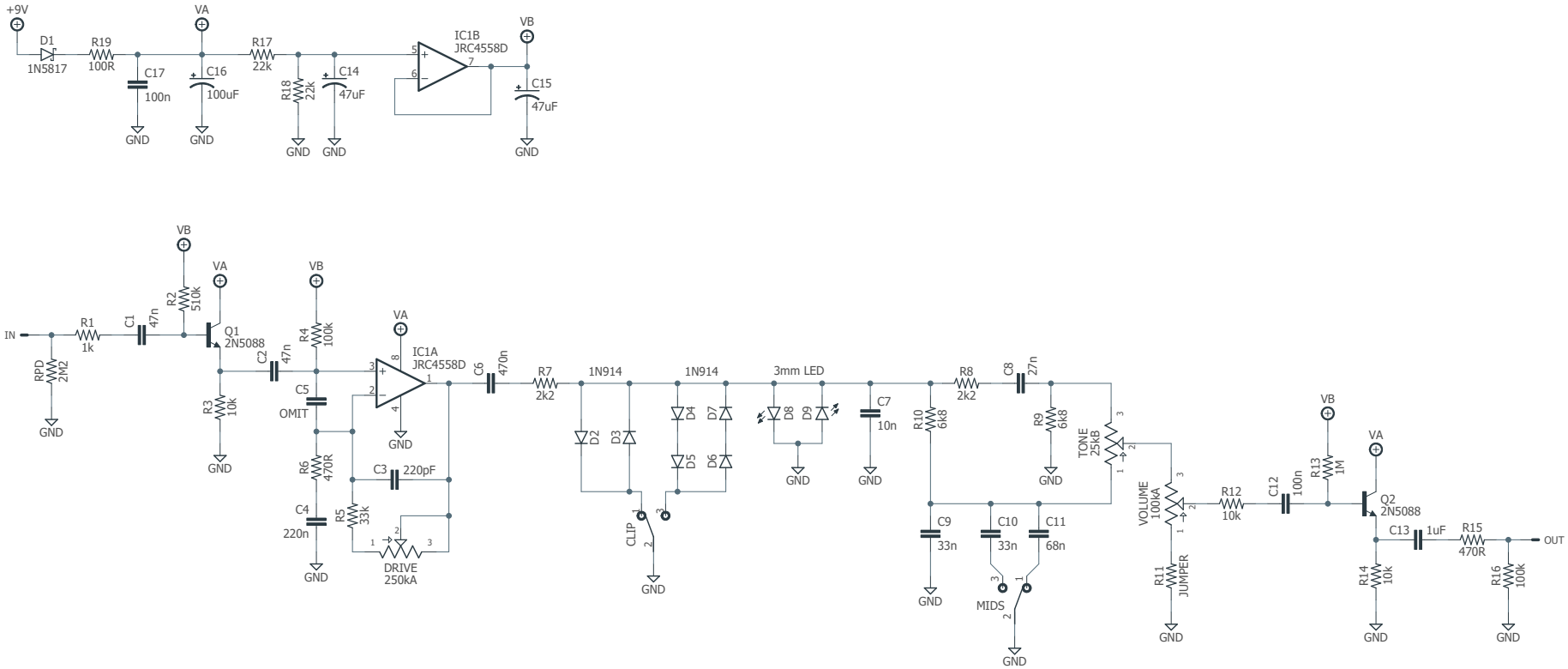
The SD-9M uses a 100pF capacitor across the "+" and "-" inputs of the opamp. We've included it in this PCB layout, although it's not in the vintage SD-9. It likely won't make a difference either way.

R11 minimum volume resistor

The original SD-9 uses a resistor in series with the volume control's ground leg, preventing the volume from going all the way to zero. This is non-standard operation for pedals today, and to an experienced builder it makes it sound like there is bleedthrough due to bad circuit design.

It's recommended to jumper R11 with a clipped resistor lead. However, to preserve the exact operation of the original circuit, you can use 1k here instead.

SCHEMATIC


+9V
D1
1N5817
R19
100R
C17
100n
GND
VA
C16
100uF
R17
22k
R18
22k
C14
47uF
IC1B
JRC4558D
VB
C15
47uF
IN
RPD
2M2
R1
1k
C1
47n
R2
510k
Q1
2N5088
R3
10k
C2
47n
R4
100k
C5
OMIT
R6
470R
C4
220n
C3
220pF
R5
33k
DRIVE
250kA
IC1A
JRC4558D
C6
470n
R7
2k2
1N914
D2
D3
CLIP
D4
D5
D6
D7
3mm LED
D8
D9
C7
10n
R10
6k8
C9
33n
C10
33n
C11
68n
MIDS
R8
2k2
C8
27n
R9
6k8
TONE
25kB
VOLUME
100kA
R11
JUMPER
R12
10k
C12
100n
R13
1M
Q2
2N5088
C13
1uF
R14
10k
R15
470R
R16
100k
OUT

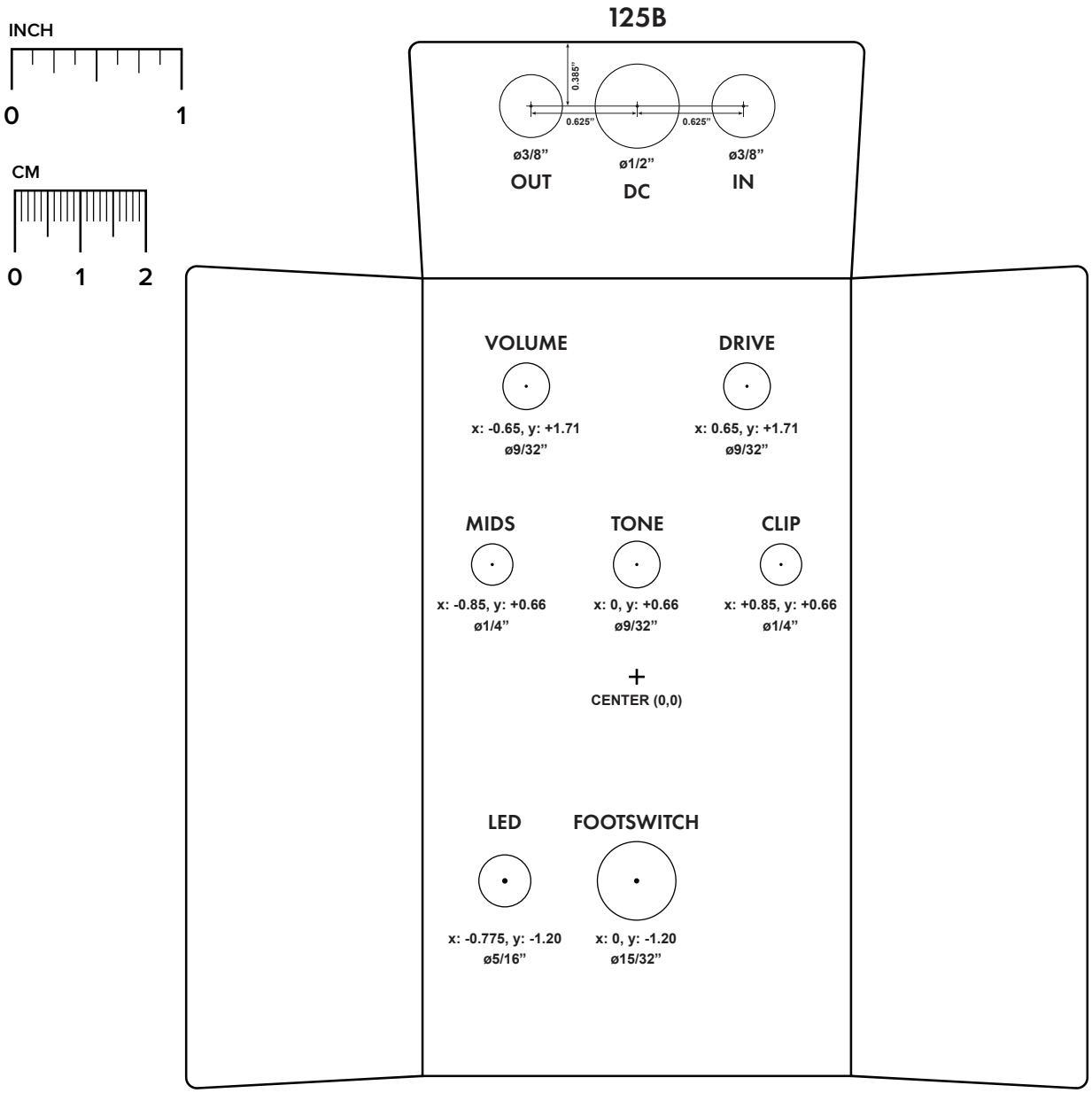
DRILL TEMPLATE

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.

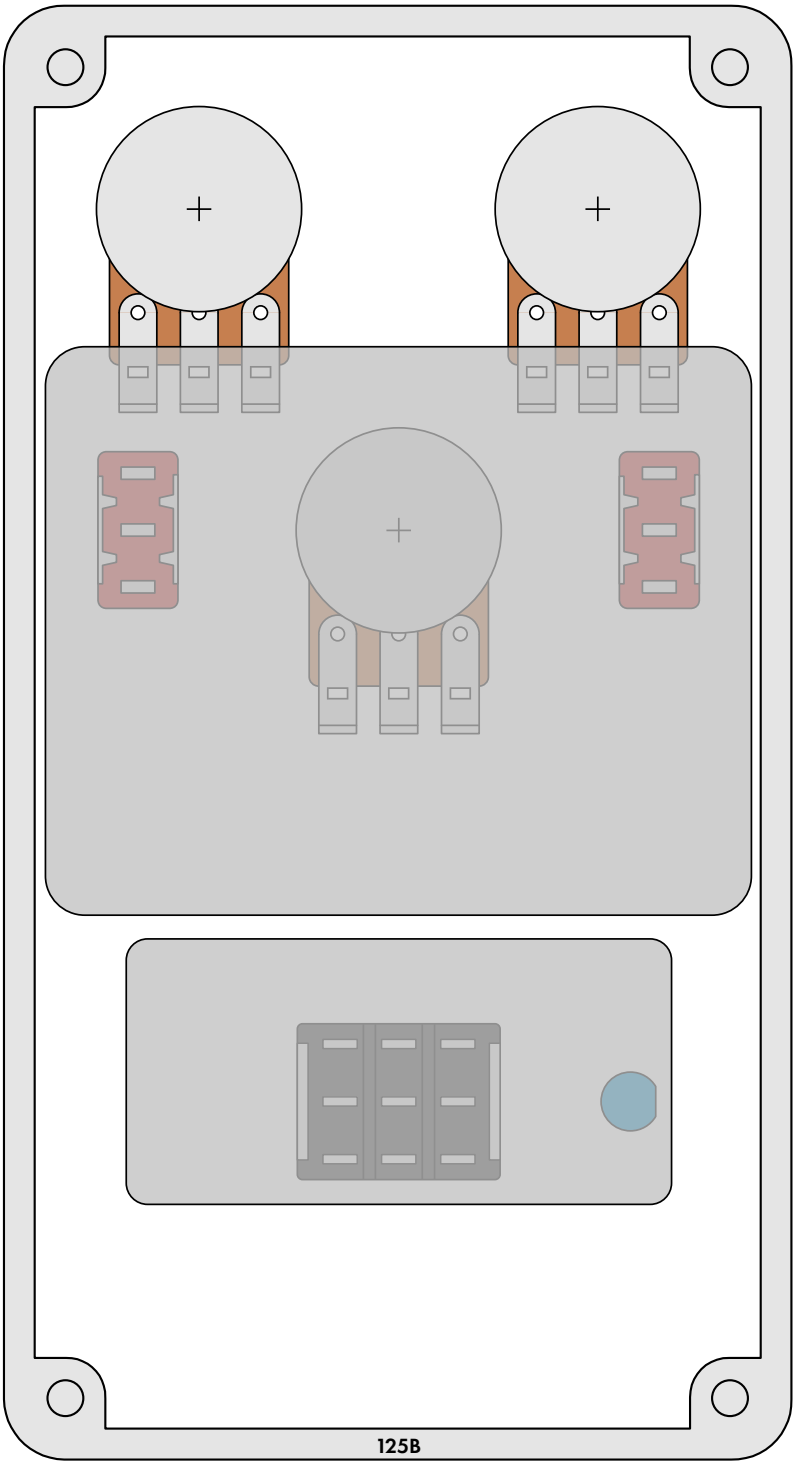
Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. If you'd rather use open-frame jacks, please refer to the Open-Frame Jack Drill Template for the top side.

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.

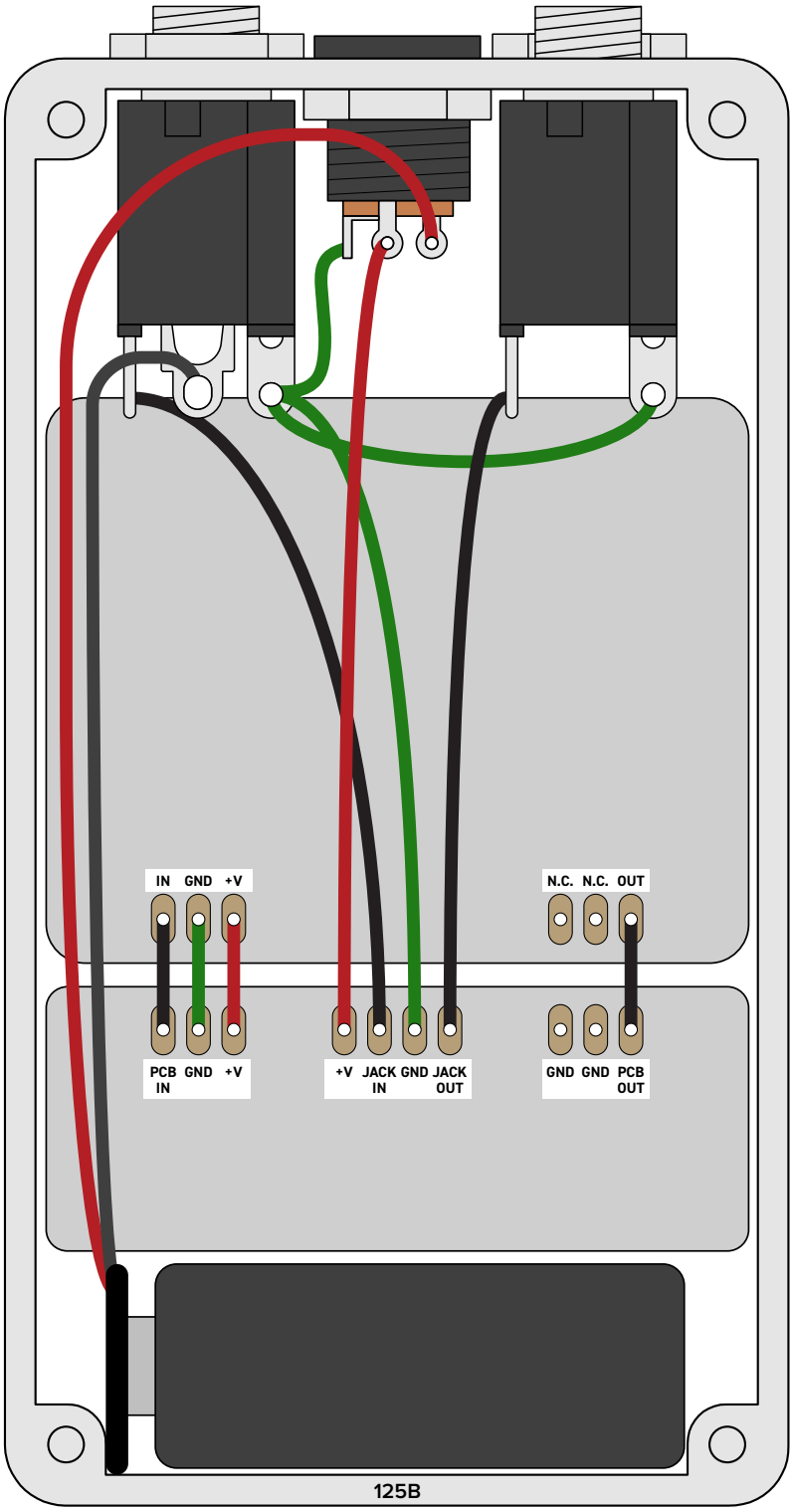


ENCLOSURE LAYOUT

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 cannotbe 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 (2024-04-05)

- Changed C3 recommendation to 220pF (a few different values were used in the original pedals). See build notes for more info.
- Changed C5 recommendation to omit, since it is only found in the SD-9M reissue.
- Swapped values for C10 and C11 so that the stock position is now "down" on the toggle switch rather than "up".

1.0.0 (2021-10-22)
Initial release.