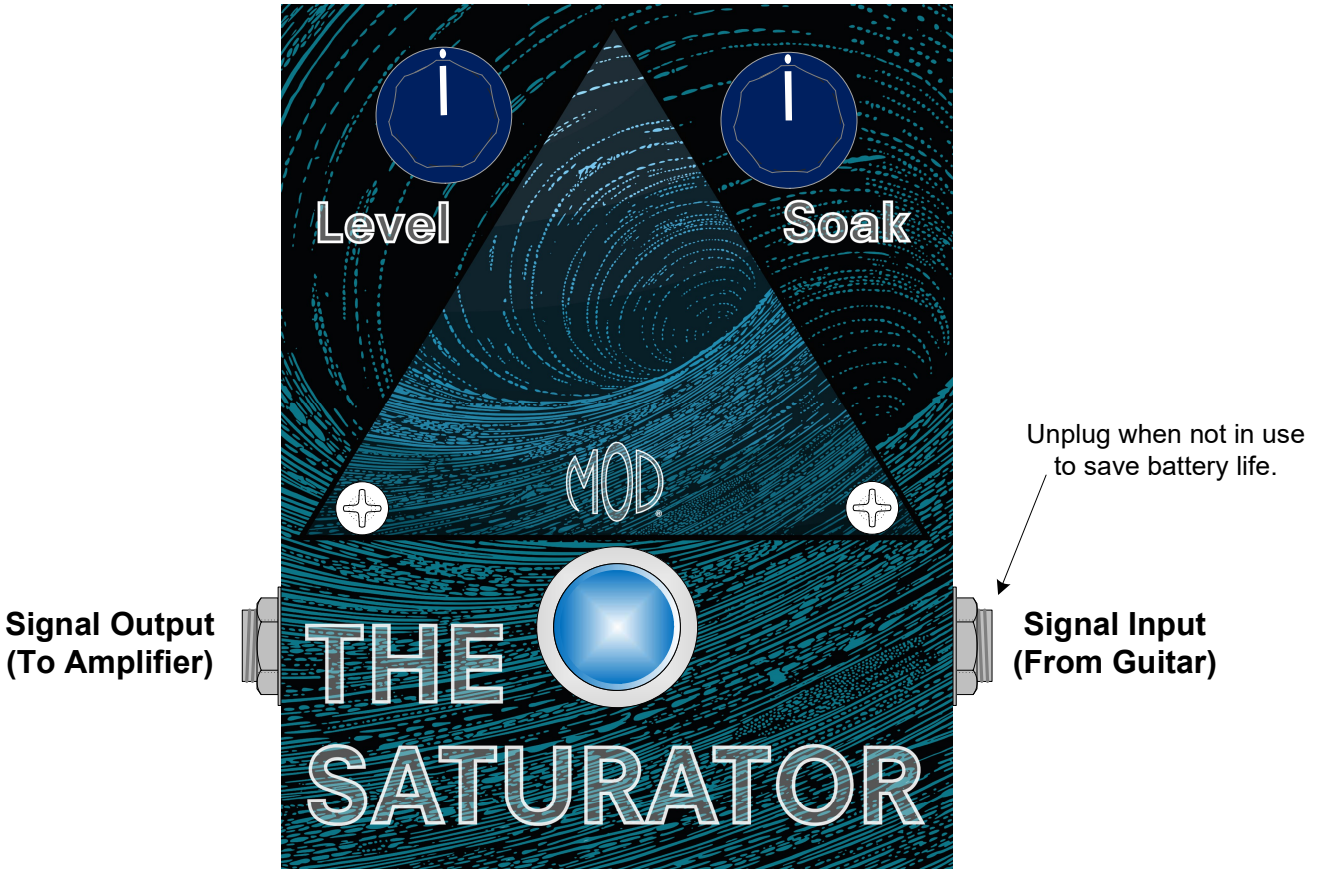
THE SATURATOR (K-999)



Use these instructions to learn:

- How to build an effects pedal for overdrive.

The Saturator is an overdrive pedal that can cover a wide range of gain effects transitioning smoothly from a massive clean boost to a warm and sustained distortion with the turn of a knob. The saturation is controlled with the Soak knob which dials in the amount of symmetrical soft-clipping applied to the guitar signal. When fully counter clockwise, the signal is unaffected and clean. Rotating the knob clockwise will incrementally increase the soft-clipping morphing from a clean signal through subtle to heavy overdrive sounds and straight into distortion territory. The Level knob sets the overall volume of the clean or saturated output. Unity gain is roughly at 8 o'clock. With the Soak set to clean, rotating the knob clockwise will increase the level to upwards of 30dB.

Warning: This circuit was designed for use with a 9V battery or a center negative 9V DC power supply only.

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ASSEMBLY DRAWINGS (6 Drawings) ……9, 10, 11
These are the last 3 pages. They should be separated and used as a reference to help assemble the kit correctly.

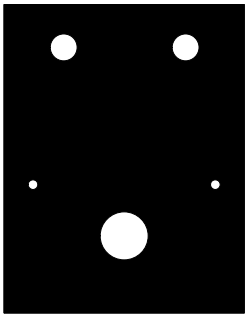
TOOL LIST

- Wire Strippers
- Needle Nose Pliers
- Hex Key (Allen Wrench)
- Cutting Pliers
- Desoldering Pump
- Solder (60/40 rosin core)
- Soldering Station
- Phillips Head Screwdrivers
- Slotted tip screwdrivers (3 mm tip)
- Channellock Pliers (or similar type)
- Ruler
- Hobby Vise (or other means to secure box while working)
- Exacto knife or similar cutting tool

PARTS LIST 1

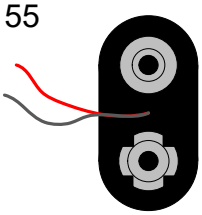
Stranded Wire (22 AWG) - Red
K-PUL1569 (3 FT)

Enclosure
P-H1590BBCE-BK (1)

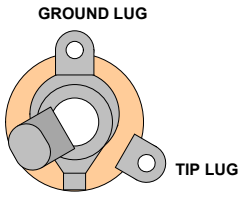


Knobs
P-K344-DKBU (2)

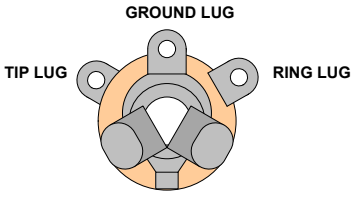
Battery Clip
S-H155 (1)



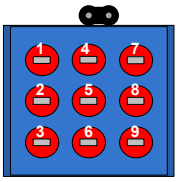
¼" Mono Jack (Output Jack)
W-SC-11 (1)



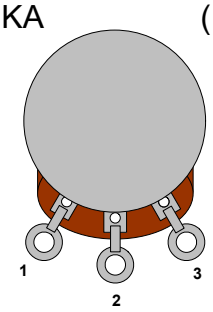
¼" Stereo Jack (Input Jack)
W-SC-12B (1)



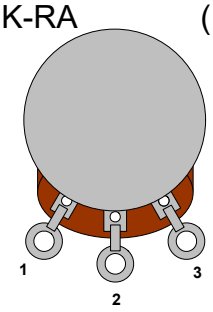
3PDT LED Foot Switch
P-H590-B (1)



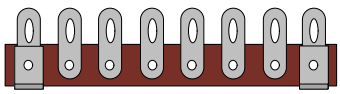
100kΩ Audio Taper Potentiometer
R-V38-100KA (1)



500kΩ Reverse Audio Taper Potentiometer
R-V38-500K-RA (1)



Terminal Strip with 8 Terminals
P-0802H (1)



DC Power Jack
S-H750 (1)

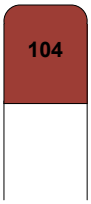
4-40 Screw (1/4" long)
S-HS440-14 (2)

4-40 Nut
S-HHN440 (2)

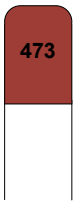
4-40 Lock Washer
S-HLW4 (2)

PARTS LIST 2

0.1μF Capacitor 100V
C-PEID1-100 (1)

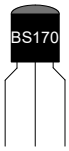


0.047μF Capacitor 100V
C-PEID047-100 (1)



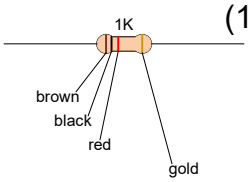
10μF Polarized Capacitor 50V
C-ET10-50 (2)

N-Channel MOSFET (BS170)
P-QBS170 (1)

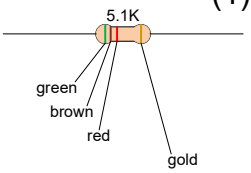


Caution: MOSFETs can easily be damaged by static electricity or excessive heat. Handle and solder with care.

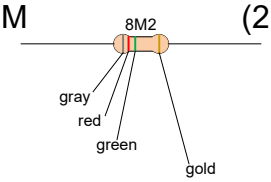
1KΩ Resistor ½ W
R-A1K (1)



5.1kΩ Resistor ½ W
R-A5D1K (1)



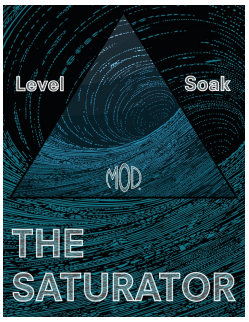
8.2MΩ Resistor ½ W
R-A8D2M (2)



1N4741A 11V Zener Diode
P-Q1N4741A (1)

1N4148 General Purpose Diode
P-Q971 (4)

The Saturator Sticker
(1)

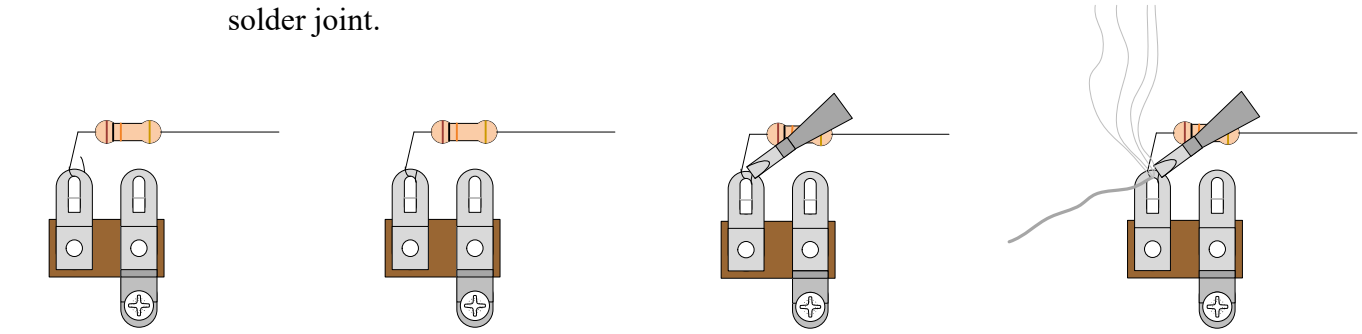


SOLDERING TIPS

It is important to make a good solder joint at each connection point. A cold solder joint is a connection that may look connected but is actually disconnected or intermittently connected. (A cold solder joint can keep your project from working.)

Follow these tips to make a good solder joint. *Take your time with each connection and make sure that all components are connected and will remain connected if your project is bumped or shaken.*

1. Bend the component lead or wire ending and wrap it around the connection point.
   - Make sure it is not too close to a neighboring component which could cause an unintended connection.
2. Wrap the component lead so that it can hold itself to the connection point.
3. Touch the soldering iron to both the component lead and the connection point allowing both to warm up just before applying the solder to them.
4. Be sure to adequately cover both component lead and connection point with melted solder.
   - Remove the soldering iron from your work and allow the solder joint to cool. (The solder joint should be shiny and smooth after solidifying.)
   - Cut off any excess wire or component leads with cutting pliers.
   - Clean the soldering iron's tip by wiping it across the wet sponge again after making the solder joint.



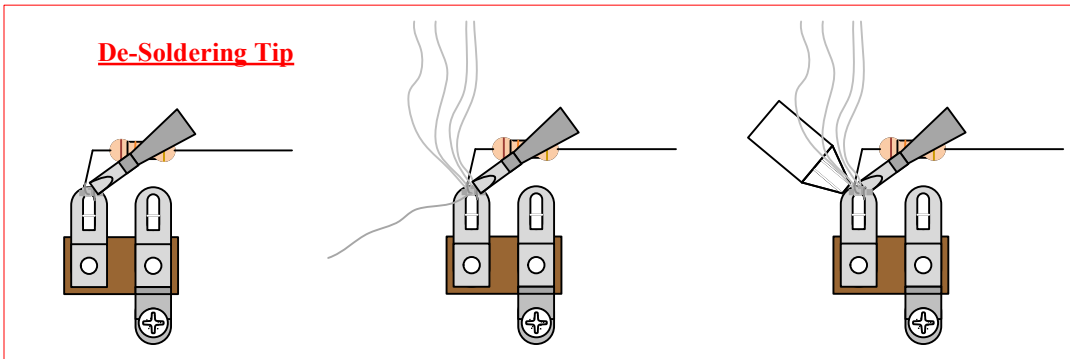
1. Bend the component lead and wrap it around the connection point.

2. Wrap the component lead so that it can hold itself to the connection point.

3. Heat up both component lead and connection point with the soldering iron.

4. Apply solder to both component lead and connection point.

De-Soldering Tip

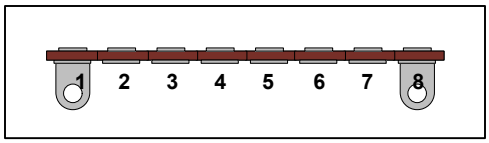


1. Heat up old solder joint with the soldering iron.

2. Apply fresh solder to mix in with old solder joint

3. Use a de-soldering tool to remove the old solder joint while it is heated.

SECTION 1 – Mount The Hardware



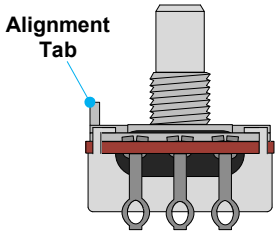
Please refer to DRAWING 1 and DRAWING 2.

Orient the box with ¾" hole nearest you and the open side facing up.

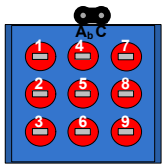
Apply the sticker to the top of the box then use a blade to cut out the holes.

- Mount the 8 lug terminal strip to the 1/8" holes as shown in drawing 2 using the 4-40 screws, nuts, and lock washers. Each lock washer goes under the nut inside the chassis.

  Be sure that no lugs are touching the sides of the box or other hardware added. We will refer to terminal numbers 1 through 8 as #1, #2, etc.

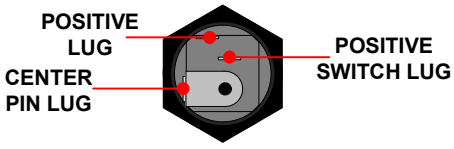


- Bend back and remove the alignment tab on the top of each potentiometer using a pair of pliers before mounting the pots so that they can mount flush against the enclosure surface.



- Mount the A100K pot in the 3/8" hole on the top right side of the box. Make sure that all three lugs are facing down toward the bottom of the box. Fasten the nut and tighten.

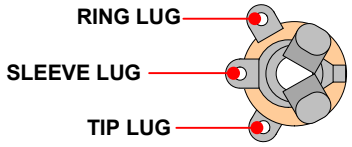
- Mount the C500K pot in the 3/8" hole on the top left side of the box. Make sure that all three lugs are facing down toward the bottom of the box. Fasten the nut and tighten.



- Mount the LED footswitch to the ¾" hole. Be sure to orient the LED leads towards the top.

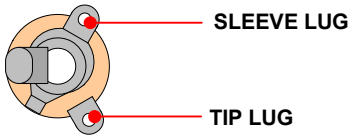
  You must remove the button cap with a hex key before mounting.

Input Jack



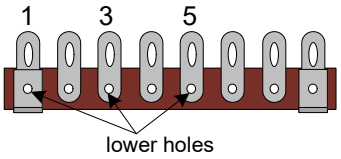
- Mount the DC power jack in the 15/32" hole on the left side of the enclosure. Orient its solder lugs so that the center-pin lug is facing the bottom side of the enclosure.

Output Jack



- Mount input jack in the 3/8" hole on left side of box with hardware provided. Washer goes under nut on outside of box. Make sure center solder lug of input jack is facing up. Correct positioning of jack will make soldering connections much easier. When positioned correctly, tighten nut.

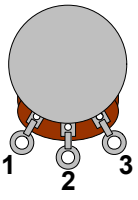
- Mount output jack in 3/8" hole on right side of box with hardware provided. Washer goes under nut on outside of box. Make sure two solder lugs are in most upright position before tightening nut.



SECTION 2

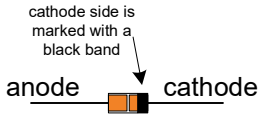
Please refer to DRAWING 3.

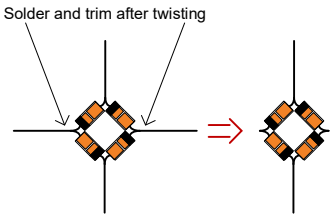
- Strip and tin a 2 ¼" piece of wire and connect the lower hole of #4 on the terminal strip to the lower hole of #7 on the terminal strip. Solder the lower hole of #4 on the terminal strip now.



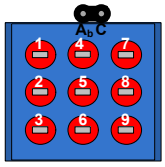
- Strip and tin a 3 ¾" piece of wire and connect the lug 1 on the C500K pot to the lower hole of #6 on the terminal strip. Solder the connection at lug 1 of the C500K pot now.

- Prepare the four 1N4148 diodes by twisting together each lead in the ring configuration pictured on the right of this page. Note the orientation. Each end with the black bar(cathode) should connect to the opposite end or anode of the next diode. After twisting all four together, solder two opposing ends and trim the soldered leads.





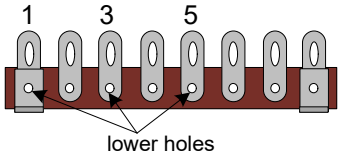
- Connect the diode ring from lug 2 of the C500K pot to the lower hole of #2 on the terminal strip. Solder the connection at lug 2 of the C500K pot and the lower hole of #2 now.
- Strip and tin a ¾" piece of wire and connect the lug 3 on the footswitch to lug 9 on the footswitch. Solder both connections now.
- Strip and tin a 2" piece of wire and connect the lug 3 on the A100K pot to the lower hole of #8 on the terminal strip.



SECTION 3

Please refer to DRAWING 4.

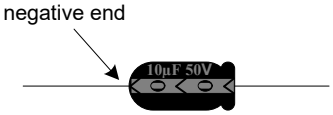
- Connect an 8.2M resistor from #7 to #8 using the lower holes for both connections. Solder the connection at the lower hole of #8 now.
- Connect an 8.2M resistor from #6 to #7 using the lower holes for both connections. Solder the connection at the lower hole of #7 now.
- Connect 5.1K resistor from #5 to #6 using the lower holes for both connections. Solder both connections at the lower holes now.
- Strip and tin a 5" piece of wire and connect the lug 7 on the footswitch to lug 2 on the A100K pot. Solder both connections now.



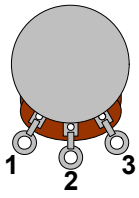
SECTION 4

Please refer to DRAWING 5.

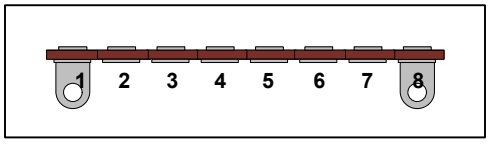
- Connect a 10µF capacitor from lug 3 of the C500K pot to lug 3 of the A100K pot with the negative end connected to lug 3 of the A100K pot. Solder both connections now.



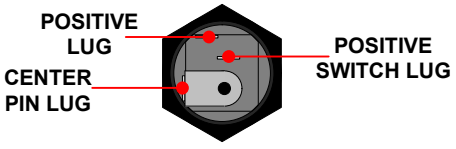
- Strip and tin a 2 1/4" piece of wire and connect the lug 1 on the footswitch to the lower hole of #3 on ther terminal strip. Solder both connections now.
- Connect the 0.1µF capacitor from #3 to #4 of the terminal strip using the top holes. Solder the connection at #3 now.



- Connect the 0.047µF capacitor from #2 to #4 of the terminal strip using the top holes. Solder both connections now.
- Connect a 10µF capacitor from lug 1 of the A100K pot to the top hole of #6 with the negative end connected to lug 1 of the pot. Solder the connection at lug 1 of the A100K pot now.

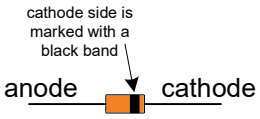


- Strip and tin a 1" piece of wire and connect the center pin lug of the DC jack to the top hole of #1 on the terminal strip. Solder both connections now.



SECTION 5

Please refer to DRAWING 6.

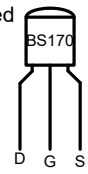


- Connect the 1N4741A zener diode from the top hole of #8 to the top hole of #7 with the black band(cathode) connected at #7.

- Connect the BS170 to the top holes of #6, #7, and #8. Note the orientation. The mosfet's body should pointed towards the top of the enclosure with the labeled, flat face pointed up. Solder the connections at #6, #7, and #8 now.

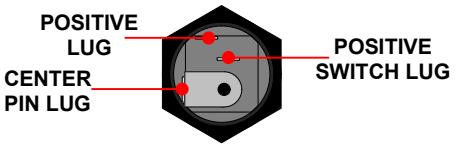
Caution: MOSFETs can easily be damaged by static electricity. Handle with care.

- Drain to terminal #6
- Gate to terminal #7
- Source to terminal #8



- Locate the battery clip. Connect the red wire to the positive-switch lug of the DC power jack. Connect the black wire to the ring lug of the input jack. Solder both connections now.

- Strip and tin a 2 ½" piece of wire and connect the positive lug of the DC jack to the top hole of #5 on the terminal strip. Solder the connection at the positive lug of the DC jack now.



- Strip and tin a 2" piece of wire and connect the lug 2 of the footswitch to the tip lug of the input jack. Solder both connections now.

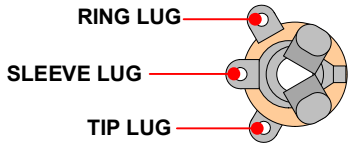
- Strip and tin a 2" piece of wire and connect the lug 8 of the footswitch to the tip lug of the output jack. Solder both connections now.

- Strip and tin a 2" piece of wire and connect the lug 5 of the footswitch to the sleeve lug of the output jack. Solder both connections now.

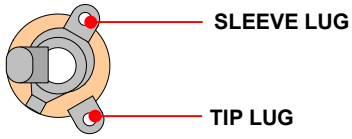
- Strip and tin a 1 ½" piece of wire and connect the top hole of #5 to the A_b pin of footswitch's LED. Solder both connections now.

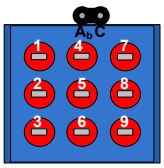
- Connect the 1KΩ resistor from lug 4 of the footswitch to the C pin of the footswitch LED. Make sure the resistor's leads are not shorted to the A_b pin or any other switch lugs. Solder both connections now.

Input Jack



Output Jack





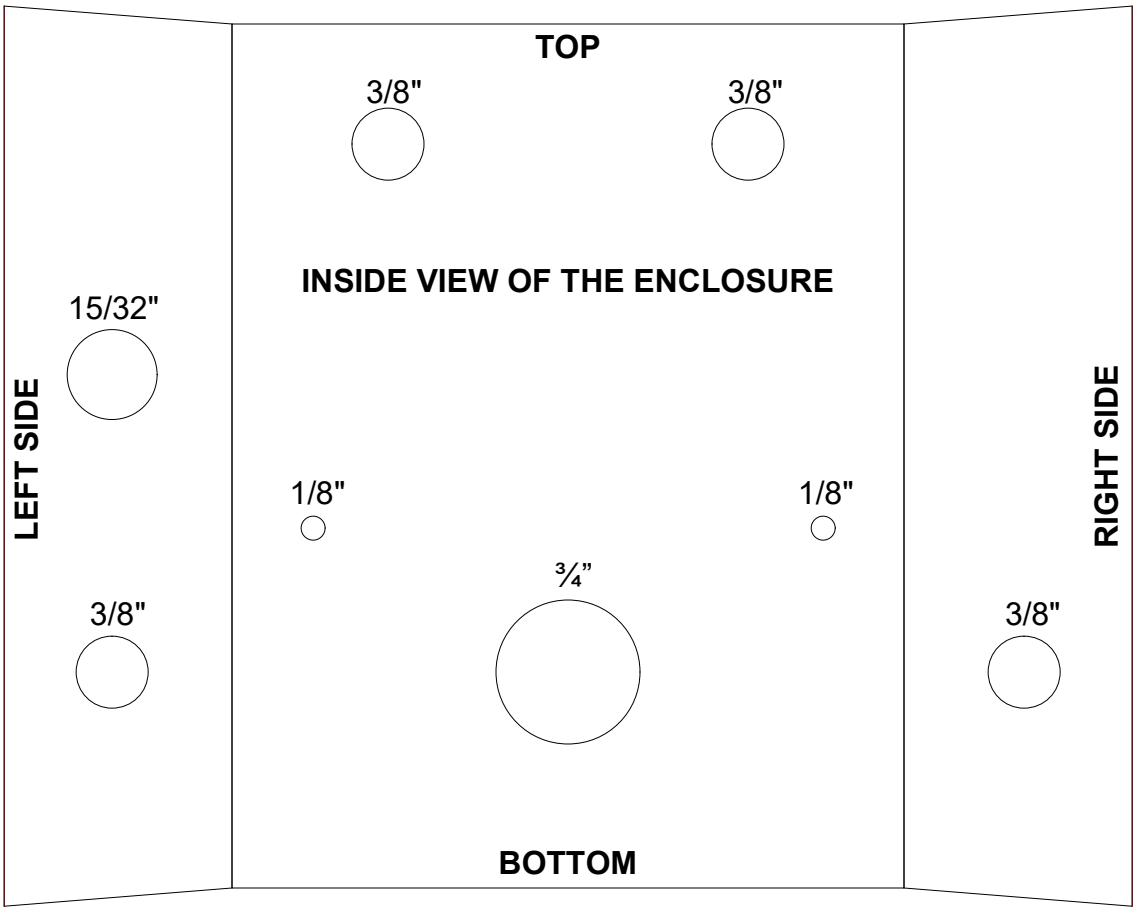
SECTION 6 Finishing Up

It's always a good idea to thoroughly double-check your connections before applying power.

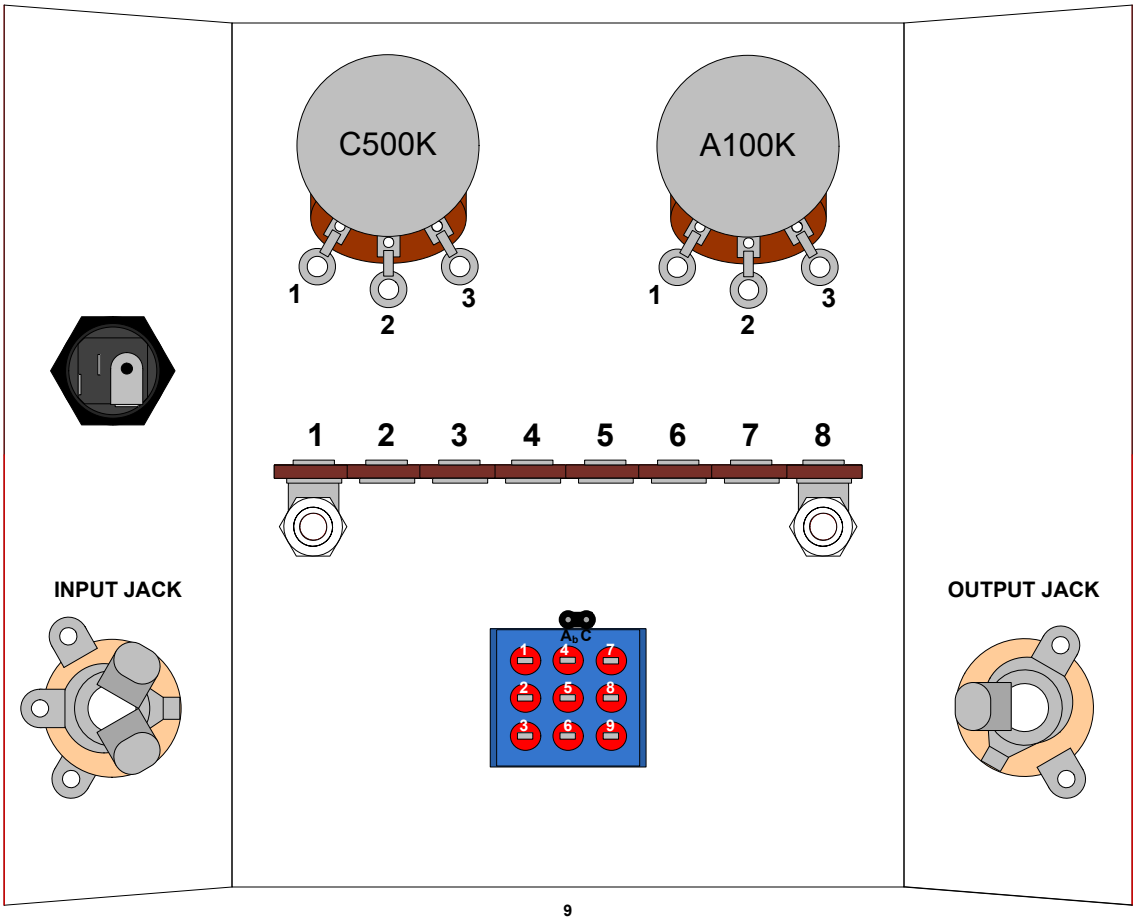
Attach the knobs provided to the potentiometer shafts. Install a 9 volt battery, close the cover using the screws provided. The battery is not required when using 9v DC power supply. Be sure to use an isolated or stand alone power supply and remove any other daisy-chained pedals when first testing if using a DC supply. The pedal can be daisy-chained once it is confirmed to be working correctly. Plug a guitar into input jack on right. Plug a cable into output jack and plug it into your amplifier. The stomp switch will engage the effect showing a lit LED when on.

-Unplug from the input jack of the unit to turn it off and save power when using a battery.

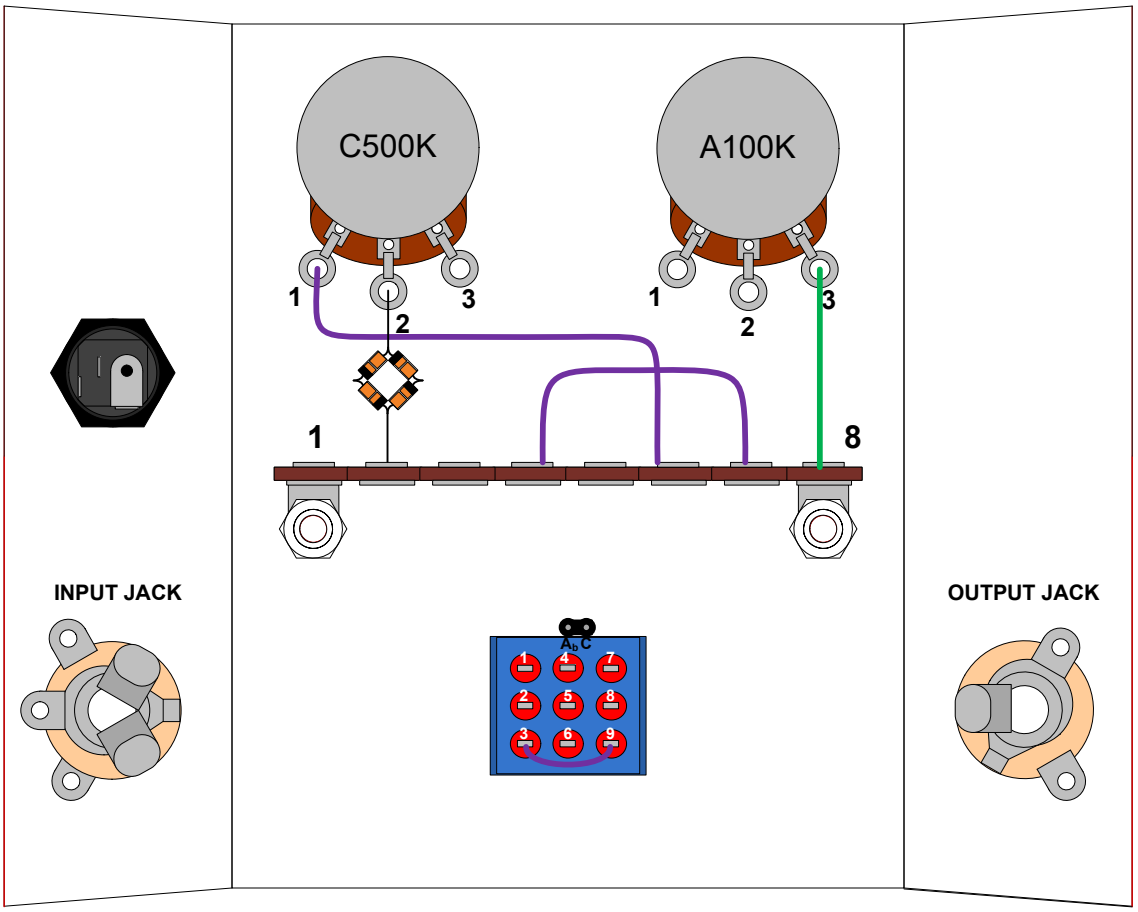
DRAWING 1



DRAWING 2



DRAWING 3



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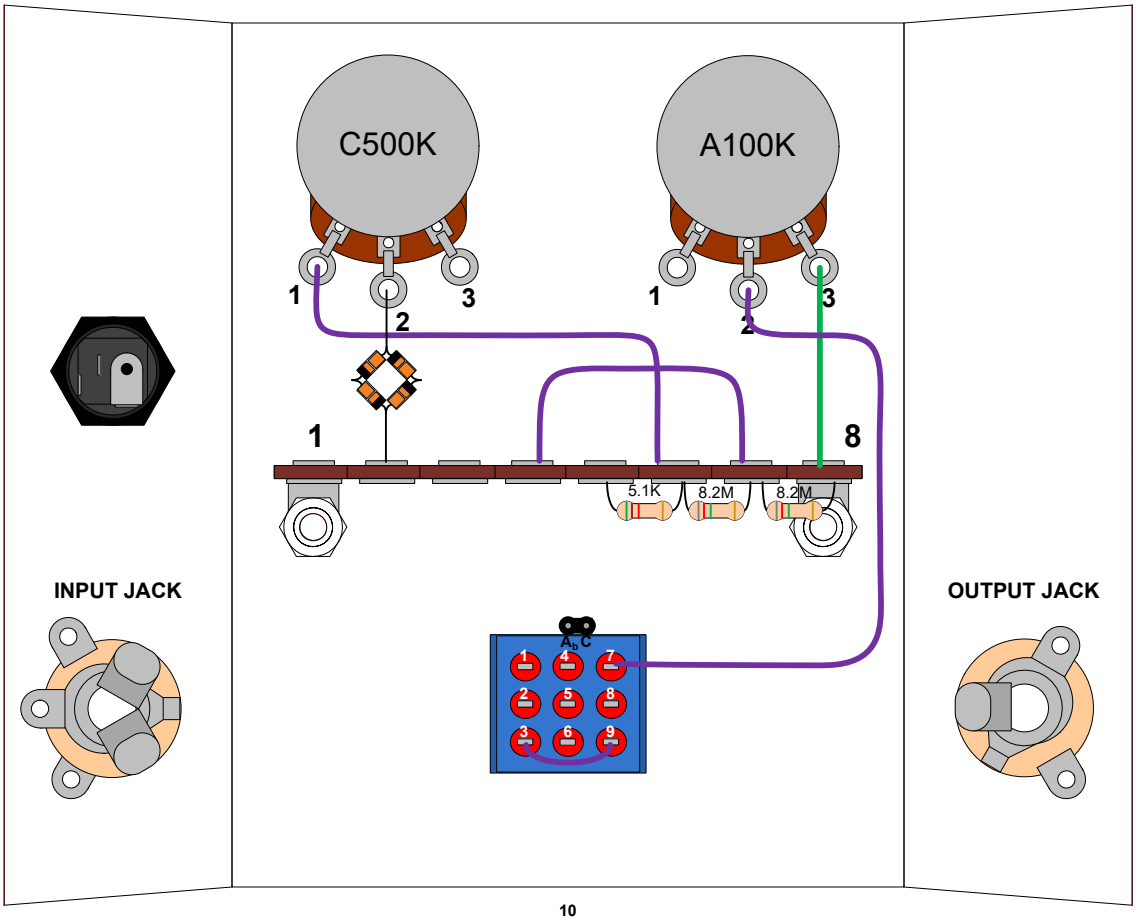
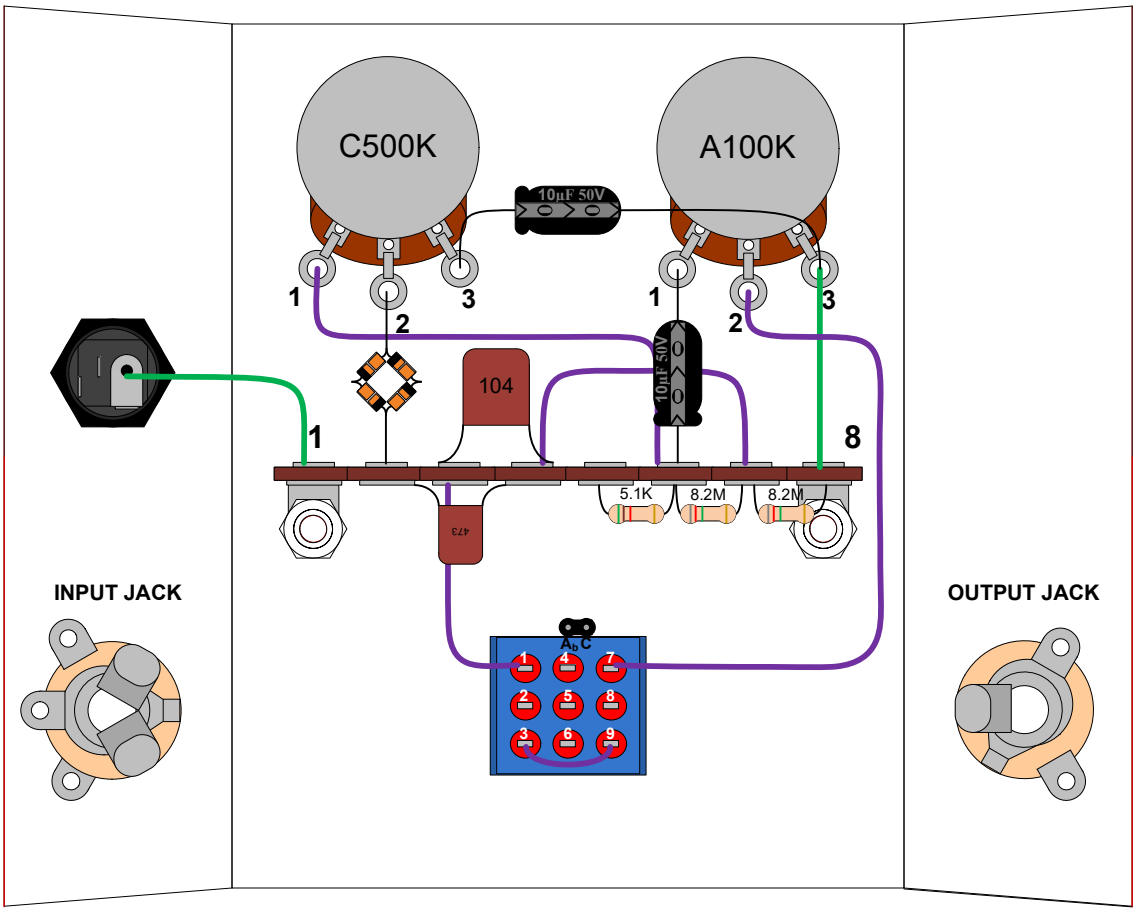
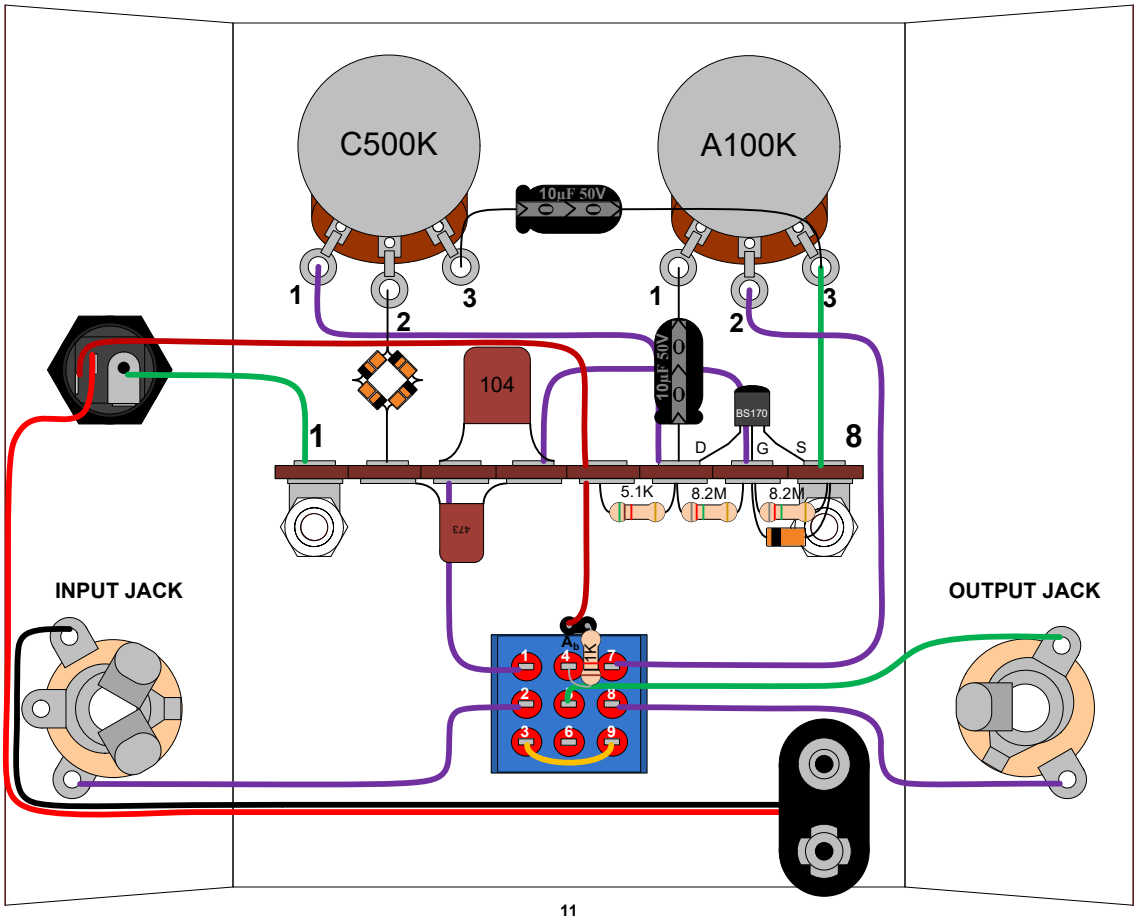


DRAWING 5



DRAWING 6



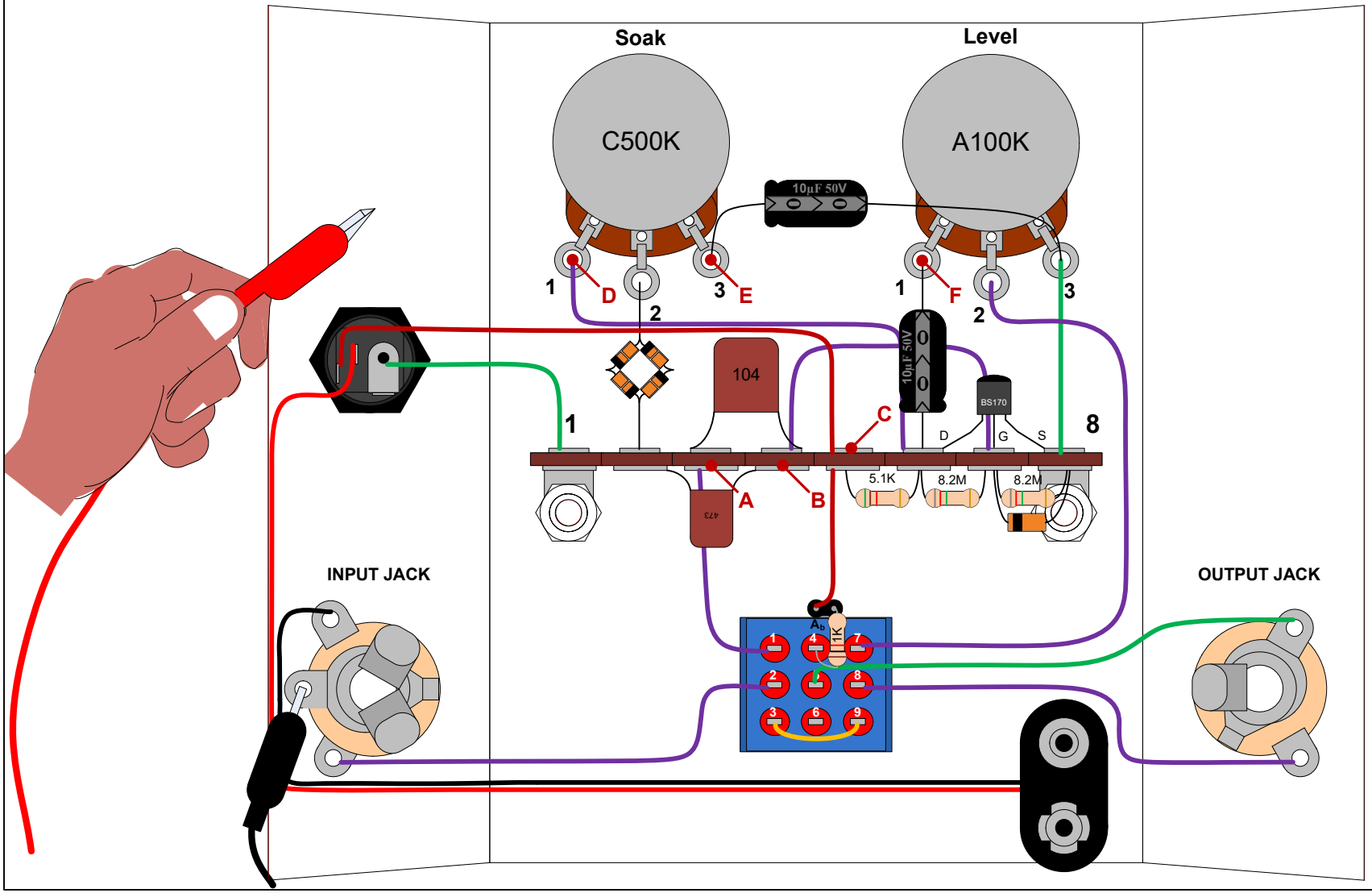
The Saturator Troubleshooting Supplement

After thoroughly double-checking your connections, the next step is to take DC voltage measurements to help locate problem areas. These tests are done with the pedal turned on but with no signal passing through the circuit.

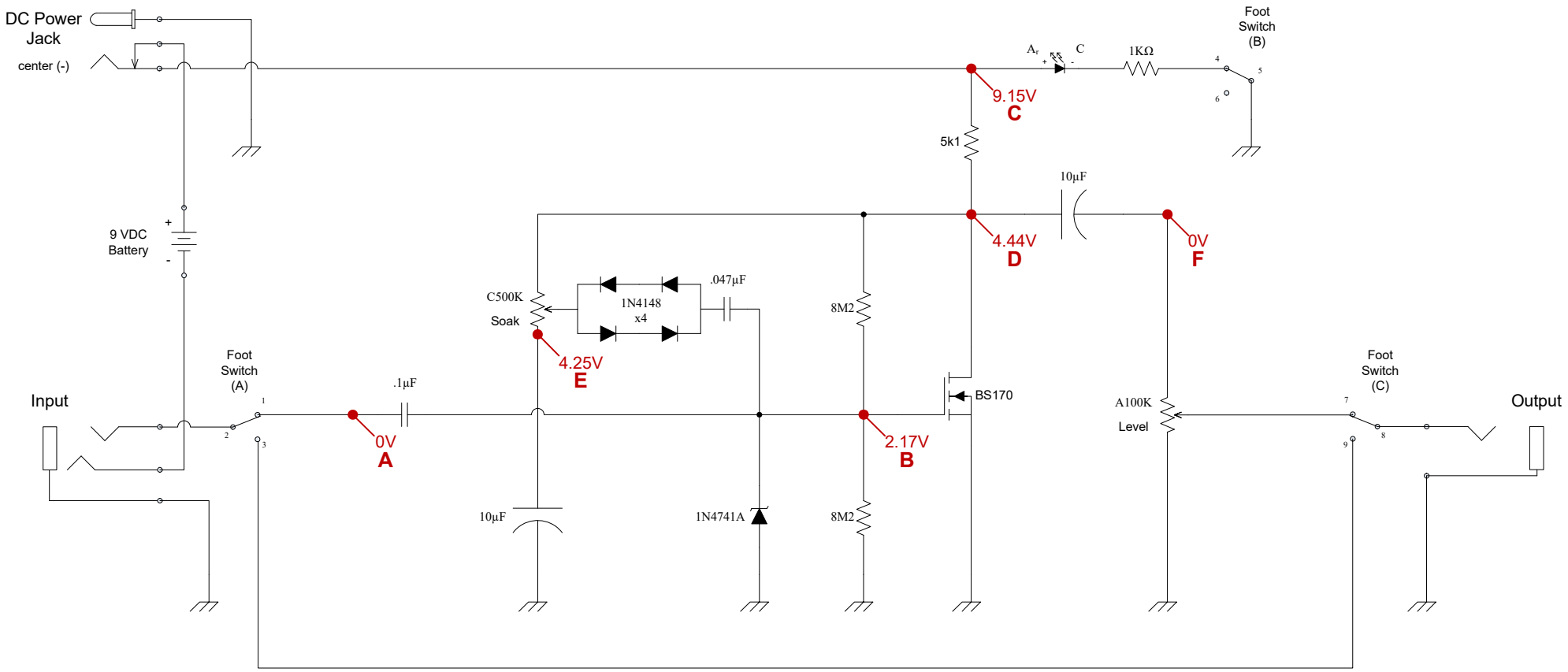
Using a volt meter, connect the ground side lead of the meter to any ground point on the pedal. One ground point would be the input or output jack's sleeve lug. The other volt meter lead will be used to measure DC voltage at the test points listed here.

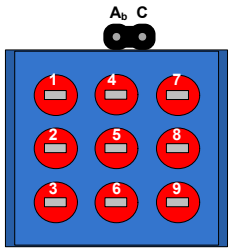
If you are using only a battery for power, be sure to plug a guitar cable into the input jack when taking measurements. Any major differences from the voltages listed should indicate a problem area.

DC Test Points	Measurement
A (Signal In)	0.00 VDC
B (BS170 Gate)	2.17 VDC
C (Power)	9.15 VDC
D (BS170 Drain)	4.44 VDC
E (Soak Pot Lug 3)	4.25 VDC
F (Signal Out)	0.00 VDC



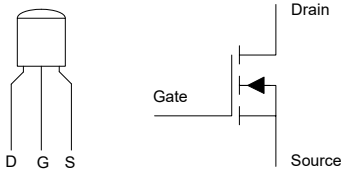
DC voltage test points in red





3PDT Foot Switch

BS170
N-Channel MOSFET

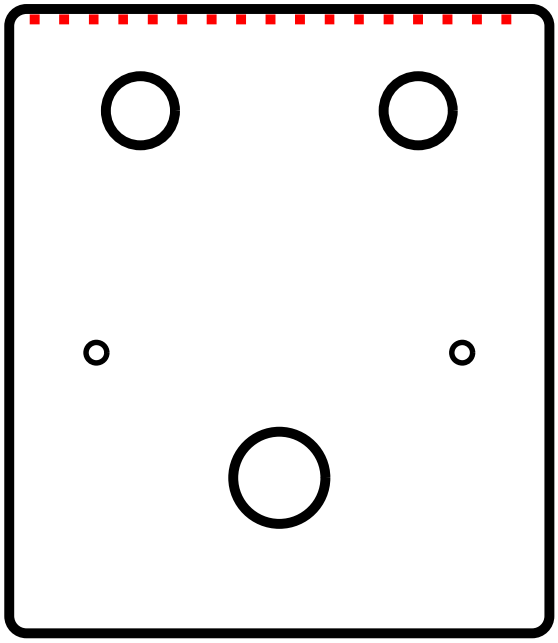


www.modkitsdiy.com

"The Saturator" (K-999)
Schematic

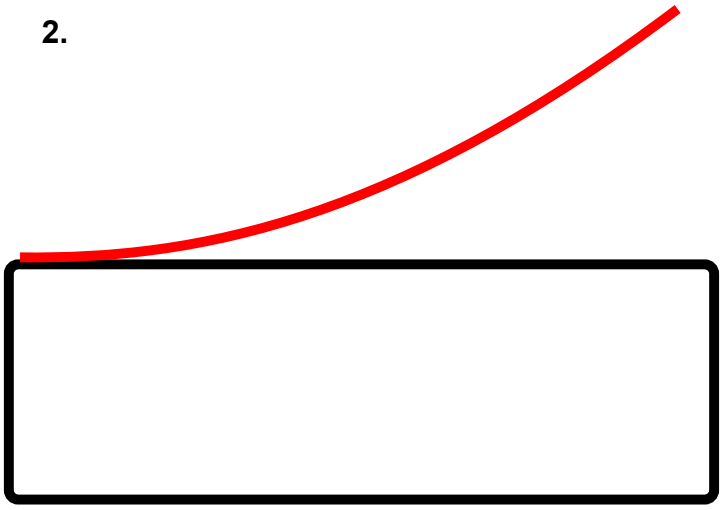
APPLYING THE STICKER TO MOD PEDAL ENCLOSURES

1.



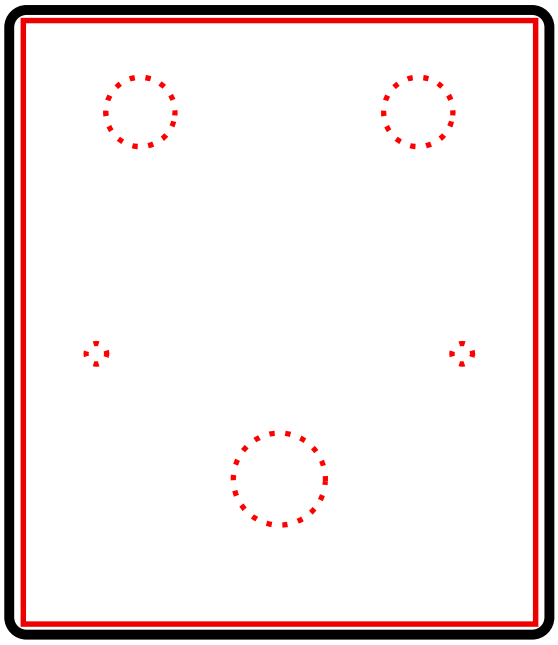
- Locate the top of the pedal as well as the top of the sticker. Page one of the instructions for your kit will have an image of the pedal that can be used for reference.

2.



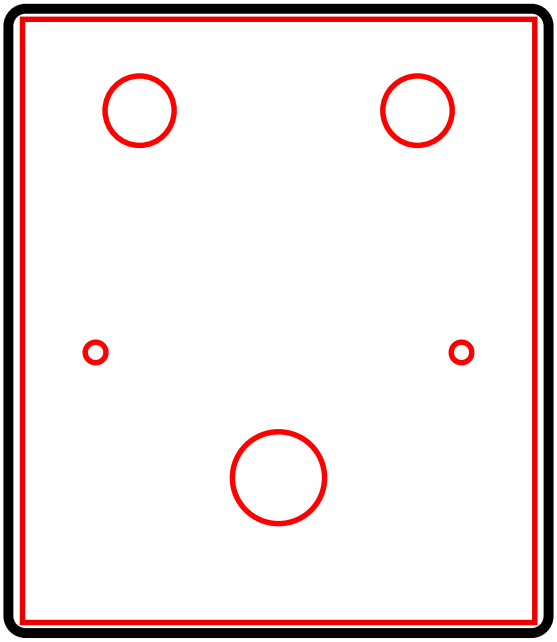
- Peel the backing from the sticker. Carefully line up the top edge of the sticker with the top of the pedal. Press down to apply the sticker only to the edge. Run a finger across the edge to push any air out from beneath the sticker. Continue this motion as you work your way down the pedal until the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

3.



- 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.

4.



- 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.