

PROJECT NAME
TITAN

BASED ON
Fulltone® OCD®

EFFECT TYPE
Overdrive / distortion

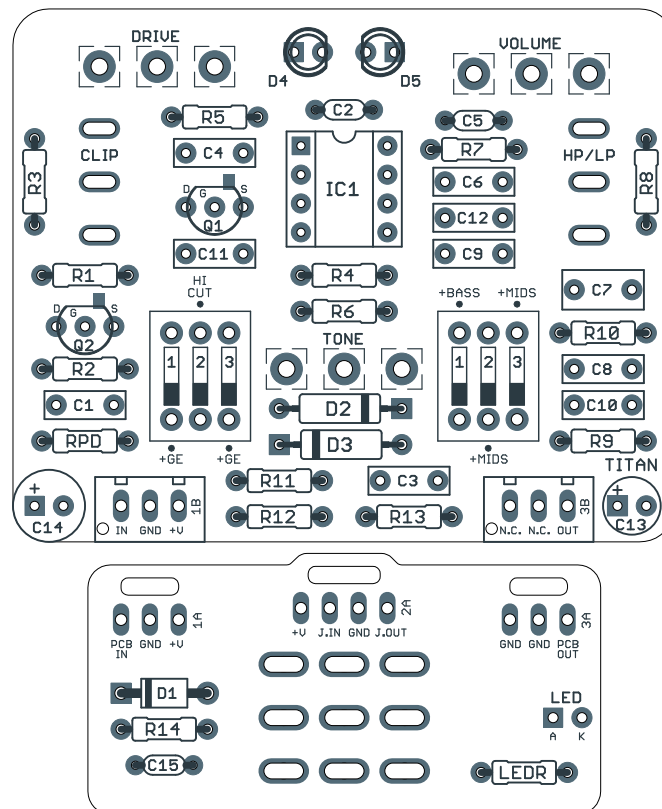
PROJECT SUMMARY

A legendary hard-clipping overdrive pedal that makes almost any rig sound better.



BUILD DIFFICULTY
■■■■■ Easy

DOCUMENT VERSION
1.0.1 (2024-08-08)



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

IMPORTANT NOTE

This documentation is for the **PCB-only** version of the project. If you are building the full kit from Aion FX, please use the [kit build documentation](#) instead. The instructions are more detailed and may differ in some areas due to the specialized parts and assembly methods used in our kits.

TRADEMARK USAGE

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INTRODUCTION

The Titan Dynamic Drive is an adaptation of the legendary Fulltone® OCD®. The Obsessive Compulsive Drive was first released in 2005, itself a modified version of the Voodoo Labs Overdrive with several added features and tweaks.

There were seven different official versions of V1 from its initial release until it was replaced by the V2 in 2017. Prior to the release of the “true” V2, these versions were referred to by the gear community as V1, V2, V3, etc., but they’ve always been labeled V1.1, V1.2, V1.3, etc. inside the enclosure.

The Titan is a fully-overhauled version of our [original legacy project](#). This version omits the on-board 18V charge pump in favor of a simplified layout. 18V mode can easily be added with our [18V Bypass PCB](#), which is compatible with this project. It also supports external 18V power like the original.

In place of this, we’ve added several new features, bringing in the most noticeable circuit tweaks from V1.1 through V1.7 and using DIP switches to make them configurable. The result is a tonal workstation, allowing you to tailor your own perfect version of the circuit.

We’ve included extensive documentation on the major differences between the versions and the switch combinations that correspond most closely to each. The default parts list corresponds to v1.7, which is the version that was in production the longest with around ~75,000 units manufactured.

USAGE

The Titan has the typical controls of a 3-knob overdrive:

- **Drive** controls the amount of gain pushed into the hard-clipping diodes.
- **Tone** controls the treble response via a passive filter.
- **Volume** controls the overall output.

There are also two toggle switches:

- **Clipping** (toggle switch) selects between stock clipping, which uses MOSFET transistors that can optionally be combined with germanium diodes, and LED clipping.
- **HP/LP** (toggle switch) selects between “high peak” and “low peak” mode, which affects the range and travel of the tone control. With Tone fully up, it just provides a slight volume boost, no different than turning up the volume control a bit.

In addition, there are two internal 3-position DIP switches, described in detail on pages 5 and 7.

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	10k	Metal film resistor, 1/4W	
R2	470k	Metal film resistor, 1/4W	
R3	18k	Metal film resistor, 1/4W	
R4	2k2	Metal film resistor, 1/4W	
R5	10k	Metal film resistor, 1/4W	
R6	10k	Metal film resistor, 1/4W	
R7	150k	Metal film resistor, 1/4W	
R8	39k	Metal film resistor, 1/4W	
R9	33k	Metal film resistor, 1/4W	
R10	22k	Metal film resistor, 1/4W	
R11	1k	Metal film resistor, 1/4W	
R12	10k	Metal film resistor, 1/4W	
R13	10k	Metal film resistor, 1/4W	
R14	100R	Metal film resistor, 1/4W	Power supply filter resistor.
RPD	1M	Metal film resistor, 1/4W	Input pull-down resistor.
LEDR	10k	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	22n	Film capacitor, 7.2 x 2.5mm	
C2	220pF	MLCC capacitor, NP0/C0G	
C3	68n	Film capacitor, 7.2 x 2.5mm	
C4	1n	Film capacitor, 7.2 x 2.5mm	
C5	220pF	MLCC capacitor, NP0/C0G	
C6	100n	Film capacitor, 7.2 x 2.5mm	
C7	1uF	Film capacitor, 7.2 x 3.5mm	
C8	47n	Film capacitor, 7.2 x 2.5mm	
C9	47n	Film capacitor, 7.2 x 2.5mm	
C10	47n	Film capacitor, 7.2 x 2.5mm	
C11	10n	Film capacitor, 7.2 x 2.5mm	
C12	33n	Film capacitor, 7.2 x 2.5mm	
C13	47uF	Electrolytic capacitor, 5mm	Reference voltage filter capacitor.
C14	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C15	100n	MLCC capacitor, X7R	Power supply filter capacitor.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
D1	1N5817	Schottky diode, DO-41	
D2	Ge	Germanium diode, DO-7	Any germanium diode should work about the same in this circuit, so use whatever you can find. See build notes for precautions about polarity.
D3	Ge	Germanium diode, DO-7	
D4	3mm LED	LED, 3mm, red diffused	Can also use 5mm.
D5	3mm LED	LED, 3mm, red diffused	Can also use 5mm.
Q1	2N7000	MOSFET, N-channel, TO-92	Can also use BS170 (rotate 180 degrees).
Q2	2N7000	MOSFET, N-channel, TO-92	Can also use BS170 (rotate 180 degrees).
IC1	TL082	Operational amplifier, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
SW1	3-pos. DIP	DIP switch, 3-position	See build notes for switch settings.
SW2	3-pos. DIP	DIP switch, 3-position	See build notes for switch settings.
DRIVE	1MA	16mm right-angle PCB mount pot	
TONE	10kB	16mm right-angle PCB mount pot	
VOL.	100kB	16mm right-angle PCB mount pot	
CLIP	SPDT on-on	Toggle switch, SPDT on-on	
HP/LP	SPDT on-on	Toggle switch, SPDT on-on	
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	
BATT.	9V	9V battery snap	Soft vinyl type. The hard-shell type will not fit.
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

BUILD NOTES

DIP switch settings

The OCD V1 had seven major versions, and many of the circuit changes across versions make a noticeable difference to the tone. In this updated version of the Titan, we added DIP switches to make several of these changes selectable so you can capture the main sonic characteristics of any version.

For a visual reference of the DIP switch settings, see page 7.

SWITCH NAME	“ON” DESCRIPTION	“OFF” DESCRIPTION
+GE	MOSFET clipping only (all versions but v1.4). Default position for v1.7 specs.	Adds D2 and/or D3 in series with Q1 and Q2. With one OFF and one ON, it's equivalent to v1.4. With both OFF, it's equivalent to the V2 Custom Shop Germanium.
HI CUT	Adds C11 (10n) in parallel with C4 (v1.5), which cuts more highs before the clipping stage.	1n hi-cut capacitor only (all versions but v1.5). Default position for v1.7 specs.
+BASS	Adds C12 (33n) in parallel with C3 (v1.1 - 1.3) for ~100n total, which increases bass before the clipping stage.	68n capacitor value (v1.4 and later). Default position for v1.7 specs.
+MIDS (left sw.)	Adds C10 (47n) in parallel with C8 for ~100n total (v1.1 and 1.2) if the other +MIDS switch is ON. If the other +MIDS switch is OFF, the total is 68n, which does not correspond to any version but is a useful in-between value.	47n tone cap (v1.3 and later). Default position for v1.7 specs.
+MIDS (right sw.)	Bypasses C9 (47n), which keeps the tone capacitor value at 47n (v1.3 - 1.7). Default position for v1.7 specs.	Adds C9 (47n) in series with C8, which halves the tone cap value to ~22n (v2.0).

Note: On the PCB, the switch positions are labeled according to what happens if the lever is moved toward the label, which is sometimes ON and sometimes OFF. In the table above, the “ON” description refers to the lever being moved up, regardless of the placement of the label on the PCB. Most DIP switches will have text on the switch itself indicating which position is ON.

Other version changes

There are a few other changes that are impractical or obscure that we have not included as switchable options, but if you're curious about the other differences then here are the full details for each.

VERSION	DESCRIPTION
1.1	Drive 500kA; Tone 25kA; Volume 100kB; op-amp capacitor 100n (+BASS set to “ON”); tone capacitor 100n (both +MIDS set to “ON”); no GE clipping (both +GE set to “ON”)
1.2	Same as v1.1, but Volume 500kB
1.3	Drive 1MA; Tone 10kB; Volume 500kB; op-amp capacitor 100n (+BASS set to “ON”); tone capacitor 47n (left +MIDS set to “OFF”, right +MIDS set to “ON”); no GE clipping (both +GE set to “ON”); C2 and C5 are 330pF (these are 220pf in all other versions)
1.4	Drive 1MA; Tone 10kB; Volume 500kB; op-amp capacitor 68n (+BASS set to “OFF”); tone capacitor 47n (left +MIDS set to “OFF”, right +MIDS set to “ON”); asymmetric GE clipping (one +GE set to “OFF” and one set to “ON”)
1.5	Drive 1MA; Tone 10kB; Volume 100kA; op-amp capacitor 68n (+BASS set to “OFF”); tone capacitor 47n (left +MIDS set to “OFF”, right +MIDS set to “ON”); add hi-cut capacitor (HI CUT set to “ON”); no GE clipping (both +GE set to “ON”)
1.6	Drive 1MA; Tone 10kB; Volume 100kB; op-amp capacitor 68n (+BASS set to “OFF”); tone capacitor 47n (left +MIDS set to “OFF”, right +MIDS set to “ON”); remove hi-cut capacitor (HI CUT set to “OFF”); no GE clipping (both +GE set to “ON”)
1.7	Same as v1.6 (the version increment was due to upgraded filter capacitors). This is the version that is specified in the parts list, and the version that was in production the longest.

BUILD NOTES (CONT.)

Clipping switch

The SPDT clipping switch allows for two positions: stock (2N7000, with optional germanium diodes) or LED clipping. The original OCD never used LED clipping in any version, but it's a very common DIY mod and it sounds fantastic in this circuit.

Looking at the schematic, you may notice that the LEDs are always connected. The stock clipping mode has a lower clipping threshold than the LED pair, so when stock mode is engaged, the LEDs have no signal left to clip and are out of the circuit. They only clip the signal when the stock mode is disabled.

Make sure to use a SPDT *on-on* switch, not the on-off-on type that is more often used for clipping diodes. It will still work, but the middle position will be the same as LED clipping.

Germanium diodes

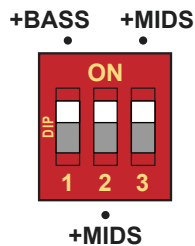
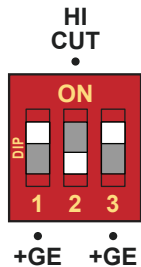
The Titan uses two germanium diodes as part of the optional clipping combinations. These days, the Russian D9 series are probably the most readily-available NOS germaniums, and will sound great in this circuit. But be aware that these Russian diodes have the stripe on the anode rather than the cathode, meaning they should be inserted backwards according to the PCB silkscreen.

This isn't an issue for circuits like the [Klon](#) or [Distortion+](#) that just use two germanium diodes, since it's electronically identical whether they're both the right way or both backwards. However, since this circuit puts them in series with the MOSFETs, then if the germaniums are reversed in relation to the MOSFET polarity, the path to ground will be blocked and only half the waveform will be clipped.

If you're not sure what type of diode you have, it's always best to check the polarity using a multimeter to avoid a time-consuming mistake.

DIP SWITCH VISUAL REFERENCE

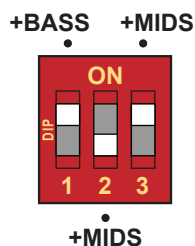
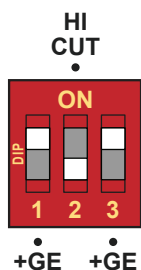
The DIP switches capture the main differences in voicing between each version of the original OCD®. However, not all of the circuit changes can be put on switches, particularly the different potentiometer values and tapers that were used throughout the manufacturing run, so we've also included notes on the remaining differences. The default parts list uses the potentiometer values from v1.6 and 1.7.



Versions 1.1 and 1.2

Other differences:

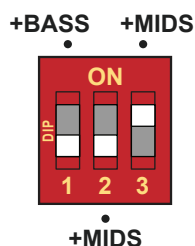
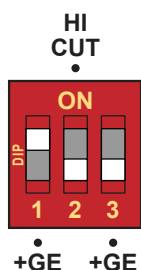
- Drive knob is 500kA (max gain is cut in half)
- Tone knob is 25kA (minimum tone position is much darker; no change at the upper end of the range)
- Volume knob is 500kB (v1.2 only; significantly higher output impedance, but less interaction with tone control)



Version 1.3

Other differences:

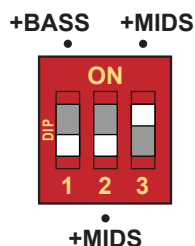
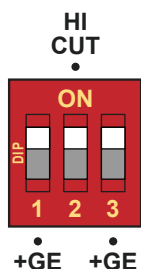
- Volume knob is 500kB (less interaction with tone control, but significantly higher output impedance)
- C2 and C5 are 330pF instead of 220pF (more treble cut in both op-amp stages)



Version 1.4

Other differences:

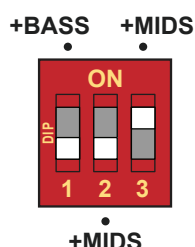
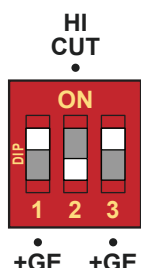
- Volume knob is 500kB (less interaction with tone control, but significantly higher output impedance)



Version 1.5

Other differences:

- Volume knob is audio taper (more gradual increase in volume at the low end of the range)

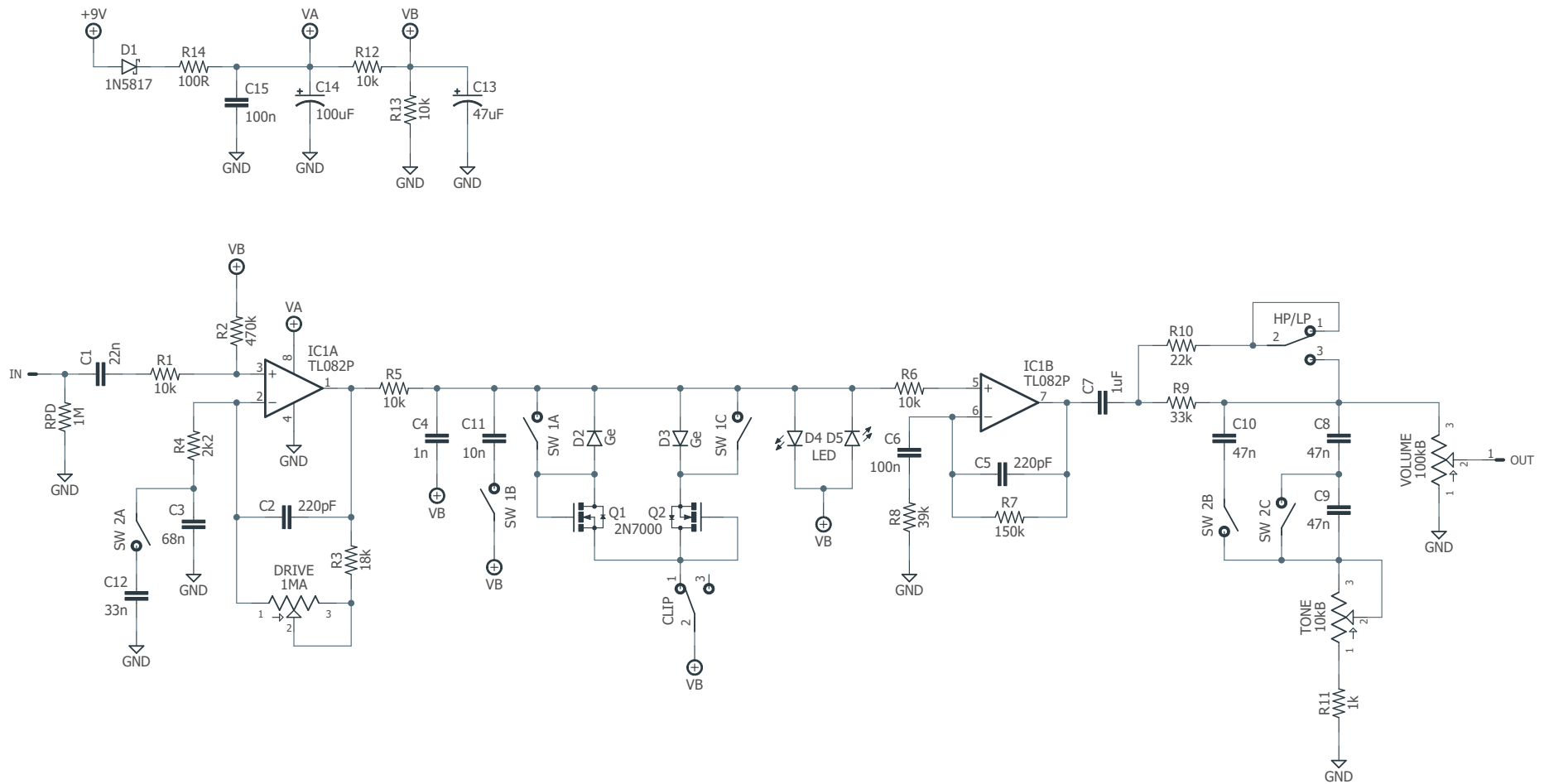


Versions 1.6 and 1.7

Other differences: none

Note: the only change between v1.6 and v1.7 is that the power supply capacitors were upgraded to higher values for better filtering and lower noise. The Titan already uses the upgraded values.

SCHEMATIC



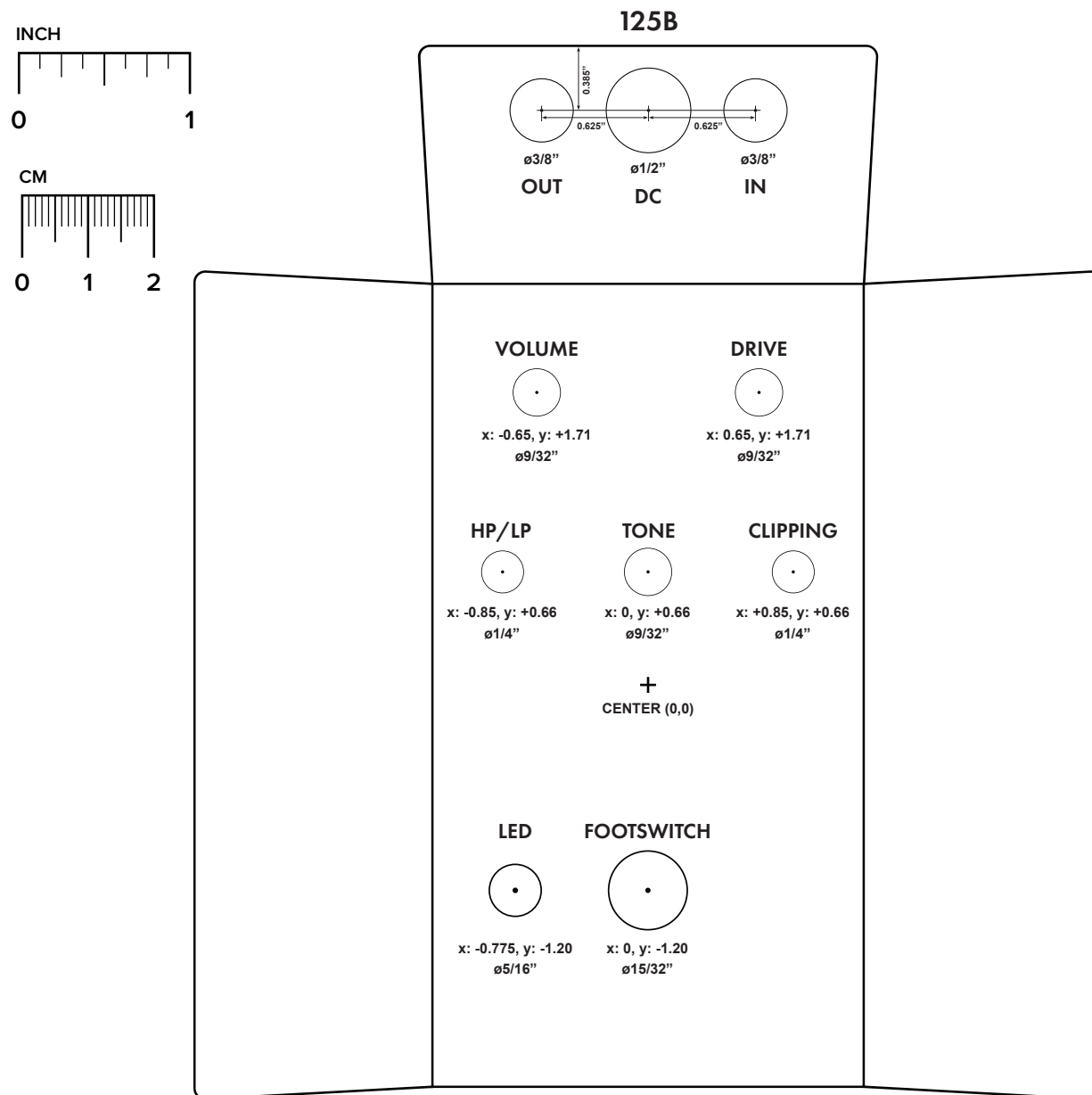
DRILL TEMPLATE

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.

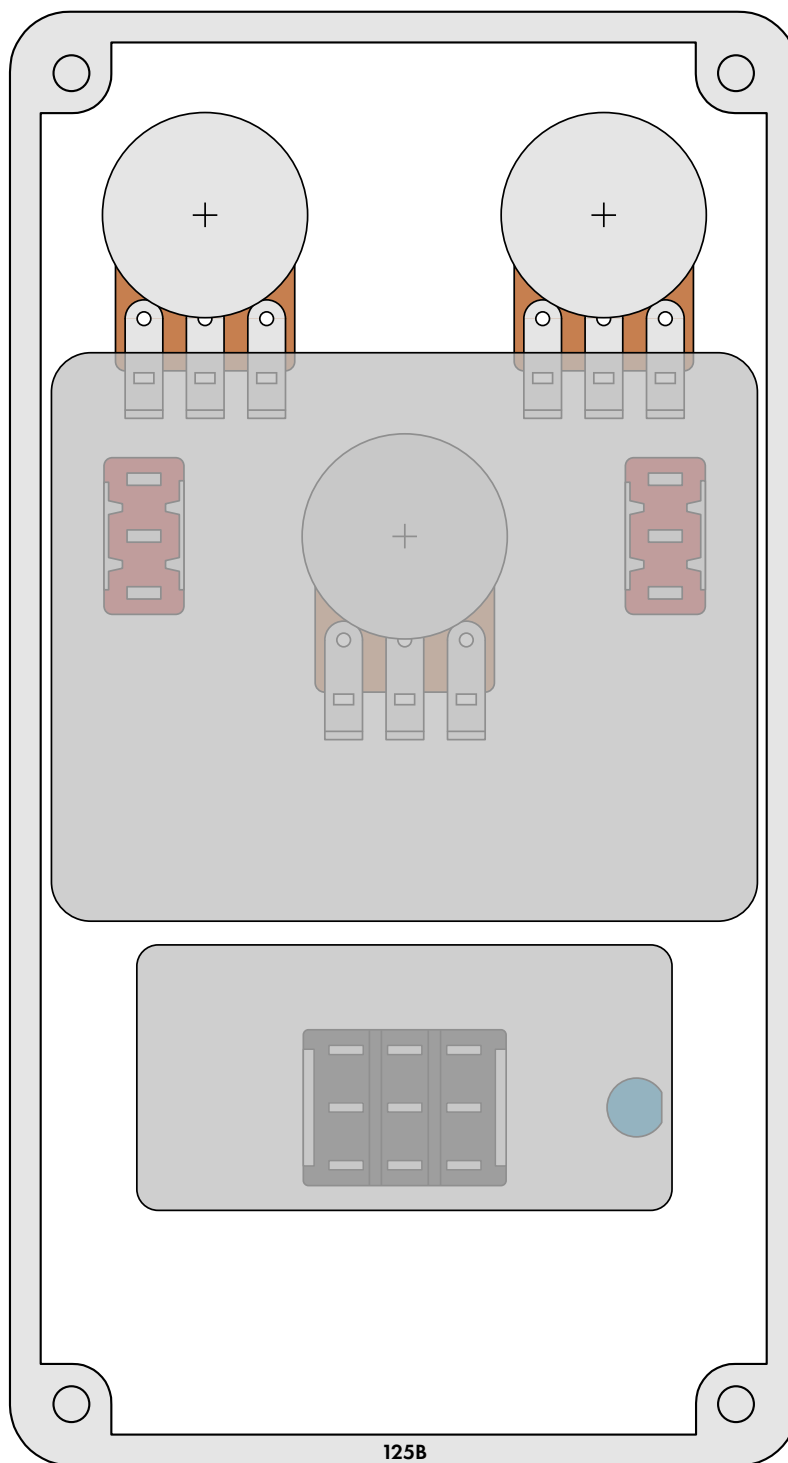
Top jack layout assumes the use of closed-frame jacks like the [Switchcraft 111X](#). If you'd rather use open-frame jacks, please refer to the [Open-Frame Jack Drill Template](#) for the top side.

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.

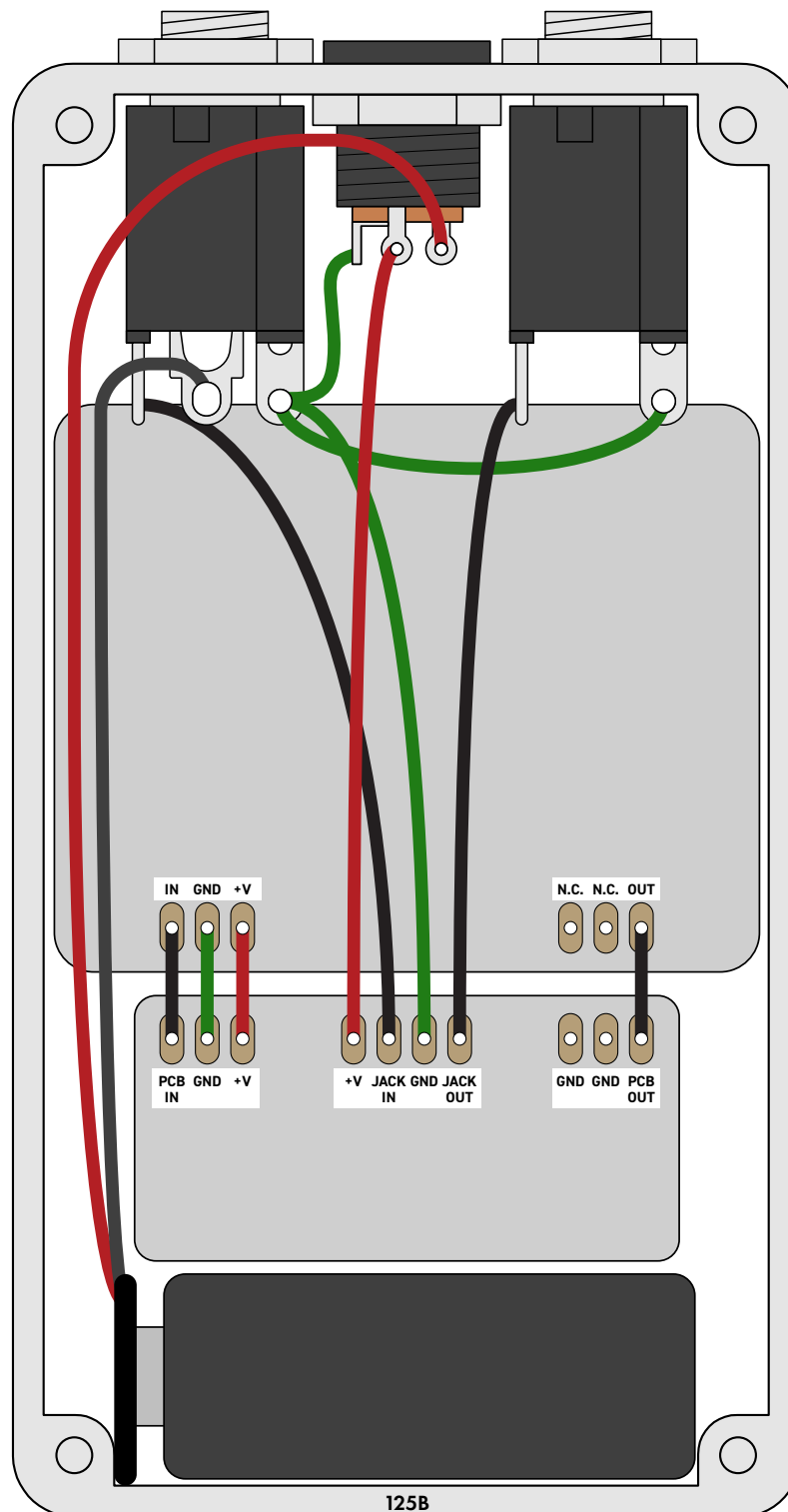


ENCLOSURE LAYOUT

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 (2024-08-08)

Added DIP switch visual reference on page 7.

1.0.0 (2023-03-24)

Initial release.