SEISMIC/SHIFT

The Seismic Shift is a JFET boost based on one of the earliest effects to ever be used on stage. This pedal adds subtle color to a guitar's sound while maintaining the natural tone of the guitar. It packs a serious punch that can cut through any mix when soloing or whenever some extra “umph” is required. The Seismic Shift pairs nicely with amps and other pedals. Place it ahead of tubes, preamps, overdrives, distortions, and fuzz pedals to shift your gear onto a new level.

The Seismic Shift pedal kit is the introduction to the Nexus Series from Mod Electronics. This series features a PCB base rather than the Mod Electronics’ traditional point-to-point wiring kits to offer builders an even wider variety of effects to build. The Seismic Shift kit is designed for all skill sets and is the perfect first build for those unfamiliar with PCB construction.

The pedal operates on both 9VDC and 18VDC. A center negative power supply is required for use (not included w/ kit). There is no battery connection. When using 9VDC the pedal draws 8mA. When using 18VDC the pedal draws 16mA. The enclosure size is a standard 1590B (4.4" x 2.4" x 1.2").

Table of Contents

Required Tools

Adjustable Wrench
Cutters
Lead Formers
Needlenose Pliers
Phillips Head Screwdriver
Ruler
Small Flat Head Screwdriver
Solder
Soldering Iron
Wire Stripper
Xacto Knife of Similar Cutting Tool

Optional Recommended Tools

Anti Static Wrist Strap
Desoldering Braid
Desoldering Pump
Helping Hands
Multimeter
Oscilloscope
PCB Vise
Signal Generator
Tweezers

For a full-color digital copy of these instructions please visit https://www.modelectronics.com/

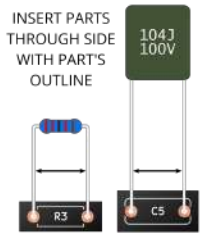
Notes on PCB Construction

This section is intended for those unfamiliar with or new to constructing circuit boards.

Lead Spacing

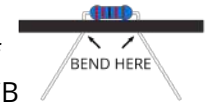
Components are made in two common mounting types, radial and axial. Radial components feature leads that are parallel and oriented in the same direction whereas the leads of axial components protrude from each end of the component oriented in opposite directions.

These parts will have corresponding footprints on the PCB marked with text. C_ designates a capacitor and R_ is used for resistors. The BOM (bill of materials) will cover all of the designators. Each footprint has a specific spacing. Footprints for the radial parts will match the spacing of that part but axial parts require preparation to fit. For the resistors in this kit you can simply use your finger to push the lead until it is perpendicular where the lead meets the part. Other axial parts will have lead spacing that are referenced in the instructions. Use a lead former tool on these parts.

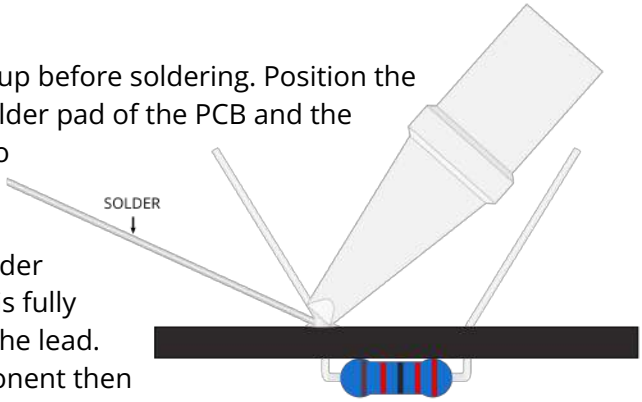


Soldering

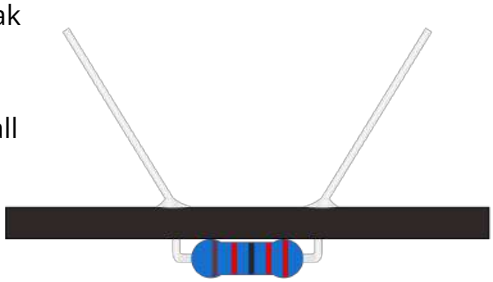
After inserting the PCB into its footprint make sure that the component is sitting flush against the PCB. Hold it in place and bend the leads on the opposite side of the PCB away from the component. This will keep the component flush to the PCB when soldering.

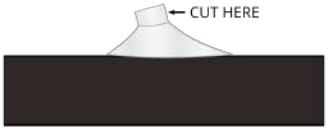


Make sure your soldering iron is fully warmed up before soldering. Position the tip of the iron so that it is touching both the solder pad of the PCB and the lead of the component. Slowly feed solder onto the pad. The solder should flow evenly across the pad and will slope up onto the component lead. You may need to move the end of the solder strand around the pad to ensure that the pad is fully coated in solder and that it is also bonding to the lead. Repeat this process for each lead of the component then use a pair of cutters to snip the lead directly above the peak of the solder.

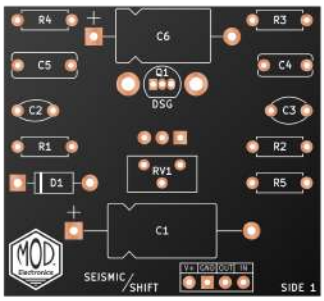


Ideally the solder will flow through the pad hole and a small amount will reach the opposite side of the PCB. This can take some practice to master and is not critical. Focus on consistently achieving full coverage of the pad with slight slopes surrounding the lead first.

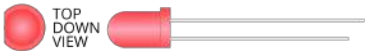
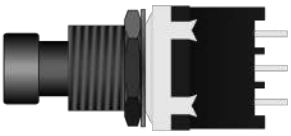
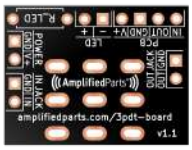




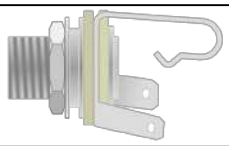
Main PCB Parts List

	R-N100	Qty 1	100Ω 1/4W Metal Film Resistor
	R-N22K	Qty 1	22KΩ 1/4W Metal Film Resistor
	R-N100K	Qty 2	100KΩ 1/4W Metal Film Resistor
	R-O1M	Qty 1	1MΩ 1/4W Metal Film Resistor
	P-Q1N5817	Qty 1	1N5817 Schottky Diode
	C-ET50-50-MOD	Qty 1	50uF Electrolytic Capacitor
	C-ET250-25-MOD	Qty 1	250uF Electrolytic Capacitor
	C-D100N-50	Qty 1	100nF Ceramic Capacitor
	C-D100-3000	Qty 1	100pF Ceramic Capacitor
	C-PEID047-100	Qty 1	47nF Film Capacitor
	C-PEID1-100	Qty 1	100nF Film Capacitor
	P-QPF5102	Qty 1	PF5102 JFET, N-Channel
	R-VT96Y-5K	Qty 1	5KΩ Trimmer, 3296Y
	R-VAV-B500K	Qty 1	B500KΩ 9mm PCB Mount Potentiometer
	K-902-BOARD	Qty 1	Seismic Shift Main PCB

3PDT PCB Parts List

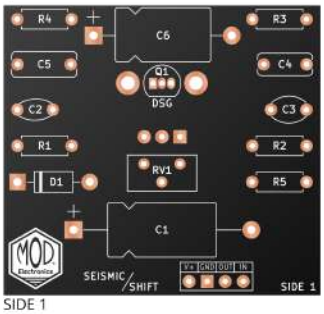
	P-L352	Qty 1	Red 5mm Diffused LED
	R-N1K	Qty 1	1KΩ 1/4W Metal Film Resistor
	P-H501-L-BLK	Qty 1	Soft Click 3PDT Footswitch
	P-PC-3PDT-BOARD	Qty 1	3PDT PCB

Enclosure Parts Lists

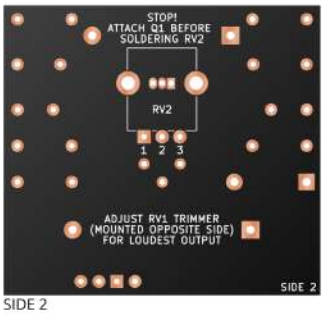
	P-L710-RED	Qty 1	Red LED Lens
	P-JB-IN-U	Qty 1	Low Profile DC Barrel Jack
	W-RN-11	Qty 2	Mono 1/4" Jack
	P-K382B	Qty 1	Black Skirted Knob with Arrow
	S-W3024TC-BK-50	3 ft	24AWG Stranded Top Coat Wire
	P-H1590BCE-BK	Qty 1	Black 1590B Enclosure
	K-902-LABEL	Qty 1	Seismic Shift Sticker

PCB BOM's

Seismic Shift PCB



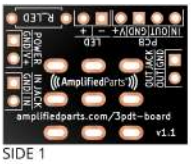
SIDE 1



SIDE 2

Part	Value	Type
R1	100Ω	1/4W Metal Film Resistor
R2	100KΩ	1/4W Metal Film Resistor
R3	1MΩ	1/4W Metal Film Resistor
R4	22KΩ	1/4W Metal Film Resistor
R5	100KΩ	1/4W Metal Film Resistor
D1	1N5817	Schottky Diode
C1	250uF	Electrolytic Capacitor
C2	100nF	Ceramic Capacitor
C3	100pF	Ceramic Capacitor
C4	47nF	Film Capacitor
C5	100nF	Film Capacitor
C6	50uF	Electrolytic Capacitor
RV1	5KΩ	Trimmer, 3296Y
RV2	B500ΩK	9mm PCB Mount Potentiometer
Q1	PF5102	JFET, N-Channel

3PDT PCB



SIDE 1

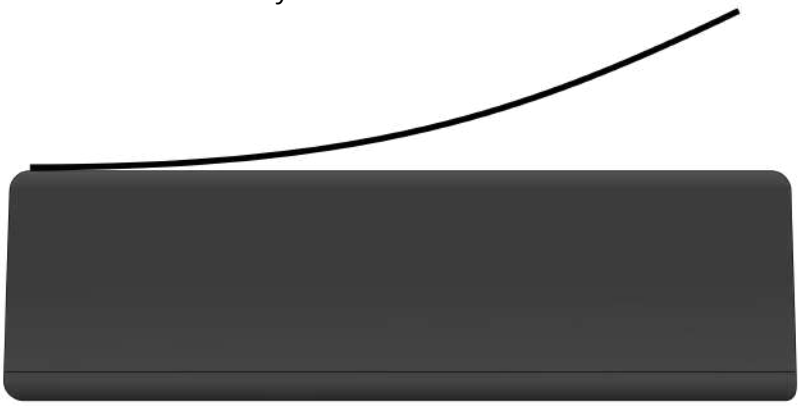
SIDE 2

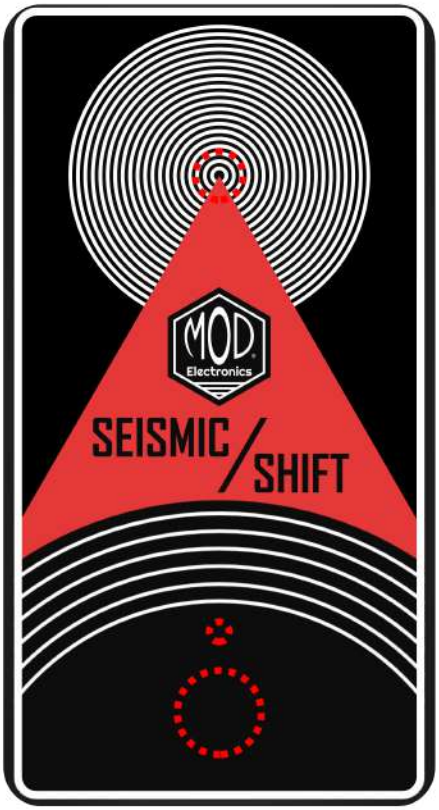
Part	Value	Type
R_LED	1KΩ	1/4W Metal Film Resistor
LED	Red	5mm Diffused Red LED
Footswitch	3PDT	Black Soft Click 3PDT Footswitch

Applying The Sticker

Locate the top of the pedal as well as the top of the sticker. The cover of the instructions for your kit will have an image of the pedal that can be used for reference.

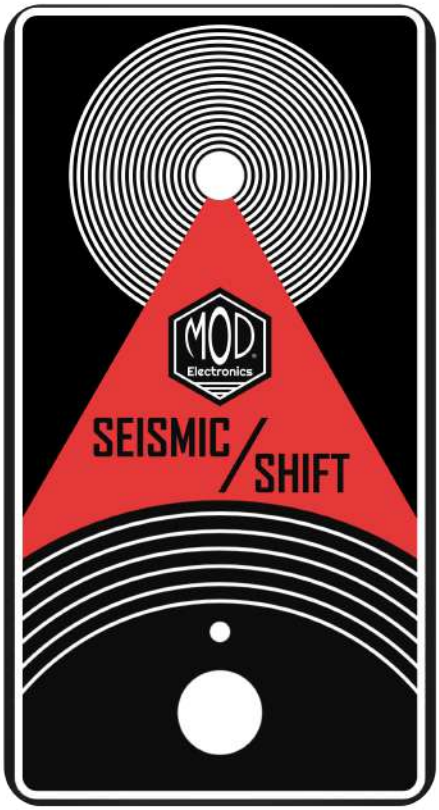
Peel the backing from the sticker. Carefully line up the top edge of the sticker with the top of the pedal. Try to line up the center of the circles to the center of the potentiometer hole. Press down to apply the sticker only to the edge. Run a finger across the edge to push any air out from beneath the sticker. Continue this motion as you work your way down the pedal until the sticker is fully attached.





Locate the holes beneath the sticker and depress them using a fingertip. Be sure that the area of the sticker surrounding the holes is fully adhered to the surface.

With an Xacto knife or similar tool, carefully pierce the sticker in the center of each hole. Carefully work the knife from the center of the hole to the edge and begin cutting fully around the edge until the sticker has been fully cleared from the hole.

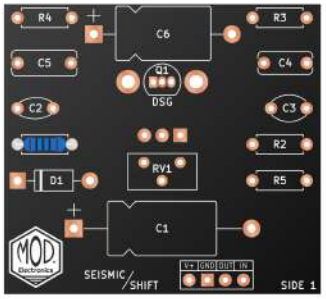


Main PCB Construction

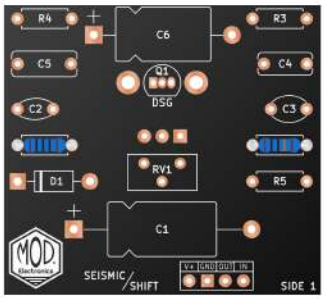
Locate the Seismic Shift Main PCB. The following steps will cover the placement and soldering of all parts that are mounted on this PCB. Use the BOM and Parts List as references.

Part 1: Resistors

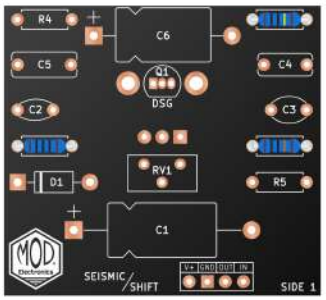
Locate the 100Ω resistor. Its color bands are brown, black, black, black, brown. Insert and solder this resistor at R1.



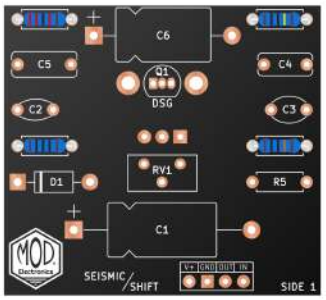
Locate one of the two 100KΩ resistors. Their color bands are brown, black, black, orange, brown. Insert and solder this resistor at R2.



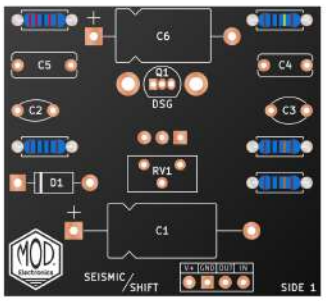
Locate the 1MΩ resistor. Its color bands are brown, black, black, yellow, brown. Insert and solder this resistor at R3.



Locate the 22KΩ resistor. Its color bands are red, red, black, red, brown. Insert and solder this resistor at R4.



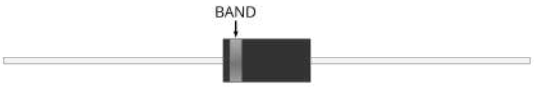
Locate the remaining 100KΩ resistor. Insert and solder at R5.

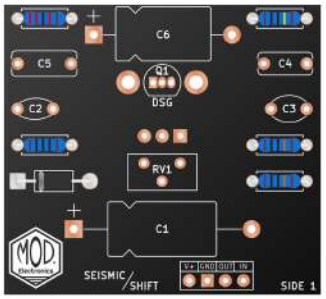


Main PCB Construction

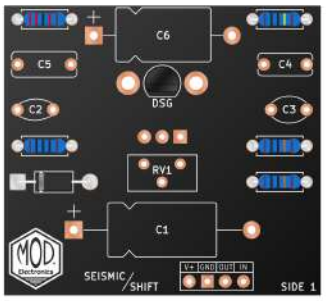
Part 2: Solid State Components

Locate the 1N5817 diode. When inserting the diode, note the orientation of the band. This should match the orientation on the silkscreen. Use the .4 notch on the lead formers. Insert and solder this diode at D1.



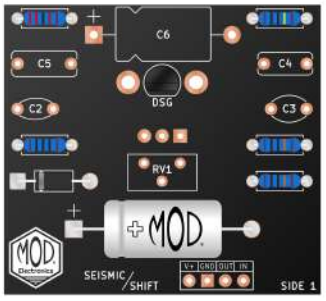


Locate the PF5102 JFET. When placing the JFET, note the orientation of the flatted side. This should match the orientation on the silkscreen. Take extra care to avoid bridging the solder pads. Begin with the middle pad first then solder the two outside pads. Insert and solder this JFET at Q1.

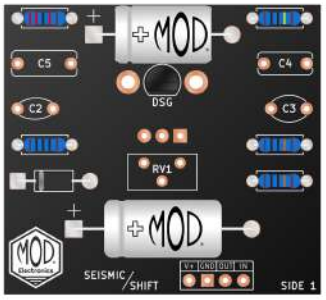


Part 3: Axial Capacitors

Locate the 250uF electrolytic capacitor. When inserting the capacitor, note the orientation of the positive lead. This should match the orientation on the silkscreen. Use the 1.0 notch on the lead formers. Insert and solder this capacitor at C1.

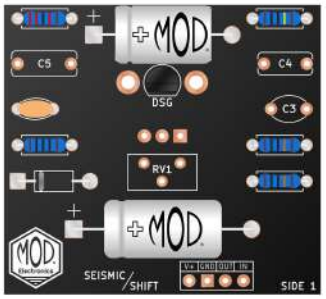


Locate the 50uF electrolytic capacitor. When inserting the capacitor, note the orientation of the positive lead. This should match the orientation on the silkscreen. Use the .8 notch on the lead formers. Insert and solder this capacitor at C6.



Part 4: Radial Capacitors

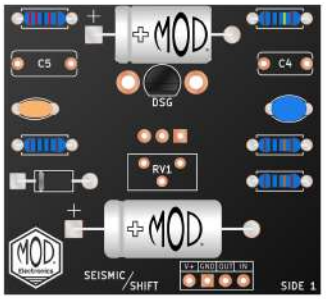
Locate the 100nF ceramic capacitor. This is the circular capacitor marked 104. Insert and solder this capacitor at C2.



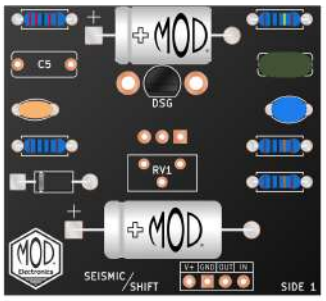
Main PCB Construction

Part 4: Radial Capacitors (cont.)

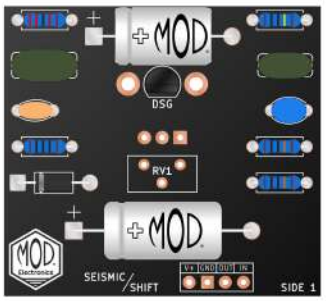
Locate the 100pF ceramic capacitor. This is the circular capacitor marked 101. Insert and solder this capacitor at C3.



Locate the 47nF film capacitor. This is the rectangular capacitor marked 473. Insert and solder this capacitor at C4.

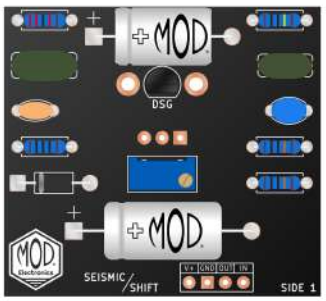


Locate the 100nF film capacitor. This is the rectangular capacitor marked 104. Insert and solder this capacitor at C5.

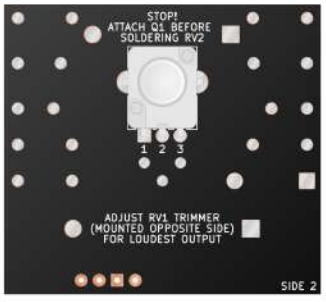


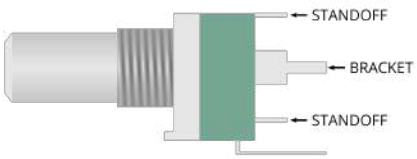
Part 5: Potentiometers

Locate the 5KΩ 3296Y 25-turn trimmer. Insert and solder this trimmer at RV1.



Locate the B500KΩ 9mm potentiometer. Flip the PCB to show Side 2. When inserting the potentiometer, make sure that the two outside brackets are fully inserted and that the standoffs are flush with the PCB. Make sure the Q1 leads are neatly soldered and trimmed before placing. Insert and solder the potentiometer at RV2.



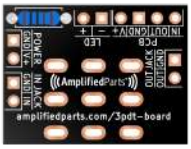


3PDT PCB Construction and Enclosure Parts

Locate the 3PDT PCB. The following steps will cover the placement and soldering of all parts that are mounted on this PCB. Use the BOM and Parts List as references.

Part 1: Board-Mounted Components

Locate the 1KΩ resistor. Its color bands are brown, black, black, brown, brown. Insert and solder this resistor at R_LED.

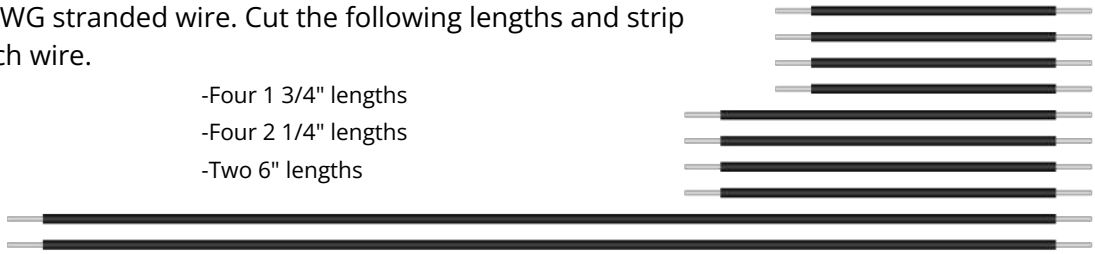


Locate the 3PDT footswitch. Flip the pcb to show side 2 and insert the footswitch into the 9 pin footprint. Solder all 9 pins to the PCB.

Part 2: Wire Preparation

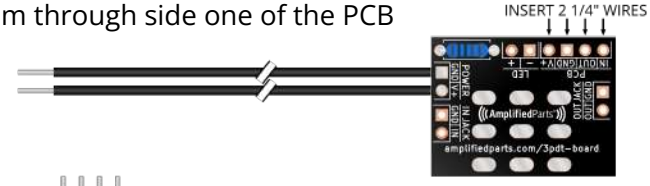
Locate the 24AWG stranded wire. Cut the following lengths and strip the ends of each wire.

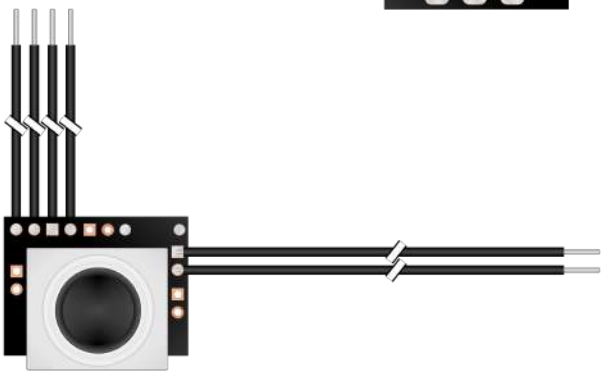
-Four 1 3/4" lengths
-Four 2 1/4" lengths
-Two 6" lengths



Take the two 6" lengths of wire and insert them through side two of the PCB at the POWER GND and POWER V+ holes. Solder the two wires to the PCB.

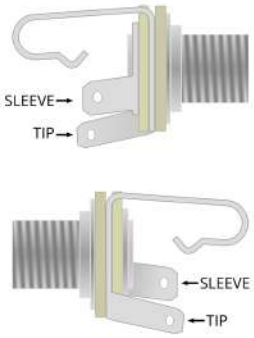
Take the four 2 1/4" lengths of wire and insert them through side one of the PCB at the PCB IN, PCB OUT, PCB GND, and PCB V+ holes. Solder the four wires to the PCB.





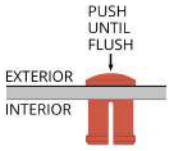
3PDT PCB Construction and Enclosure Parts (cont.)

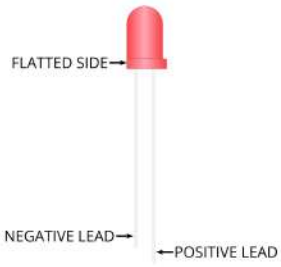
Locate the two 1/4" jacks. Solder the four 1 3/4" wires to the sleeve and tip of each jack.



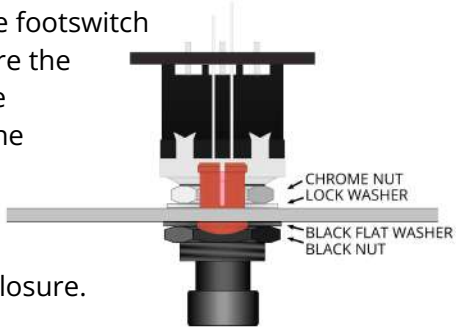
Part 3: Mounting to the Enclosure

Locate the red LED, the lens, and 1590B enclosure. Insert the LED lens into the small hole directly above the large footswitch hole. Some force may be required. Slide the LED into the lens. The LED will lightly snap into place when fully inserted. Orient the LED so that the positive lead (longer lead) is on the left side of the enclosure and the negative lead (shorter lead) is on the right side when viewed from below.



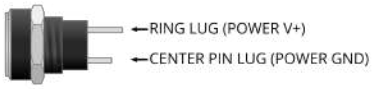


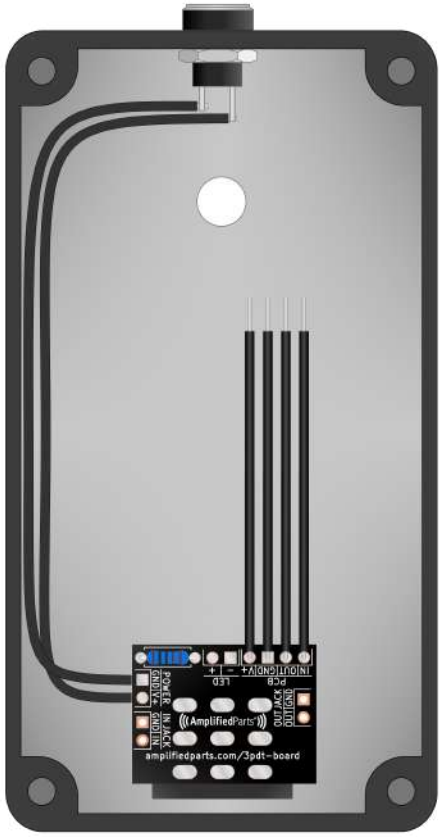
Remove the mounting hardware from the 3PDT footswitch except for the serrated lock washer and chrome nut. Make sure that the chrome nut is threaded to the bottom of the footswitch bushing. Carefully guide the LED leads through the LED + and LED - holes while inserting the footswitch bushing through the footswitch mounting hole at the bottom of the enclosure. The positive lead goes through the LED + hole and the negative lead goes through the LED - hole. When fully inserted slide the black metal flat washer over the bushing of the footswitch then use the black nut to secure the footswitch to the chassis. Once secured, check to make sure the LED leads are straight, that the LED is fully inserted into the lens and that the lens is flush to the exterior of the enclosure. Solder the LED to the PCB.



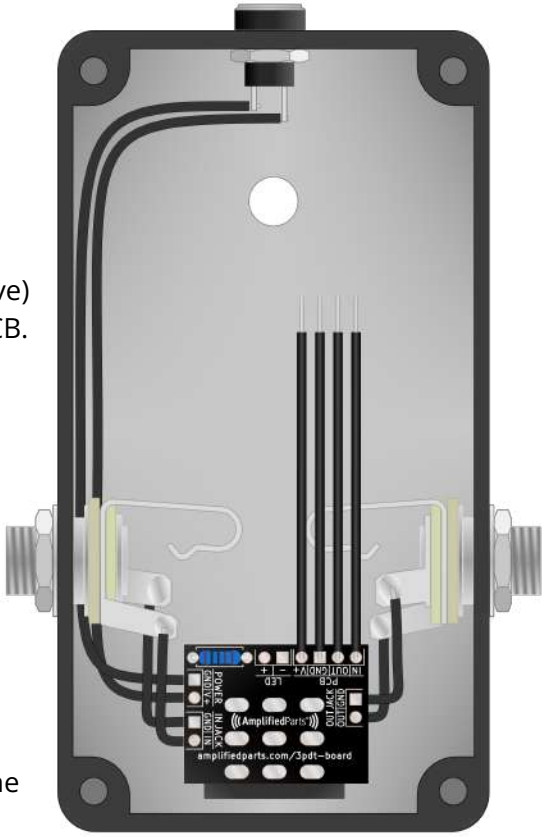
3PDT PCB Construction and Enclosure Parts (cont.)

Locate the DC jack and mount it in the hole on the top side of the enclosure. Run the two 6" wires connected to the POWER GND and POWER V+ along the bottom left edge inside the enclosure then connect the V+ wire to the longer lug and the GND wire to the shorter lug. Solder both lugs.





Locate the two 1/4" jacks. Remove the nut and washer from each jack. Lift the PCB wires (IN, OUT, GND, and V+) away from the chassis so the two 1/4" jack mounting holes on the left and right sides of the chassis are easily accessed. Insert the jacks in each hole as shown to the right. Make sure that the POWER GND and POWER V+ wires connected to the DC jack are tucked beneath the left 1/4" jack. Slide the washer over the bushing and secure each jack with its nut. Check to make sure that the lower lug of each jack is not touching against the chassis. If so, slightly rotate the jack until it is fully clear of the chassis.



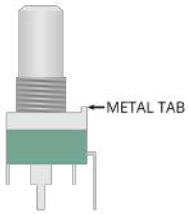
Using needle nose pliers:

- Take the wire connected to the lower lug of the left jack (sleeve) and push it up through the IN JACK GND hole on the 3PDT PCB. Solder this wire onto the PCB.
- Take the wire connected to the upper lug of the left jack (tip) and push it up through the IN JACK IN hole on the 3PDT PCB. Solder this wire onto the PCB.
- Take the wire connected to the lower lug of the right jack (tip) and push it up through the OUT JACK OUT hole on the 3PDT PCB. Solder this wire onto the PCB.
- Take the wire connected to the upper lug of the right jack (sleeve) and push it up through the OUT JACK GND hole on the 3PDT PCB. Solder this wire to the PCB.

3PDT PCB Construction and Enclosure Parts (cont.)

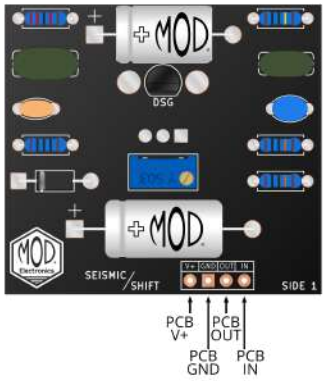
Part 4: Mounting The Main PCB

Remove the nut and washer from the 9mm pot mounted to the main PCB. Grip the small metal tab with a pair of pliers and gently rock the tab until it snaps off.



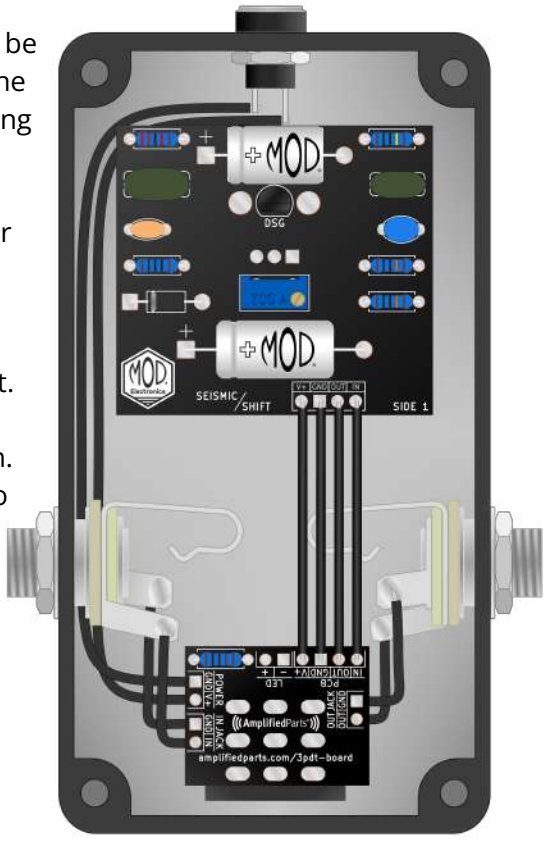
Before mounting the main PCB to the chassis connect the four remaining wires from the 3PDT PCB through side 1 of the main PCB.

- PCB V+ connects to V+ on the main PCB.
- PCB GND connects to GND on the main PCB.
- PCB OUT connects to OUT on the main PCB.
- PCB IN connects to IN on the main PCB.



Make sure that each wire is connecting straight across for each connection as shown in the image below. Solder the four wires to the main PCB.

Once the last four wires have been soldered, the main PCB can be mounted. Insert the potentiometer through the hole towards the top of the enclosure. If the longer lug of the DC jack is obstructing the main PCB, bend it away from the shorter lug of the DC jack until the main PCB can clear it. Slide the flat washer over the bushing and secure the pot with its nut. Make sure that the four wires connecting the two PCB's are positioned up and over the right 1/4" jack.



The pedal is nearly complete. Secure the knob to the pot's shaft. If installed correctly, the min and max rotational point of the knob should line up with the edges of the red triangular section. Leave the back plate off for now since the trimmer still needs to be calibrated.

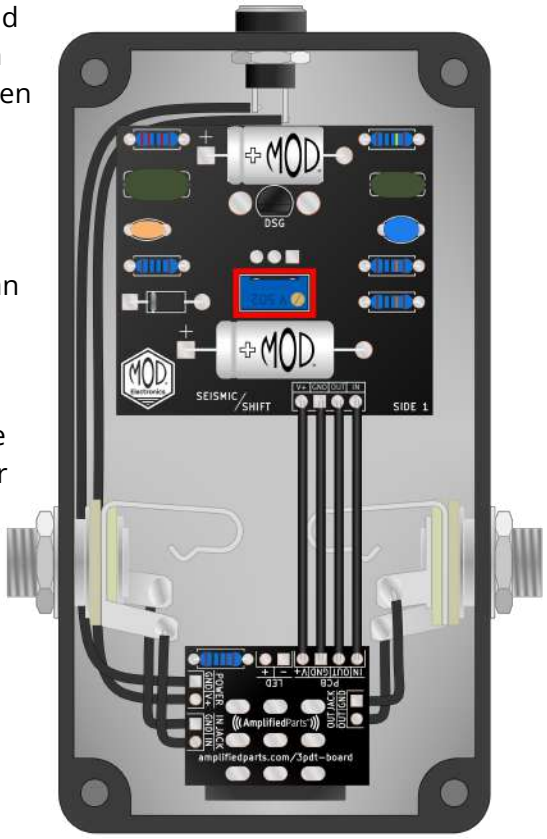
FULLY COUNTER-CLOCKWISE

FULLY CLOCKWISE

Calibration

Calibrating By Ear

Locate the 5KΩ trimmer on the main PCB. With a small flat head screwdriver rotate the trimmer fully clockwise. This is a 25 turn trimmer. A quiet clicking sound will occur once the end has been reached.



Plug a guitar into the pedal's input and connect the output to an amp or other device for listening. Plug a 9VDC center negative power supply into the DC jack. Engage the effect with the footswitch and set the volume knob for a clean sound. Avoid overdriving the amp with the pedal. You may need to lower the volume knob during the calibration process to avoid clipping or overdriving in the amp.

Strum an open string and begin adjusting the trimmer counter-clockwise. Try to keep a consistent volume with your strumming hand. As the trimmer is rotated counter-clockwise the volume will slowly increase in the pedal.

Keep rotating until the volume begins to decrease. Once the decrease occurs, start rotating the trimmer clockwise and try to dial in the loudest clean signal. This does not need to be exact and if you prefer the sound in one direction or the other feel free to leave it as is. The pedal cannot be harmed by setting the bias differently than intended.

Calibrating w/ Scope and Signal Generator

Adjusting the trimmer using an oscilloscope and signal generator will follow a similar procedure as tuning by ear. Send a sine wave to the input of the pedal. Make sure the signal is low enough to not cause clipping in the pedal. ~50mV RMS works well. Attach the oscilloscope to the pedal's output.

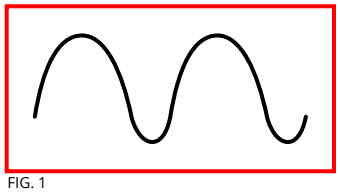


FIG. 1

Set the trimmer to the fully clockwise position. Connect the power supply and engage the effect with the footswitch. Adjust the volume knob and oscilloscope to get a stable image of the waveform.

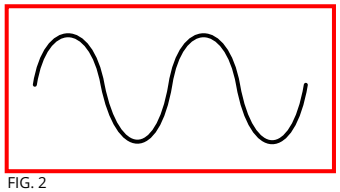


FIG. 2

The signal should look similar to the image in fig. 1. This means that the bias is too low. Adjust the trimmer counter-clockwise until it reaches a near-perfect sine wave like fig. 2. This will coincide with the largest peak to peak setting for the trimmer. If the signal begins to look like fig. 3, the bias is too high and the trimmer should be rotated clockwise.

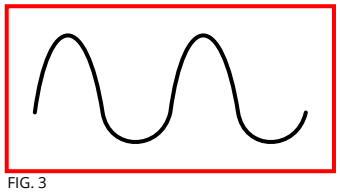
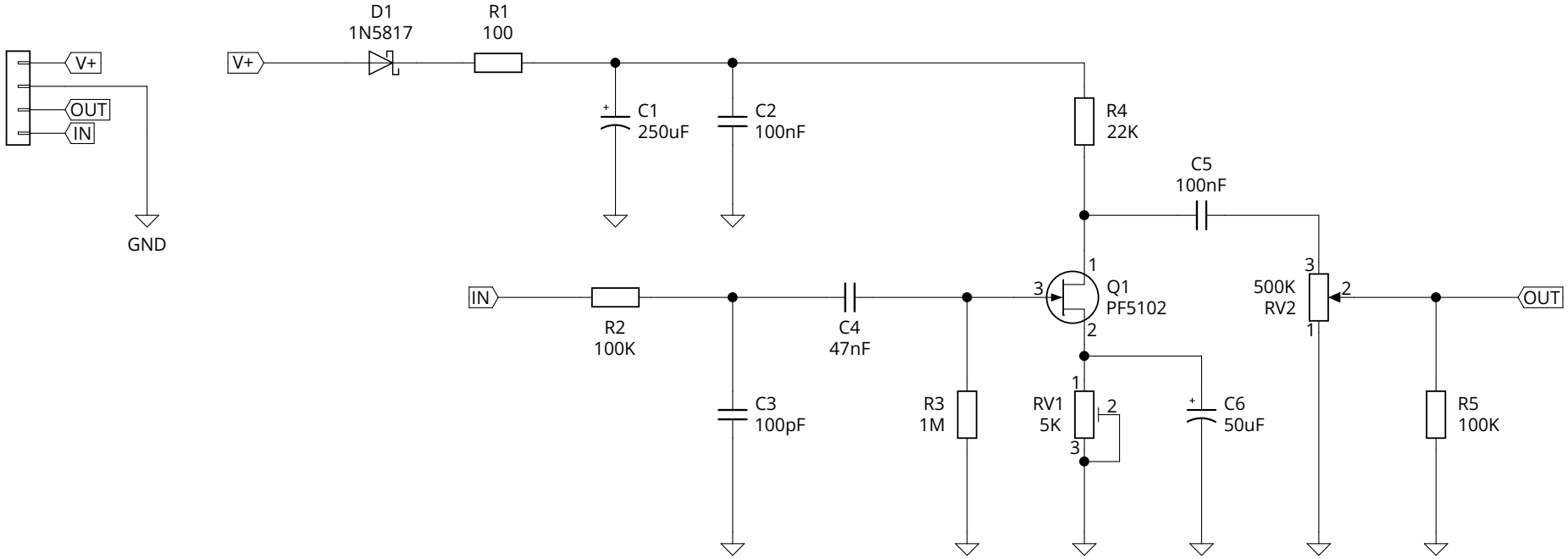


FIG. 3



Seismic Shift (K-902)
Main PCB Schematic