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# AC/DC MULTI-EFFECTS PEDALBOARD

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USER'S GUIDE

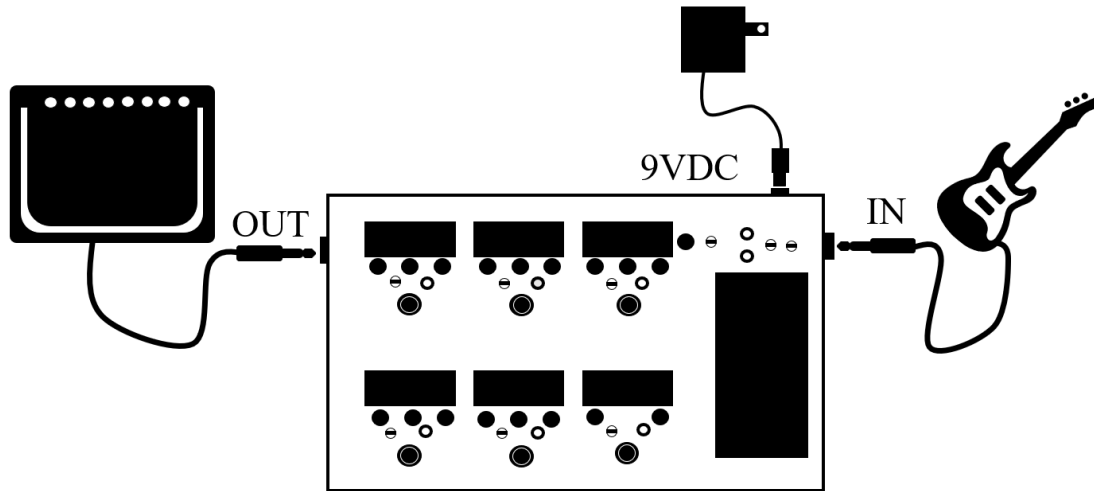
MAY 2022  
OHIO NORTHERN UNIVERSITY  
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# OVERVIEW

The AC/DC Multi-Effects Pedalboard is a unique solution to the common guitarist's normal chain of analog effects. This system allows the user to mix and match up to 6 analog guitar effects at one time, using custom integration of the removable effect-holding cards. These hot-swappable analog circuit cards can be placed in any card slot on the board and are fully controllable by the knobs and switches below that card slot. The system also features a custom expression pedal, which replaces the middle knob of the adjacent effect card (in the bottom right card slot), see Figure 7, and selectable signal routing with the parallel/cascade option, see Figures 5 and 6. This guide is intended to briefly demonstrate how to get started with the custom pedalboard.

# CONNECTIONS

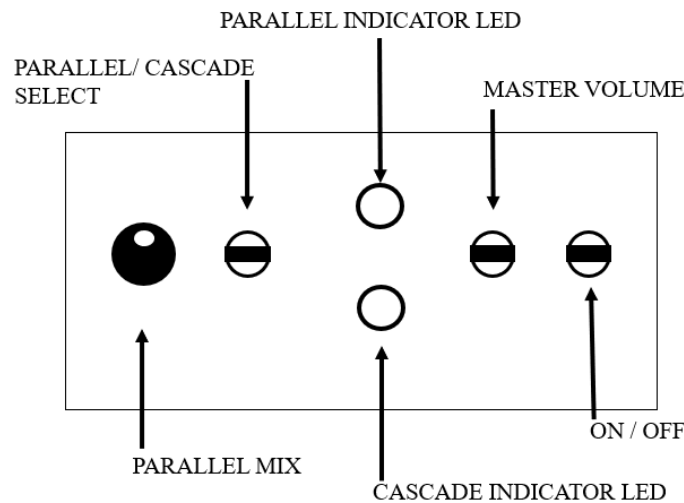
Below is a figure that briefly lays out the pedalboard connections between the guitar, amp, and included 9V external power supply.



**FIGURE 1: SYSTEM LEVEL CONNECTIONS**

# MAIN INTERFACE

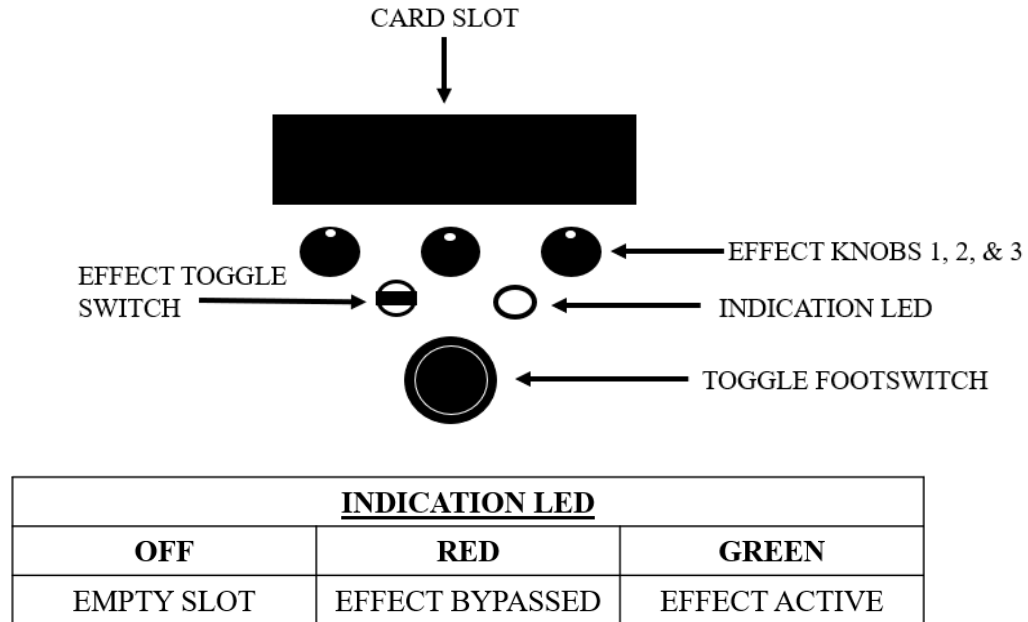
The figure below outlines the main control interface that is above the expression pedal on the pedalboard. These are the main controls for overall system power, volume, and parallel/ cascade signal routing selection.



**FIGURE 2: MAIN INTERFACE CONNECTIONS**

## EFFECT CARD INTERFACE

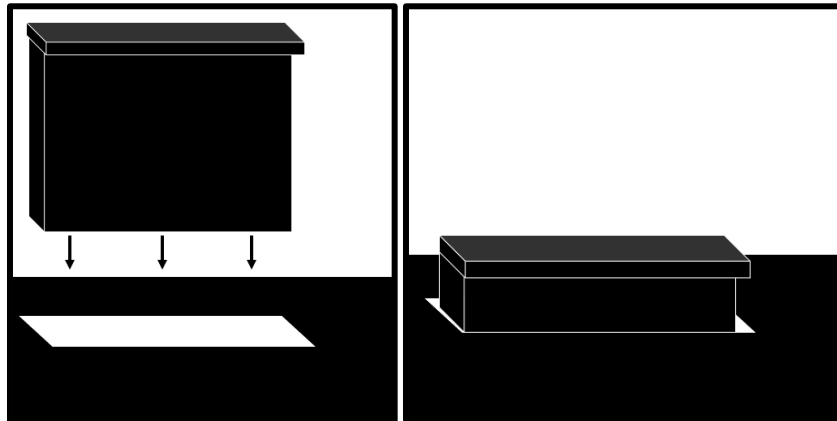
The figure below illustrates the interface that is present on each of the six effect card slots. Note that not all these interface controls will be utilized for each effect circuit. More detail can be found in the “Effect Circuit Cards” section.



**FIGURE 3: EFFECT CARD INTERFACE**

## EFFECT CARD CONNECTION

Connect each effect card to the board by simply sliding the card into the card slot. The indication LED on that card interface will light up when the card is properly connected.



**FIGURE 4: EFFECT CARD CONNECTION**

## CASCADE SIGNAL ROUTING

Cascade signal routing is the standard signal routing for guitar effect pedals. The figure below shows the order of card slot connections in this mode.

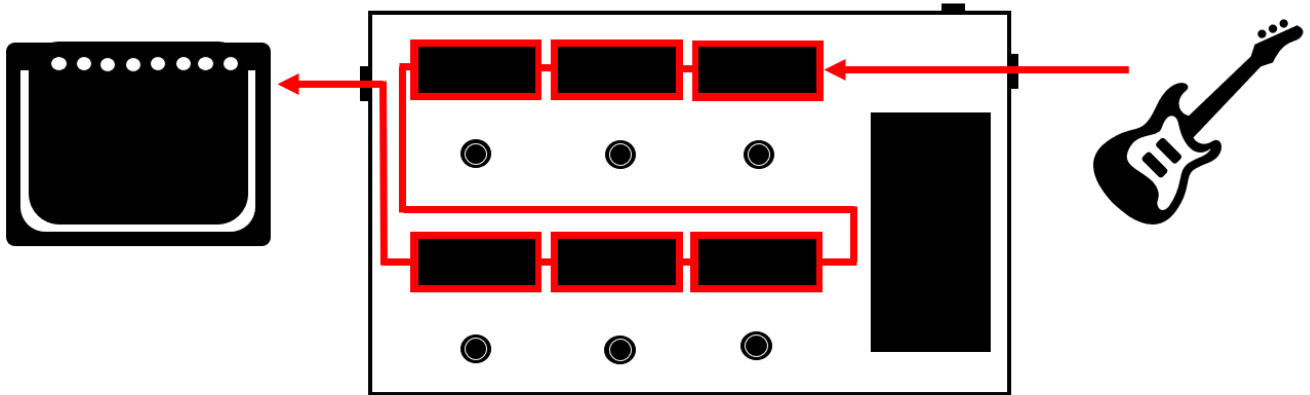


FIGURE 5: CASCADE SIGNAL PATH

## PARALLEL SIGNAL ROUTING

Parallel signal routing allows the input signal to be altered separately by the top and bottom rows of effect cartridges, and then mixed with a summing output. This allows for more unique and customizable sounds. The parallel mix knob shown in Figure 2 allows the user to balance the mix between the top and the bottom rows in this mode.

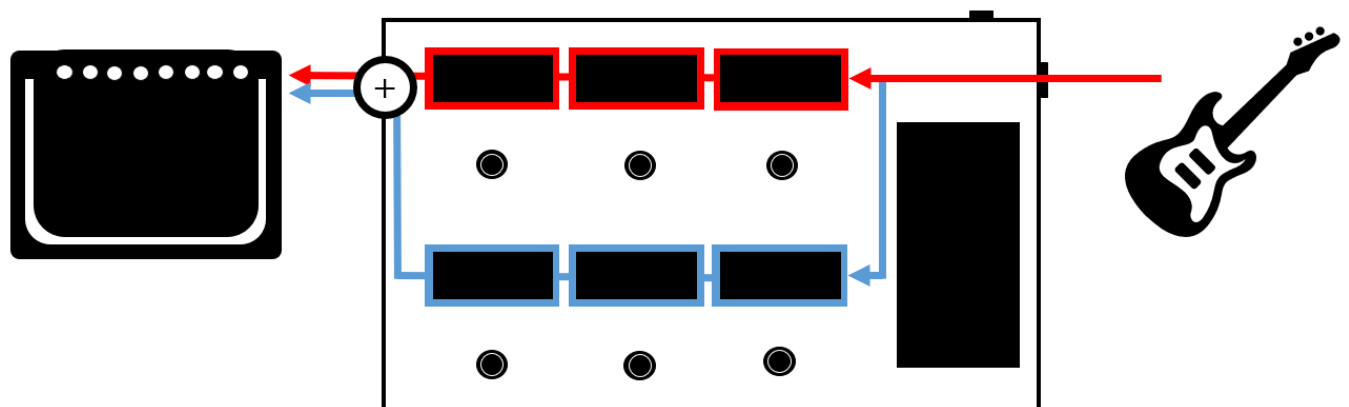
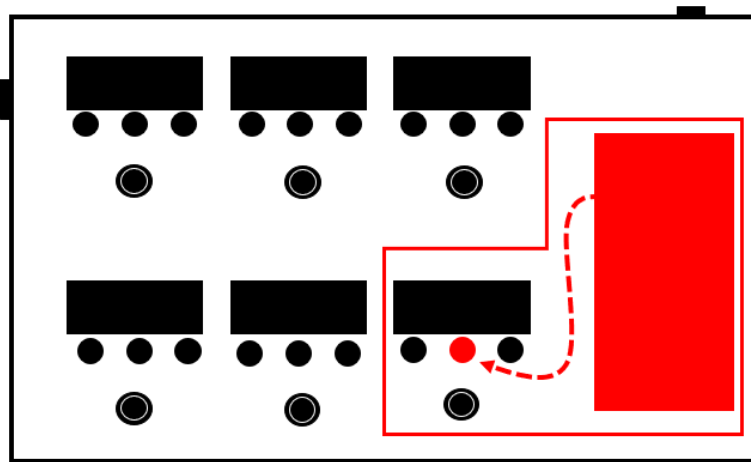


FIGURE 6: PARALLEL SIGNAL PATH





## PEDAL CONNECTION

The figure below illustrates the connection of the expression pedal to the card slot. The expression pedal replaces the Knob 2 potentiometer in the bottom right card slot. Any effect card with a used Knob 2 can be utilized by the expression pedal. See the “Effect Circuit Cards” section for more details on this.







**FIGURE 7:** EXPRESSION PEDAL CONTROL CORRELATION



## EFFECT CIRCUIT CARDS

<b>BOOST</b>		
		 GAIN
		

The boost is a simple effect that is used to increase the gain of the guitar's signal. Most often, this is placed at the beginning of the chain of effects, to scale up the input signal for the other effects to work with.

<b>OVERDRIVE</b>		
 TONE	 GAIN	 LEVEL
	 SOFT CLIPPING	

An overdrive pedal is typically used to simulate the sound of a guitar being played through a tube amplifier. The signal has increased gain but maintains its sinusoidal shape, with a touch of gritty flavor. Soft clipping will add to the grittiness, but lower the overall volume at the output of this effect.

<b>DISTORTION</b>		
 COLOR	 GAIN	 LEVEL
		

A distortion pedal does exactly what it sounds like: distorts the signal to give a heavy-metal style tone. This distortion effect features a gain to boost the signal to the max, as well as two different flavors of distortion.

## EFFECT CIRCUIT CARDS

<b>OCTA-FUZZ</b>		
 FUZZ	 OCTAVE MIX	 LEVEL
	 TOGGLE OCTAVE	

Fuzz is a more aggressive form of distortion where the signal is passed through a set of diodes and amplifiers to change the signal into a more triangular or square shape. This effect also can add a higher octave harmonic by doubling the frequency of the signal.

<b>OCTAVE DOWN</b>		
 COLOR	 OCTAVE MIX	 LEVEL
		





The octave down pedal blends the original guitar signal with a version that is one octave lower. To create a sound an octave lower, the frequency needs to be divided by two. To achieve this output an oscillator is used with a discharging capacitor which in turn adds distortion to the signal.

<b>COMPRESSOR</b>		
 LEVEL	 GAIN	 SUSTAIN
		





A compressor pedal compresses the dynamic range of the signal. It increases the volume of quieter sounds and reduces the volume of louder sounds. It includes a positive feedback loop which allows the pedal to sustain low volumes for a longer period of time.



## EFFECT CIRCUIT CARDS

WAH		
 WIDTH	 WAH	 LEVEL
	 HIGH / LOW	

The wah pedal, typically foot controlled, is essentially the same as the tone knob that is on the body of the guitar. With a foot controlled wah, the tone filtering can be changed back and forth from emphasizing low frequency content to emphasizing higher frequency content, creating a “wah wah wah” effect. This effect card can be placed in another card slot to give a fixed frequency filter.

TREMOLO		
	 SPEED	 LEVEL
		

A tremolo pedal is used to rapidly increase and decrease the volume of the guitar signal, to give the guitar a sense of motion toward and away from the listener.

# GLOSSARY OF EFFECT TERMS

**Color** [Distortion]: This describes the change in the resultant sound of the output of the pedal. The color knob mixes different combinations of various types of diodes to create a unique blend of clipping on the signal.

**Fuzz** [Octa-Fuzz]: Fuzz is a very harsh form of distortion.

**Gain** [Multiple]: This determines the overall amplitude, and thus, signal strength, of the guitar signal. Higher gain allows for a wider range of signal shaping.

**High/Low** [Wah]: This changes the resonant peak of the wah effect from being in the upper frequency range to the lower frequency range of the guitar.

**Tone** [Overdrive]: Tone typically is in the form of a frequency filter, where higher pitches can either be smoothed out for a “warmer” tone or emphasized for a “sharper” tone.

**Level** [Multiple]: Level is simply the output volume of the particular effect.

**Octave Mix** [Multiple]: This knob determines how much of the added octave signal is present in the output compared to the original frequency signal.

**Soft Clipping** [Overdrive]: Soft clipping is a smoother style of distortion, where the signal experiences a curve in shape, rather than a hard distortion where there is abrupt reshaping.

**Speed** [Tremolo]: This determines how quickly the guitar sound pulses in and out in the tremolo effect. For this effect, the range is about 3 to 15 Hz.

**Sustain** [Compressor]: Sustain determines how long a note is held after the guitar is done being played.

**Toggle Octave** [Octa-Fuzz]: When flipped on, this switch will enable the octave-up effect of the octa-fuzz. Disabling it means that the pedal only produces a fuzz effect.

**Wah** [Wah]: The wah pedal creates a filter with an emphasis on a specific frequency. Moving the knob moves the resonant peak of the filter to emphasize a different frequency. Commonly used with an expression pedal to move the peak back and forth on the fly.

**Width** [Wah]: The width knob determines how large the range of emphasized frequencies is in the wah effect.