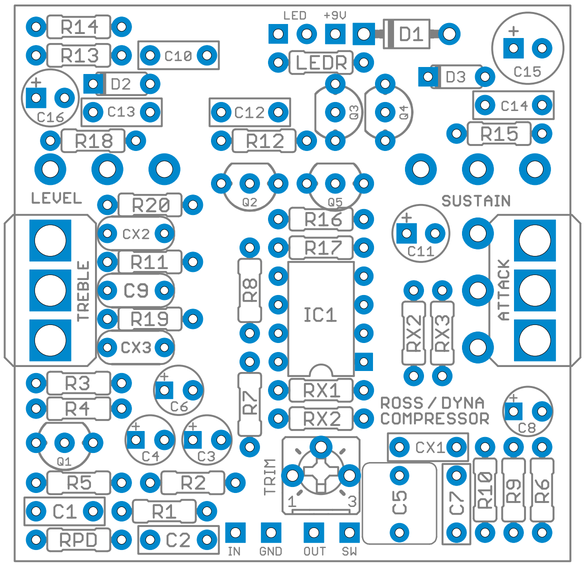
Aurora Compressor

Ross Compressor / MXR Dyna Comp

Overview

Aurora Project Link



The Aurora Compressor is a clone of the Ross Compressor, which was a slightly tweaked MXR Dyna Comp with improved filtering and minor EQ adjustments. This PCB allows you to build either of those versions, along with a Keeley Compressor (which is a Ross with an attack knob) and a pretty close Janglebox (which is a Ross with a treble switch), or your own combination of the above.

The modifications to the original circuit include an attack knob (or a switch, if you can't find the odd pot value), an input trim, and a treble switch.

The Boss CS-2 is fairly close to a Ross/Dyna Comp, enough so that the Attack mod has been adapted from it, but there are enough other differences that I wasn't able to use the same PCB for both. If you'd like to see a Boss CS-2 project, let me know—I may make one if there's enough interest.

Controls & Usage

- **Sustain** controls the amount of compression. As you turn it up, it increases the sustain but also the noise level. If you keep it down lower than 12:00, the effect acts more like a limiter.
- **Level** is the output level of the effect.
- **Attack** is technically a "Release" control, but it's called Attack in both the Boss CS-2 and Keeley Compressor so the name stuck. It sets the amount of time after the input signal falls below the threshold before the compressor "resets" and is ready to compress again. It can be either a pot or a switch, with the switch functioning as presets for *all the way off*, *all the way up*, and *halfway up*.
- **Treble** controls the amount of treble attenuation immediately after the CA3080 does its thing. The normal 1n capacitor creates a fairly flat frequency response. By lowering this value with a switch, you can increase the amount of treble in the signal, which in combination with the compression can create some really cool jangly sounds, different than just turning up the treble on the amp.
- **Input trim** is an internal trimmer that attenuates the signal going into the CA3080, allowing you to use the compressor with high-output instruments such as keyboards or active pickups.

Modifications & Experimentation

I'd recommend building it with all the modifications regardless of which variant you'e going for. These additions are all *enhancement only*: they give you wider control over certain parameters, but the exact stock circuit is always available with certain switch or knob positions, so there's no good reason not to use them.

The Aion Compressor

This is not a DIY version of my Aion Compressor pedal. It's not far off, mine being a Ross variant with a treble switch—but the output section is different than the typical Ross and mine has a lot of other "usability enhancements" like relay-driven true bypass and illuminated knobs.

Parts (Ross / Dyna values)

Resistors

R1	10k	
R2	470k	jumper
R3	470k	1M
R4	10k	jumper
R5	10k	
R6	1M	
R7	220k	jumper
R8	220k	470k
R9	1M	
R10	15k	
R11	150k	
R12	10k	
R13	10k	
R14	1M	
R15	1M	
R16	27k	
R17	10k	
R18	10k	
R19	56k	
R20	27k	
RX1	1k [1]	
RX2 (by IC1)	1k [1, 2]	
RX2 (by switch)	150k [2, 3]	
RX3	39k [3]	
RPD	1M to 2M2	
LEDR	4k7	

Capacitors

C1	220pF [4]	omit
C2	10n	
C3	1uF	omit
C4	1uF	omit
C5	1uF film	
C6	1uF	omit
C7	10n	
C8	1uF	
C9	180pF MLCC [5]	
C10	10n	
C11	10uF	
C12	10n	
C13	100n	
C14	10n	
C15	47uF electro	
C16	1uF	
CX1	2n2 [7]	
CX2	360pF MLCC [5]	
CX3	820pF MLCC [5]	

Except for C5, all 1uF capacitors can be either tantalum (my preference) or electrolytic.

Semiconductors

Q1–Q5	2N5088 [6]
IC1	CA3080
D1	1N4002
D2, D3	1N914
LED	5mm LED

Potentiometers

Sustain	500kC
Level	50kB
Attack	150kC [3]
Trim	200k trim (3362P) [7]

Other

Treble	SPDT center off [5]
Attack	SPDT center off [3]

Where values are split, the **Ross Compressor** is on the left and the **Dyna Comp** is on the right.

See next page for build notes.

Additional Part Notes

- Capacitors are shown in nanofarads (n or nF) where appropriate. 1000n = 1uF. Many online suppliers do not use nanofarads, so you'll often have to look for 0.047uF instead of 47n, 0.0056uF instead of 5n6, etc.
- The PCB layout assumes the use of film capacitors with 5mm lead spacing for all values 1nF through 470nF. I prefer EPCOS box film or Panasonic ECQ-B/V-series.
- Potentiometers are Alpha 16mm right-angle PCB mount.
- Switches are Taiway (Small Bear) or Mountain Switch (Mouser) brand with solder lugs. I prefer the short-toggle variety, but that's just a matter of aesthetics.
- I recommend using these dust covers / insulators from Small Bear to insulate the back of the pots from the board and prevent shorts. If you don't use these, use some electrical tape or cardboard to act as insulation. The right-angle pots will make direct contact with the solder pads otherwise.

Build Notes

[1] The original has a **2k trimmer** here to compensate for imbalances in the early metal-can versions of the CA3080. The later DIP8 packages were much improved, and so this trimmer has been omitted from this project and replaced with two **1k** resistors.

[2] **Silkscreen error:** There are two resistors labeled **RX2** on the board. The one below IC1, next to RX1, should be **1k**. The one near the switch, next to RX3, should be **150k**.

[3] **Switch or pot:** This PCB allows you to incorporate the Attack pot used in the Boss CS-2 and Keeley C-4 Compressor. Since this pot is a very odd value (150k reverse audio) and is only available from a few places, a second option has been included so you can use a switch with three presets for Fast, Medium and Slow.

- If using the **150kC pot**, omit **RX2** and **RX3** near the switch. As of this writing, the 150kC pot is only available from a couple of suppliers, and only in solder-lug format. The PCB is designed for the eventuality that Small Bear will carry a right-angle version at some point.
- If using the **switch**, just leave the pot's pads empty and use **RX2**, **RX3** and the Attack switch as listed.
- If you want to omit this control altogether (such as for a stock Dyna or Ross compressor), leave off both the switch and the pot, use **150k** for **R17**, and jumper **RX2** (the one near the switch).

[4] Some schematics show this capacitor as **2n2**, which I believe is a mistake since it would cut far too much treble at the input and would not result in a transparent compressor. The original value is more likely **220pF**. However, the Keeley Compressor uses **150pF**, and this is the value I settled on for for my Aion Compressor as well after testing a number of different options. (The Dyna Comp omits this capacitor entirely.)

[5] These components make up the Treble switch, which is adapted from the Janglebox. The Janglebox actually omits **C9** entirely so there's no treble attenuation after the CA3080, with **CX2** being the original **1n**. However, after testing out a number of different combinations, I found that it was best to have at least a very small capacitor connected at all times. These three capacitor values (180pF, 360pF and 820pF) are the ones I settled on. With the switch in the **CX3** position, the result is the stock **1n**, but then there's a mode with 540pF (a bit of treble boost) and a mode with 180pF (a bit more treble boost). If you want to omit this control altogether, use a **1n** capacitor for **C9** and leave off CX2, CX3 and the switch. You can also experiment with different capacitor combinations for C9, CX2 and CX3. If you end up with something you like, be sure to send in a build report!

[6] Since **Q3** and **Q4** are symmetrical in operation, it's best if they are fairly close to each other in gain (hFe). I wouldn't obsess too much over it, but if you have a multimeter with an "hFe" function, just measure all five transistors and use the two that are closest in hFe for these positions. The gain doesn't matter for the others.

[7] This input trim control was adapted from the Keeley Compressor. The original value in the Keeley is **150k**, but this is a pretty rare trimpot value. Since it's just a variable resistor, you can use the more common **200k**, **250k** or even just **100k** and the result will be the same—you'll just have a different available range. If you'd like to omit this control entirely, leave off **CX1** and jumper **pins 2 and 3** of the trimmer.

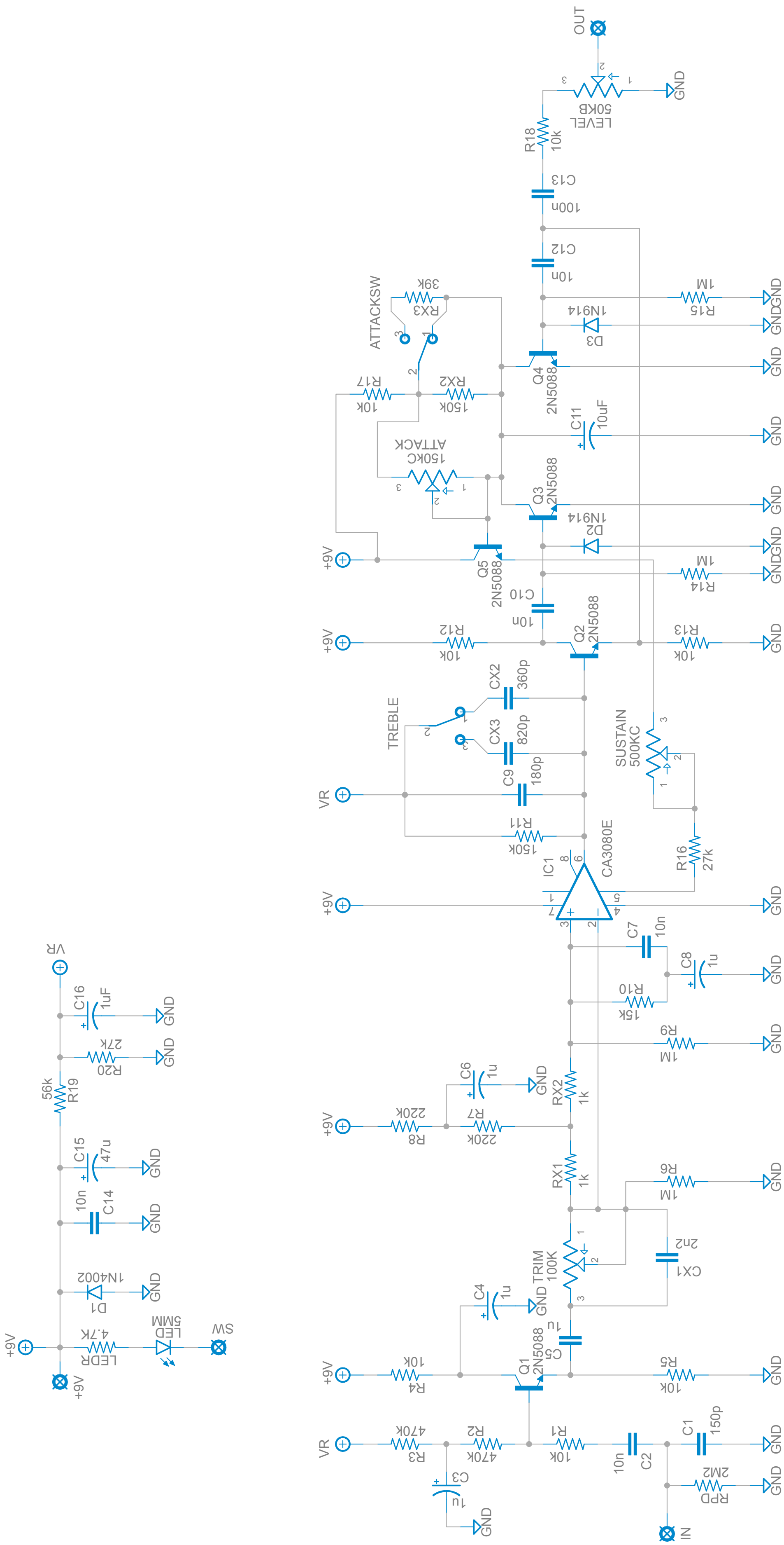
JangleBox values

With a couple of parts substitutions, you can get pretty close to a JangleBox 1, though not exact—the switch wiring has an extra "Dark" mode that is not covered here, but I don't know why you'd need this since the whole trick of the JangleBox is that it can add some sparkle to the compressed signal. Start with the **Dyna Comp** values above, and make the following replacements: *(old value → new value)*

C5: 1uF → 2u2; **C11**: 10uF → 2u2; **C13**: 2u2 electro *(negative side facing R18)*; **R8**: 470k → 1M; **R11**: 150k → 220k; **R16**: 27k → 33k; **R17**: 1M (omit the Attack switch & pot); **R18**: 10k → 92k; **R19**: 56k → 68k; **R20**: 27k → 33k; **RX1/RX2**: 1k → 500R; **Sustain**: 500kC → 250kB; **Level**: 50kB → 250kB.

The Treble switch is different, but a very close approximation would be to leave off **C9** entirely, use **470pF** for **CX2** and **1n** for **CX3**. Instead of Dark, Normal, Bright, it's Normal, Bright 1 and Bright 2.

Schematic



OUT
LEVEL
50KB
GND
R18
10k
C13
100n
C12
10n
ATTACKSW
RX3
39K
R15
1M
D3
1N914
Q4
2N5088
R17
10K
RX2
150K
C11
10uF
ATTACK
150KC
Q3
2N5088
D2
1N914
+9V
Q5
2N5088
R14
1M
C10
10n
R12
10K
Q2
2N5088
R13
CX2
360p
TREBLE
CX3
820p
C9
180p
VR
SUSTAIN
500KC
R11
150K
IC1
CA3080E
R16
27k
C7
C8
1u
R10
15K
R9
C6
RX2
1k
R8
220K
R7
RX1
R6
TRIM
100K
CX1
2n2
C4
C5
Q1
R5
R4
R3
470K
R2
R1
C2
C1
150p
C3
RPD
2M2
IN
C16
1uF
R20
27K
R19
56k
C15
47u
C14
D1
1N4002
LEDR
4.7K
LED
5MM
SW

General Build Instructions

These are general guidelines and explanations for all Aion Electronics DIY projects, so be aware that not everything described below may apply to this particular project.

Build Order

When putting together the PCB, it's recommended that you do not yet solder any of the enclosure-mounted control components (pots and switches) to the board. Instead, follow this build order:

1. Attach the **audio jacks**, **DC jack** and **footswitch** to the enclosure.
2. Firmly attach the **pots** and **switches** to the enclosure, taking care that they are aligned and straight.
3. Push the **LED**[1] into the hole in the enclosure with the leads sticking straight up, ensuring that the flat side is oriented according to the silkscreen on the PCB.
4. Fit the **PCB** onto all the control components, including the leads of the LED. If it doesn't fit, or if you need to bend things more than you think you should, double-check the alignment of the pots and switches.
5. Once you feel good about everything, **solder them from the top**[2] as the last step before wiring. This way there is no stress on the solder joints from slight misalignments that do not fit the drilled holes. You can still take it out easily if the build needs to be debugged, but now the PCB is "custom-fit" to that particular enclosure.
6. Wire everything according to the wiring diagram on the last page.

[1] **For the LED**: You can use a bezel if you'd like, but generally it's easier just to drill the proper size of hole and push the LED through so it fits snugly. If you solder it directly to the PCB, it'll stay put even if the hole is slightly too big. Make absolutely sure the LED is oriented correctly (the flat side matches the silk screen) before soldering, as it'll be a pain to fix later! After it's soldered, clip off the excess length of the leads.

[2] **Note on soldering the toggle switch(es):** It will require a good amount of solder to fill the pads. Try to be as quick as possible to avoid melting the lugs, and be prepared to feed a lot of solder as soon as the solder starts to melt. I recommend waiting 20-30 seconds between soldering each lug to give it time to cool down.

"RPD" and "LEDR" resistors

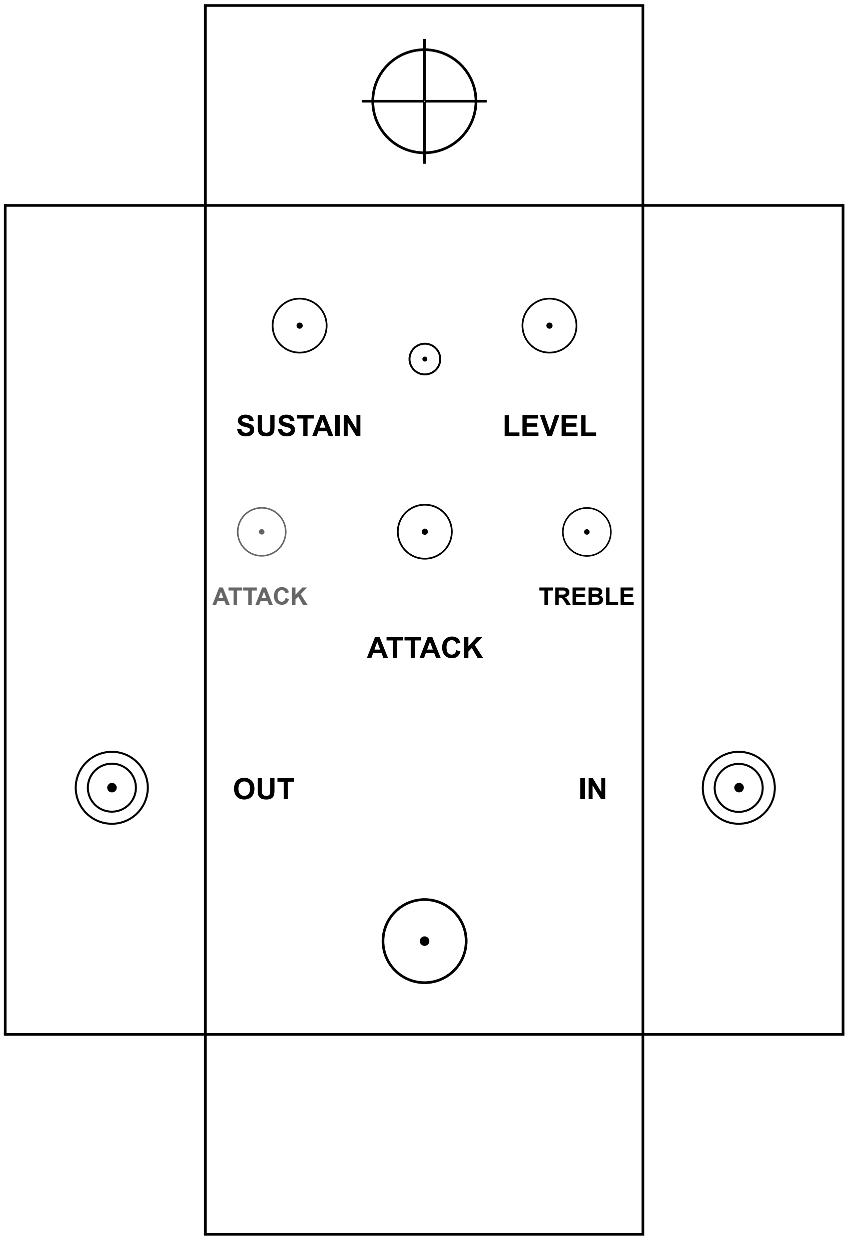
The resistors marked "RPD" and "LEDR" are generally not original to the circuit and can be adjusted to preference. "RPD" is the pulldown resistor to help tame true-bypass popping, while "LEDR" controls the brightness of the LED. I generally use 2.2M for the pulldown resistor and 4.7k for the LED resistor.

Sockets

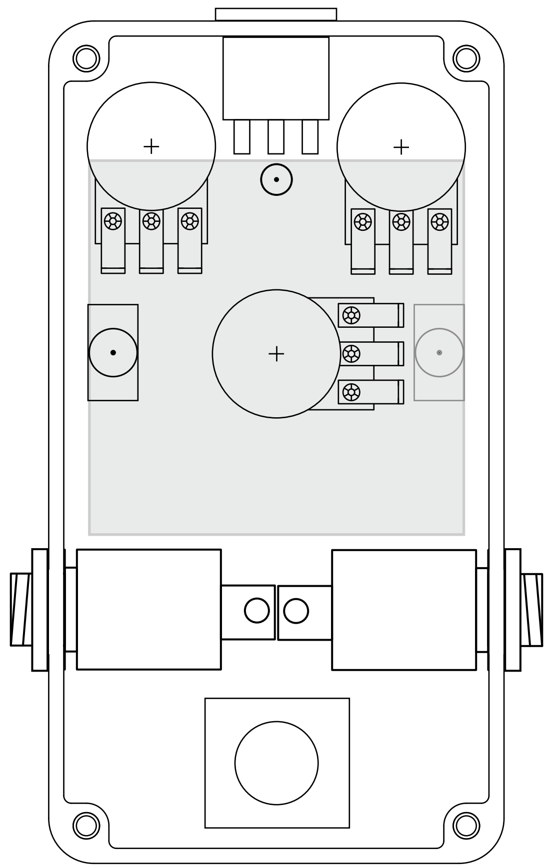
Since double-sided boards can be very frustrating to desolder, especially components with more than 2 leads, it is recommended to use sockets for all transistors and ICs. It may save you a lot of headaches later on.

Drilling & Placement

Print this page and have an adult cut out the drilling template below for you. Tape it to the enclosure to secure it while drilling. Note that the holes are shown slightly smaller than they need to be, so drill out the holes as shown and then step up until they are the correct size for the components.



Hammond 1590B
(bottom/inside view)



Parts Used

- Switchcraft 111X enclosed jacks
- Kobiconn-style DC jack with internal nut

Standard Wiring Diagram

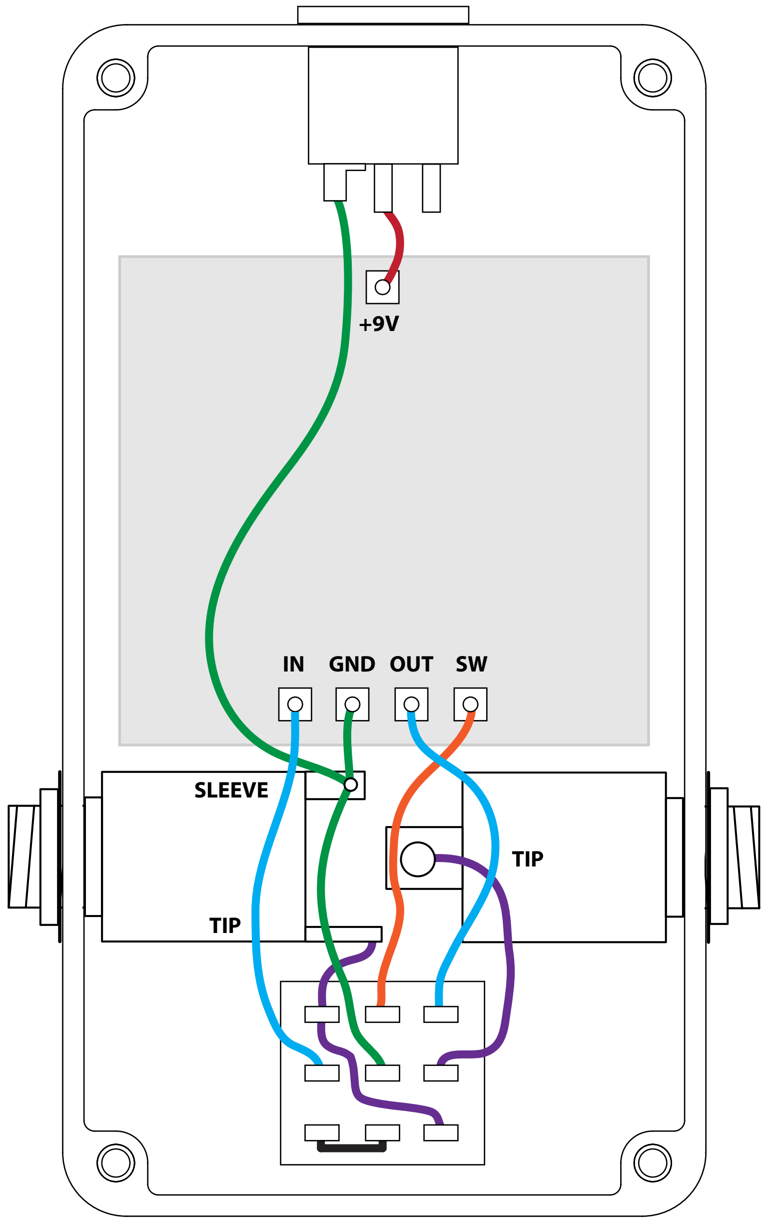
This diagram shows standard true-bypass wiring with a 3PDT switch. When the switch is off, the input of the circuit is grounded and the input jack is connected directly to the output jack.

The **SW** pad is the cathode connection for the LED. This will connect to ground to turn it on when the switch is on. Usage of the on-board LED connection is not required if you have specific placement needs for your enclosure, but's incredibly convenient.

The wiring diagram also makes use of **star grounding** principles where all of the grounds connect to a single ground point (in this case the sleeve of the input jack). This is best practice to avoid added noise caused by improper grounding. The sleeve of the output jack is unconnected.

If using a painted or powdercoated enclosure, **make sure both jacks have solid contact with bare aluminum** for grounding purposes. You may need to sand off some of the paint or powdercoat on the inside in order to make this happen.

Make sure to double-check the markings of the pads on the PCB for your particular project – they are not always in the order shown here!



License / Usage

No direct support is offered for these PCBs beyond the provided documentation. It is assumed that you have at least some experience building pedals before starting one of these. Replacements and refunds will not be offered unless it can be shown that the circuit or documentation are in error. I have in good faith tested all of these circuits. However, I have not necessarily tested every listed modification or variation. These are offered only as suggestions based on the experience and opinions of others.

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