

PROJECT NAME

GLADIATOR



BASED ON

King Tone Duellist

BUILD DIFFICULTY

■■■■□ Intermediate

EFFECT TYPE

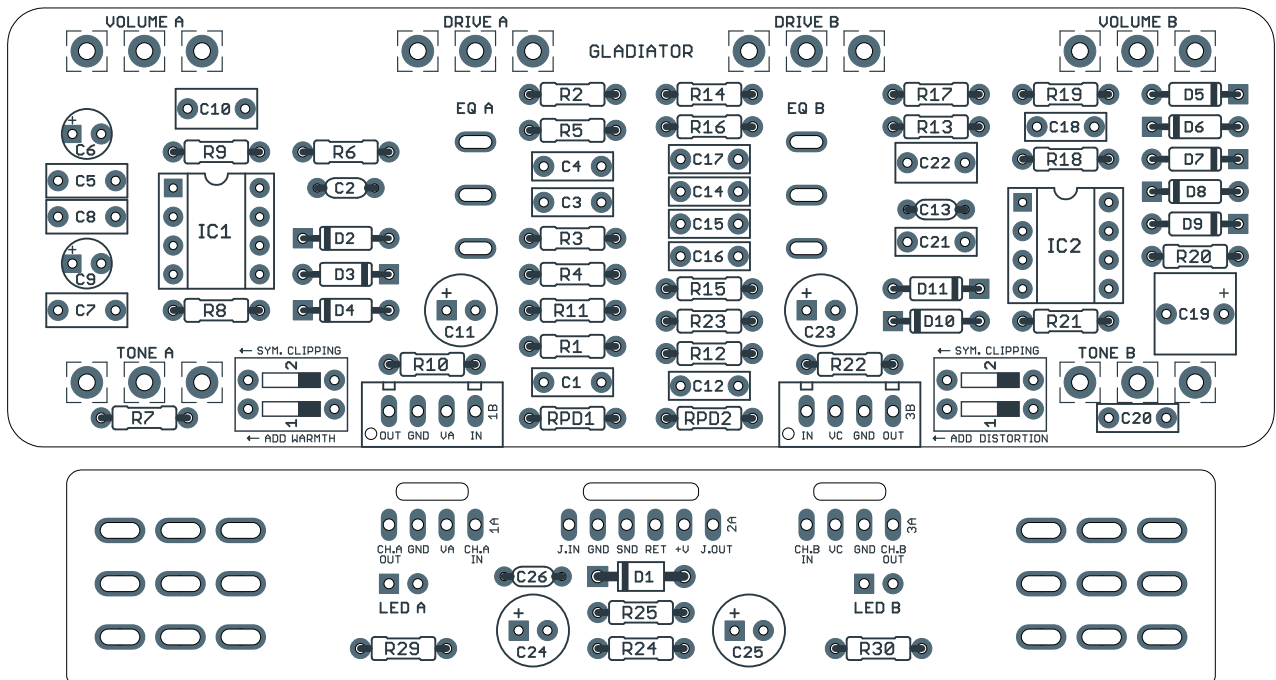
Dual-channel overdrive

DOCUMENT VERSION

1.0.1 (2022-05-23)

PROJECT SUMMARY

A popular dual-channel overdrive first released in 2015 that combines a stripped-down Tube Screamer with a hot-rodged Bluesbreaker.



Actual size is 4.4" x 1.52" (main board) and 4.00" x 0.74" (bypass board).

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INTRODUCTION

The Gladiator Dual Overdrive is based on the King Tone Duellist, a highly prized dual pedal first released in 2015 consisting of the “String Singer” for side A and the “Heavy Hand” for side B. The Duellist was [traced by Aion FX](#) in 2022.

The String Singer is based on a stripped-down Tube Screamer with input & output buffers removed. The circuit is highly modified, so the EQ and clipping will sound drastically different from the classic Ibanez circuit, but that was the source at least. This half of the circuit was released in single-pedal format as the Soloist, available from Aion FX as the [Gladius](#).

The Heavy Hand is based on the Marshall Bluesbreaker, but again it has been heavily modified from the original circuit—so it may remind you of it, but it’s not going to sound quite the same. This half of the was also released as a single pedal called the Heavyhand, available from Aion FX as the [Xiphos](#).

Each side also has an external “EQ” toggle switch to select between different EQ voicings, as well as two internal DIP switches for fat EQ and asymmetrical clipping (side A) or and asymmetrical clipping and hard clipping (side B).

The Gladiator simplifies the send/return functionality of the original unit by including 4 jacks by default. The send & return now have their own jacks that automatically short together if nothing is plugged in. Otherwise, the Gladiator is a direct clone of the Duellist based on our own trace. Details are available in the [tracing journal](#) on our website.

USAGE

The Gladiator has four external controls per channel:

- **Drive** controls the amount of gain going into the op-amp feedback diode clipping stage.
- **Tone** controls the treble response of the channel via a passive filter.
- **Volume** controls the overall output of the channel.
- **EQ** (toggle) selects between Fat (more bass), Stock (balanced), and Glass (more treble) modes.

In addition, each channel has two internal controls by way of DIP switches:

- **Asymmetric** (both channels) adds a clipping diode in series. Engaged when DIP switch is off.
- **Warmth** (side A only) adds an extra treble-cut capacitor. Engaged when DIP switch is on.
- **Hard Clip** (side B only) enables the hard clipping diodes. Engaged when DIP switch is off.

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	1M	Metal film resistor, 1/4W	
R2	47k	Metal film resistor, 1/4W	
R3	4k7	Metal film resistor, 1/4W	
R4	3k3	Metal film resistor, 1/4W	
R5	20k	Metal film resistor, 1/4W	
R6	1k	Metal film resistor, 1/4W	
R7	220R	Metal film resistor, 1/4W	
R8	10k	Metal film resistor, 1/4W	
R9	1k	Metal film resistor, 1/4W	
R10	47k	Metal film resistor, 1/4W	
R11	47k	Metal film resistor, 1/4W	
R12	1M	Metal film resistor, 1/4W	
R13	133k	Metal film resistor, 1/4W	
R14	30k1	Metal film resistor, 1/4W	
R15	28k7	Metal film resistor, 1/4W	
R16	4k7	Metal film resistor, 1/4W	
R17	10k	Metal film resistor, 1/4W	
R18	220k	Metal film resistor, 1/4W	
R19	5k6	Metal film resistor, 1/4W	
R20	1k	Metal film resistor, 1/4W	
R21	9k53	Metal film resistor, 1/4W	
R22	47k	Metal film resistor, 1/4W	
R23	47k	Metal film resistor, 1/4W	
R24	100R	Metal film resistor, 1/4W	Power supply filter resistor.
R25	100R	Metal film resistor, 1/4W	Power supply filter resistor.
R29	4k7	Metal film resistor, 1/4W	LED current-limiting resistor (Ch. A) which affects LED brightness.
R30	4k7	Metal film resistor, 1/4W	LED current-limiting resistor (Ch. B) which affects LED brightness.
RPD1	2M2	Metal film resistor, 1/4W	Channel A input pulldown resistor. Can be anywhere from 1M to 2.2M.
RPD2	2M2	Metal film resistor, 1/4W	Channel B input pulldown resistor. Can be anywhere from 1M to 2.2M.

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
C1	22n	Film capacitor, 7.2 x 2.5mm	
C2	47pF	MLCC capacitor, NP0/C0G	
C3	47n	Film capacitor, 7.2 x 2.5mm	
C4	100n	Film capacitor, 7.2 x 2.5mm	
C5	220n	Film capacitor, 7.2 x 2.5mm	Alternative for C6. Recommended to use this instead.
C6	OMIT		0.22uF tantalum in original. Recommended to use C5 and omit C6.
C7	220n	Film capacitor, 7.2 x 2.5mm	
C8	220n	Film capacitor, 7.2 x 2.5mm	Alternative for C9. Recommended to use this instead.
C9	OMIT		0.22uF tantalum in original. Recommended to use C8 and omit C9.
C10	1uF	Film capacitor, 7.2 x 3.5mm	
C11	100uF	Electrolytic capacitor, 6.3mm	Reference voltage filter capacitor.
C12	10n	Film capacitor, 7.2 x 2.5mm	
C13	100pF	MLCC capacitor, NP0/C0G	
C14	10n	Film capacitor, 7.2 x 2.5mm	
C15	10n	Film capacitor, 7.2 x 2.5mm	
C16	15n	Film capacitor, 7.2 x 2.5mm	
C17	4n7	Film capacitor, 7.2 x 2.5mm	
C18	100n	Film capacitor, 7.2 x 2.5mm	
C19	4.7uF	Film capacitor, 7.2 x 7.2mm	Electrolytic capacitor in original. See build notes.
C20	10n	Film capacitor, 7.2 x 2.5mm	
C21	10n	Film capacitor, 7.2 x 2.5mm	
C22	1uF	Film capacitor, 7.2 x 3.5mm	
C23	100uF	Electrolytic capacitor, 6.3mm	Reference voltage filter capacitor.
C24	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C25	100uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C26	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	BAS33	Switching diode, DO-35	
D3	BAS33	Switching diode, DO-35	
D4	BAS33	Switching diode, DO-35	
D5	BAS33	Switching diode, DO-35	Original uses BA282 diodes. The BAS33 is the closest available diode currently in production. See build notes.
D6	BAS33	Switching diode, DO-35	
D7	BAS33	Switching diode, DO-35	
D8	BAS33	Switching diode, DO-35	
D9	BAS33	Switching diode, DO-35	
D10	1N914	Fast-switching diode, DO-35	
D11	1N914	Fast-switching diode, DO-35	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
IC1	RC4558P	Operational amplifier, single, DIP8	
IC1-S	DIP-8 socket	IC socket, DIP-8	
IC2	RC4558P	Operational amplifier, single, DIP8	
IC2-S	DIP-8 socket	IC socket, DIP-8	
CHAR.A	2-pos DIP	DIP switch, 2-position	
CHAR.B	2-pos DIP	DIP switch, 2-position	
DRIVE A	1MA	16mm right-angle PCB mount pot	
DRIVE B	150kC	16mm right-angle PCB mount pot	
TONE A	20kW	16mm right-angle PCB mount pot	
TONE B	25kB	16mm right-angle PCB mount pot	
VOL. A	100kA	16mm right-angle PCB mount pot	Original uses 100kB, but audio taper provides better control.
VOL. B	100kA	16mm right-angle PCB mount pot	Original uses 100kB, but audio taper provides better control.
EQA	SPDT cntr. off	Toggle switch, SPDT on-off-on	
EQB	SPDT cntr. off	Toggle switch, SPDT on-off-on	
LED A	5mm	LED, 5mm, red diffused	
LED B	5mm	LED, 5mm, red diffused	
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.
SEND	NMJ6HC-S	1/4" phone jack, stereo, switched	
RETURN	NMJ6HC-S	1/4" phone jack, stereo, switched	
DC	2.1mm	DC jack, 2.1mm panel mount	Mouser 163-4302-E or equivalent.
CH.A	3PDT	Stomp switch, 3PDT	
CH.B	3PDT	Stomp switch, 3PDT	
ENC	1590BBS	Enclosure, die-cast aluminum	

BUILD NOTES

Clipping diodes

The Duellist uses BA282 diodes, which clip at a slightly higher threshold than standard silicon diodes such as 1N914 (approximately 0.82V compared to 0.7V). These diodes are out of production and hard to find in the old-stuck market.

Now, the closest option is the BAS33. These clip at around 0.8V, still significantly higher than the 1N914 and only slightly lower than the BA282. We've compared the curves on a Peak DCA75 and confirmed that they closely match the BA282 across the current test range.

The only problem is that the BAS33 went end-of-life in early 2022. Availability is still high, but eventually they'll join the ranks of the others.

Omitting the send/return jacks

The loop between the two channels is a modification that is not in the original Duellist. This loop automatically shorts together if nothing is plugged in, so it's fully backwards-compatible if you don't use this feature. However, if you do want to omit it entirely, see the alternate wiring diagram on page 11.

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!

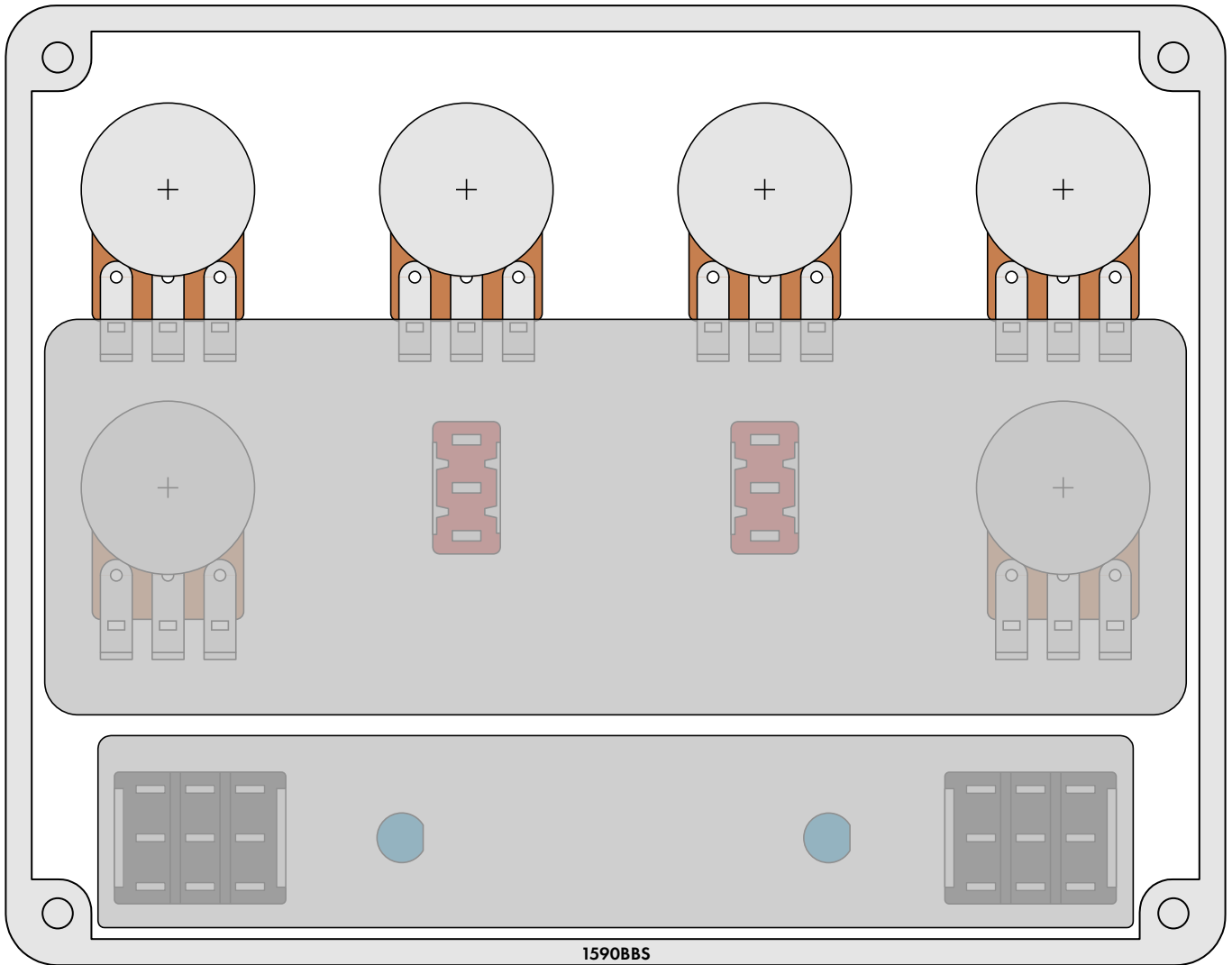
Another alternative is the 1590C (also available from Tayda and Love My Switches). It's about 10mm taller than necessary, but if that's all you can find, it will definitely work.

SCHEMATIC



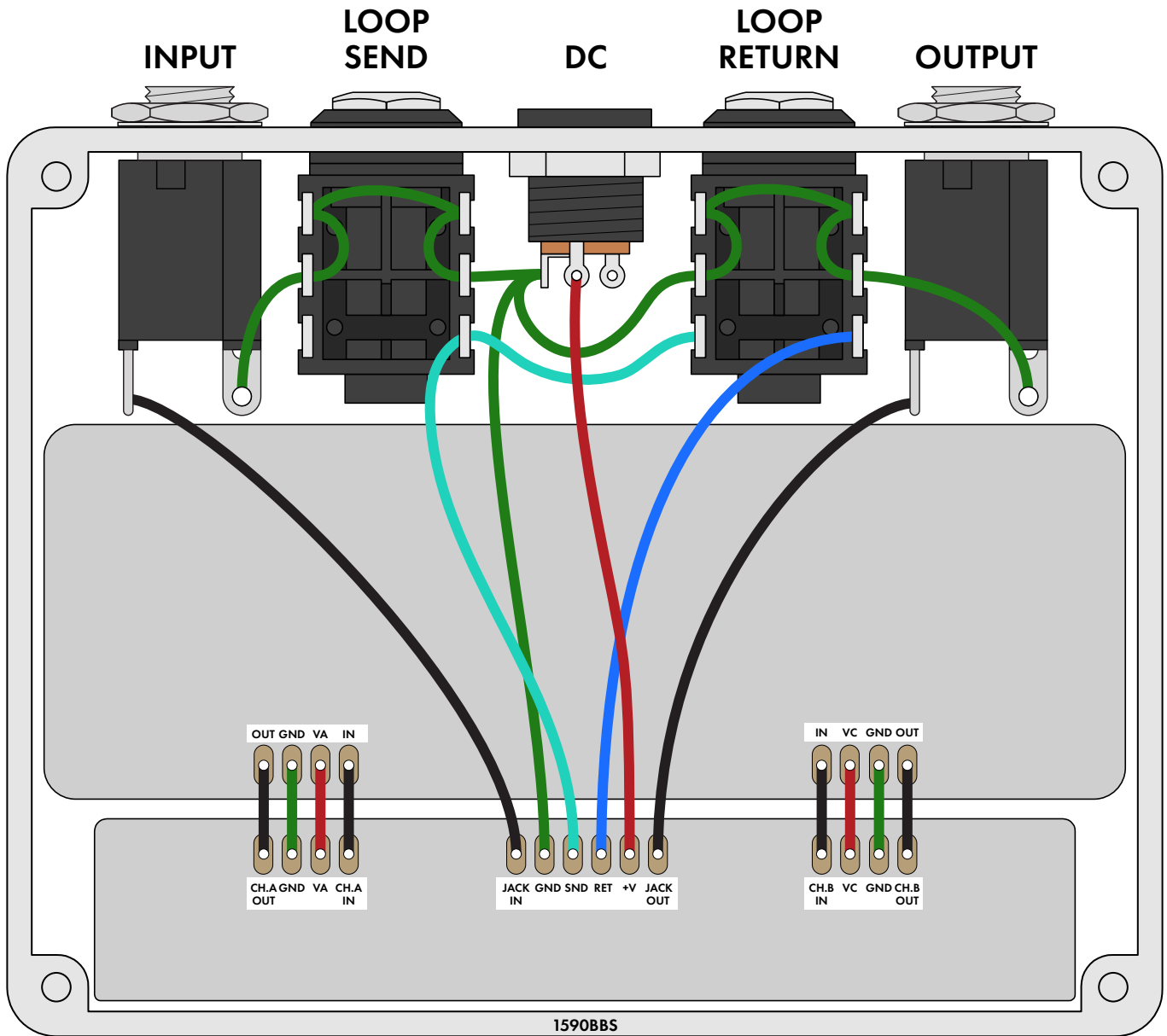
ENCLOSURE LAYOUT

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



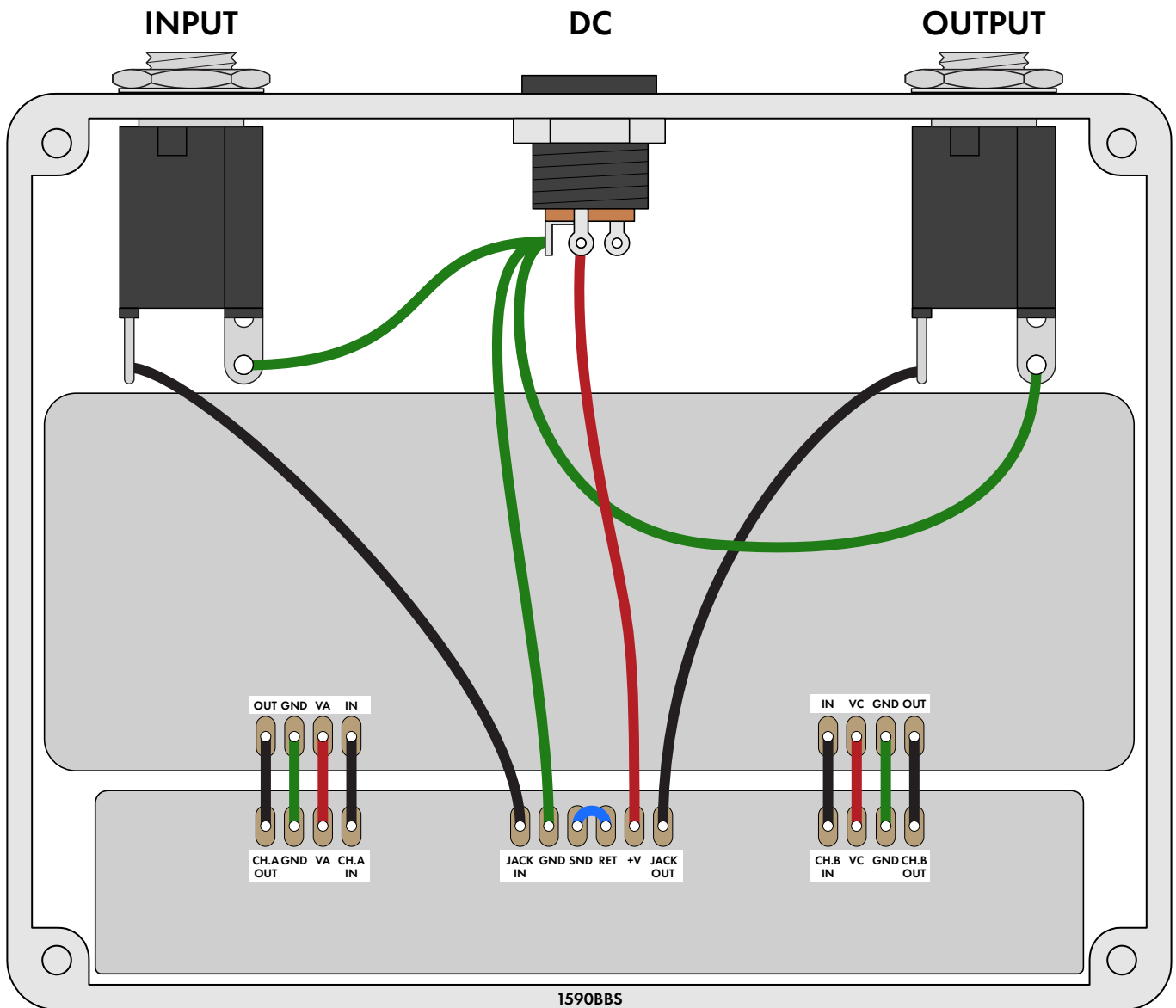
WIRING DIAGRAM

This is the default wiring diagram with the send/return loop. If you want to omit this loop, see the modified wiring diagram on the next page.



WIRING DIAGRAM (NO SEND/RETURN LOOP)

If you want to omit the send & return jacks, use the following wiring diagram. Note the jumper between the SND and RET pads on the footswitch PCB.



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 (2022-05-23)

Corrected resistors in parts list (R1-3 were listed twice).

1.0.0 (2022-05-13)

Initial release.