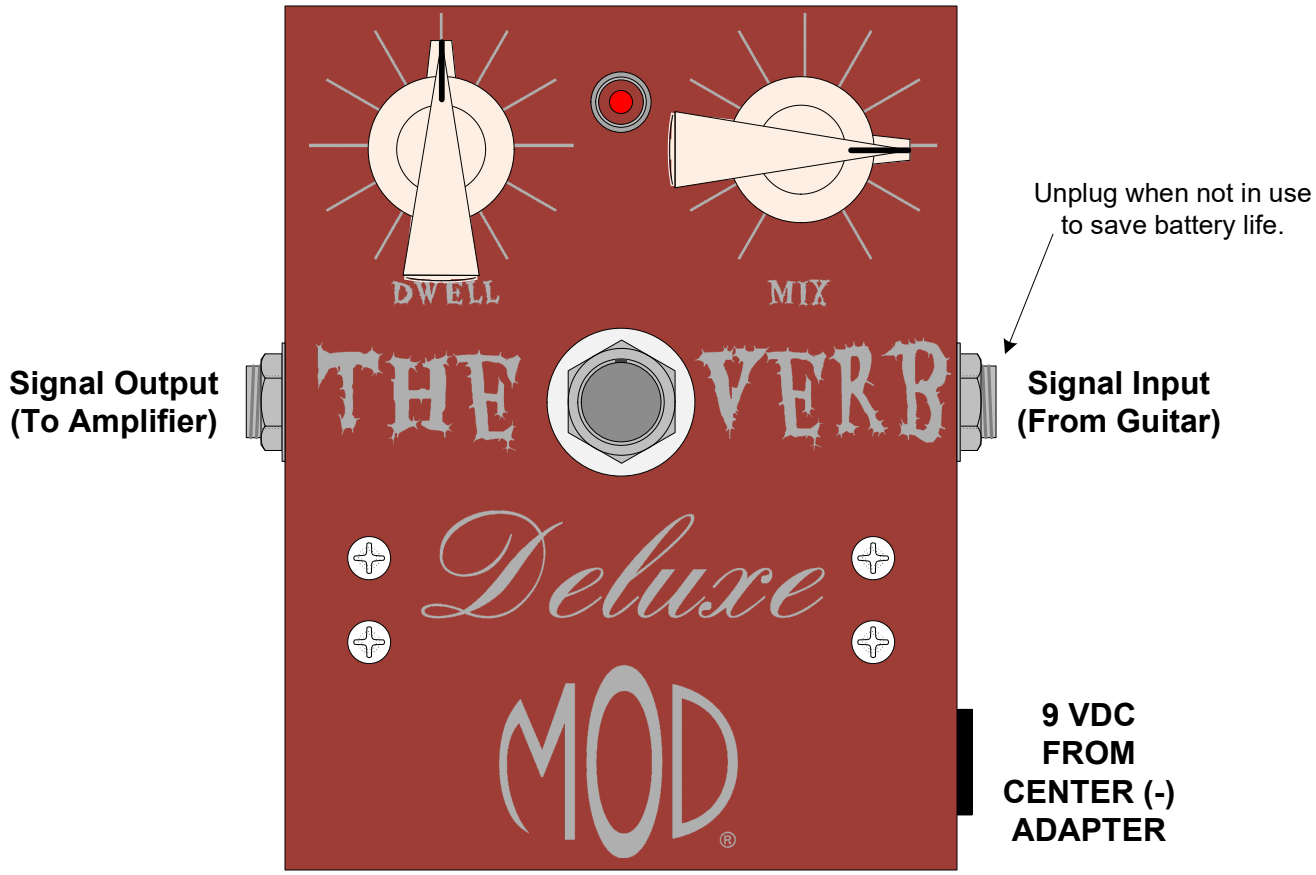
THE VERB DELUXE (K-915)



Use these instructions to learn:

- How to build an effects pedal for reverb.

This pedal produces sweet warm reverb using the Belton Digi-Log module. It operates on a 9V battery or AC adapter (center negative), which are not included. When completed this pedal draws considerable current and battery life will be short. The use of an AC adapter is highly recommended. This effect works best when placed at the end of your effects chain.

Warning: This circuit was designed for use with a 9 VDC power supply only.

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TABLE OF CONTENTS

These are the last 3 pages. They should be separated and used as a reference to help assemble the kit correctly.

TOOL LIST

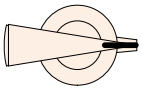
- Wire Strippers
- Needle Nose Pliers
- Cutting Pliers
- Desoldering Pump
- Solder (60/40 rosin core)
- Soldering Station
- Phillips Head Screwdrivers
- Slotted tip screwdrivers (3 mm tip)
- Channellock Pliers (or similar type)
- Ruler
- Hobby Vise (or other means to secure box while working)

PARTS LIST 1

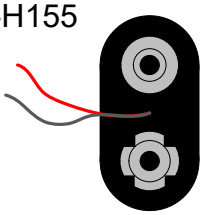
Stranded Wire (22 AWG) - Red
K-PUL1569 (6.5 FT)

Enclosure
P-H1590BBCE-BN (1)

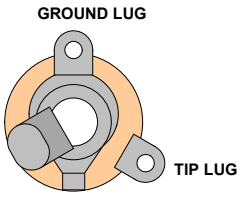
Chicken Head Knob
P-K300C (2)



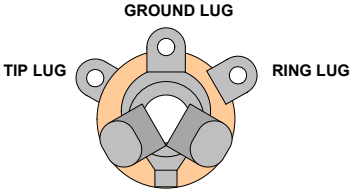
Battery Clip
S-H155 (1)



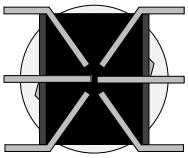
¼" Mono Jack (Output Jack)
W-SC-11-T (1)



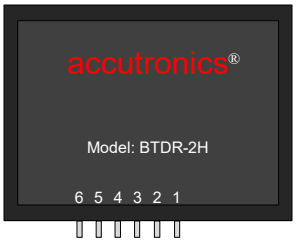
¼" Stereo Jack (Input Jack)
W-SC-12B (1)



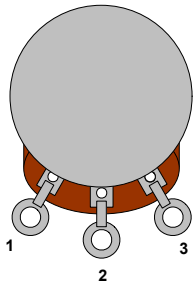
DPDT Foot Switch
P-H498 (1)



Reverb Module
P-RBTDR-2H-L (1)

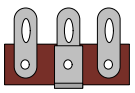


Potentiometers with Linear Taper
R-V38-100KL (1)
R-V38-500KL (1)

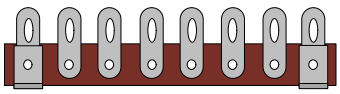


Terminal Strip with 2 Terminals
P-0201H (3)

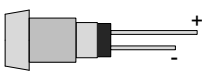
Terminal Strip with 3 Terminals
P-0301H (1)



Terminal Strip with 8 Terminals
P-0802H (2)



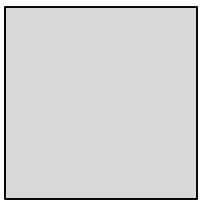
Light Emitting Diode
P-L400 (1)



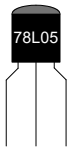
PARTS LIST 2

DC Power Jack
S-H750 (1)

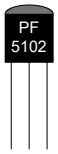
Double Sided Foam Tape (1" x 1")
(1)



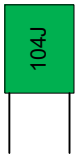
Voltage Regulator (78L05)
P-QMC78L05 (1)



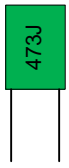
N-Channel JFET (PF5102)
P-QPF5102 (2)



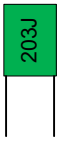
0.1µF Capacitor
C-PEID1-100 (2)



0.047µF Capacitor
C-PEID047-100 (1)

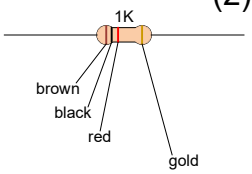


0.02µF Capacitor
C-PEID02-100 (1)

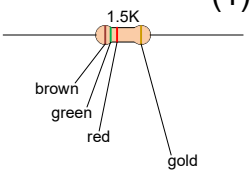


10µF Polarized Capacitor 50V
C-ET10-50 (1)

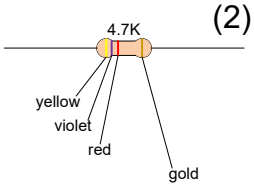
1kΩ Resistor ½ W
R-A1K (2)



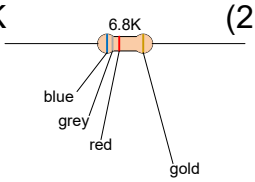
1.5kΩ Resistor ½ W
R-A1D5K (1)



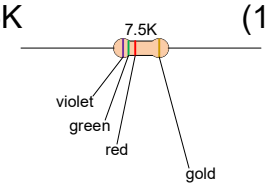
4.7kΩ Resistor ½ W
R-A4D7K (2)



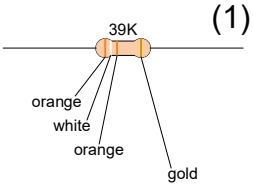
6.8kΩ Resistor ½ W
R-A6D8K (2)



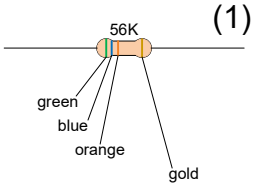
7.5kΩ Resistor ½ W
R-A7D5K (1)



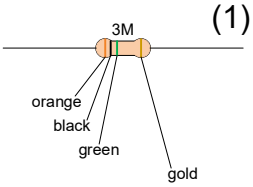
39kΩ Resistor ½ W
R-A39K (1)



56kΩ Resistor ½ W
R-A56K (1)



3MΩ Resistor ½ W
R-A3M (1)



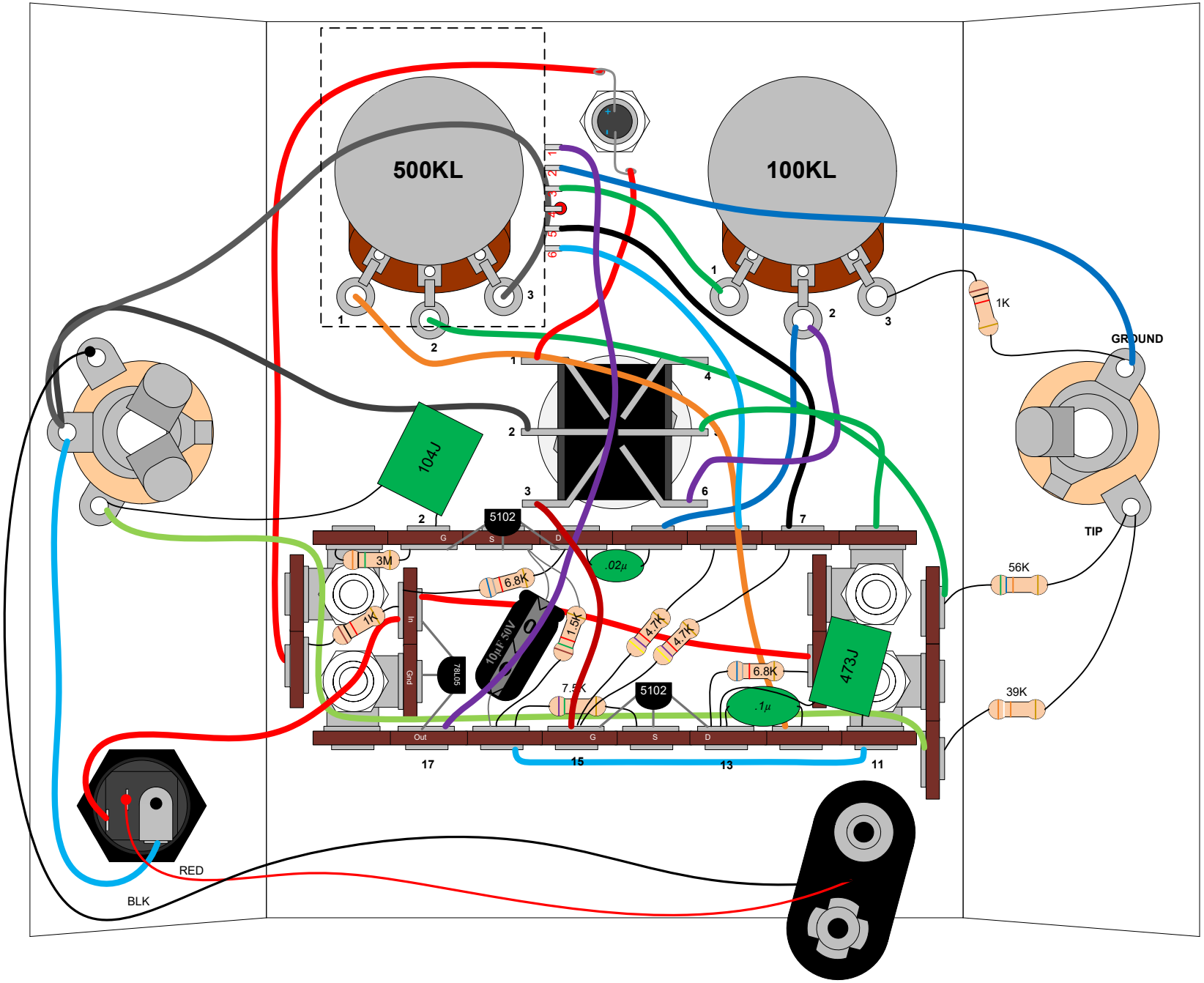
#4 Nut
S-HHN440 (4)

#4 Lock Washer
S-HLW4 (4)

#4 Screw (3/8" long)
S-HS440-38 (4)

FINAL ASSEMBLY REFERENCE DRAWING

This is a large version of the final assembly drawing. Refer to this drawing as you make your way through each step of the instructions. Before you make a new connection at a particular terminal or solder lug, notice how many other connections will be made at that terminal. That way you can decide whether it's best for you to solder the connection and leave space open for future connections or hold off on soldering until after every connection at that location has been made.

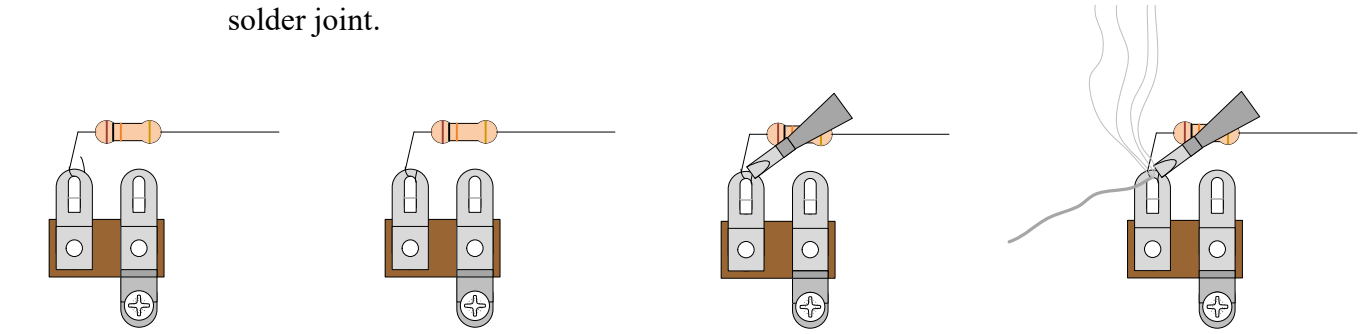


SOLDERING TIPS

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.



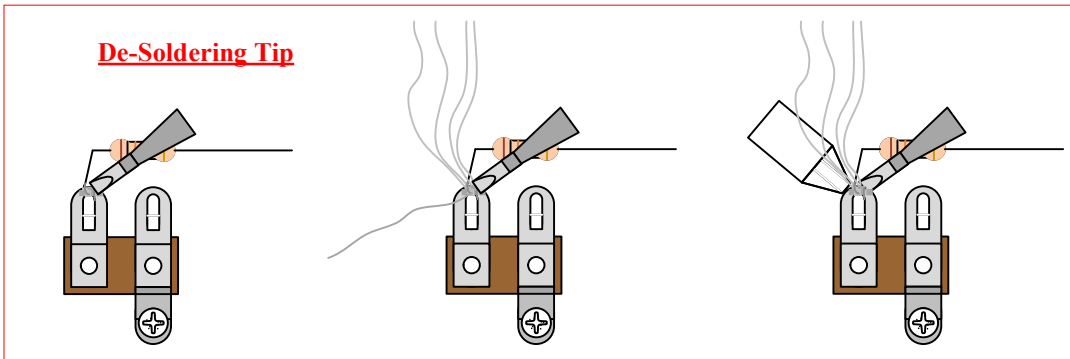
1. Bend the component lead and wrap it around the connection point.

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 Large Components

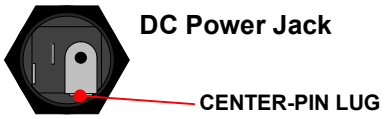
The Verb Deluxe enclosure has a high gloss finish. To avoid scratching the surface while assembling this kit, you may want to place a soft cloth, towel or similar item over your work surface.

Stripping and tinning wire and soldering. Throughout these instructions you will be told to strip and tin a length of wire numerous times. Unless noted otherwise, cut the wire to the length stated in the instructions. Then strip ¼" of insulation off each end. Twist each end of the stranded wire, and apply a small amount of solder to each end (tin the wire ends). This will prevent the stranded wire from fraying and will make the final soldering much easier.

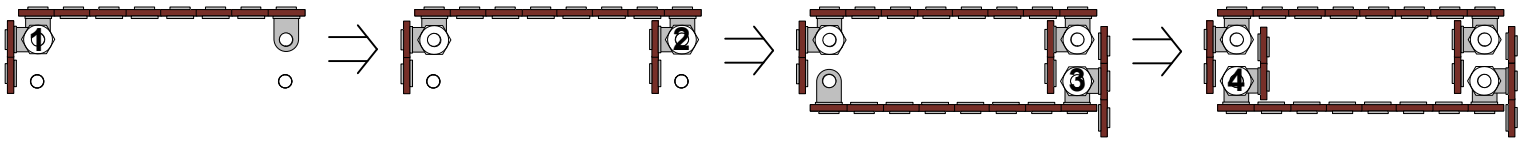
Please refer to DRAWING 1 and DRAWING 2.

Orient box with two 3/8" holes and one 1/4" hole on top.

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



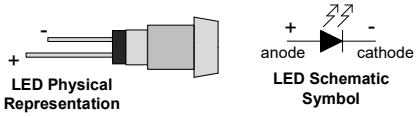
Using the four screws, nuts and lock washers provided, fasten the six terminal strips to match DRAWING 2. You might find it easier to mount the long (8 lug) terminal strips by fastening the first screw and nut loosely at first, then tighten them once the second screw and nut are in place.



It may be necessary to angle the terminal strips forward with your fingers so that the terminals are not pressing against the sides of the enclosure making it difficult to mount the components.

Mount the LED using the hardware provided. The Anode (+) terminal should be oriented towards the top side of the enclosure.

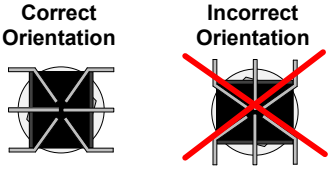
The Anode (+) side of the LED is indicated by a slightly longer lead and/or a positive sign.



Mount the 100K pot in the 3/8" hole on the top right and the 500K pot in the 3/8" hole on the top left. Their solder lugs should be directed toward the bottom side of the enclosure. (*You can bend their thin guide tabs with pliers so that the pots mount flush against the enclosure surface).*

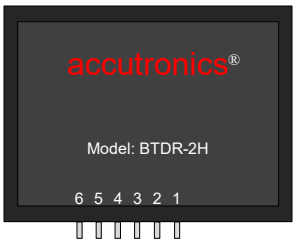
Mount the input jack in 3/8" hole on the left side of the enclosure with the hardware provided. The washer goes under the nut on the outside of the enclosure. Make sure the center solder lug of the input jack is facing up. Correct positioning of the jack will make soldering connections much easier.

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



Mount the footswitch in 15/32" hole in center of box. The nylon washer goes under the mounting nut on the outside of the enclosure. The lock washer mounts on inside between the enclosure surface and the other nut. Make sure that the footswitch is oriented to match DRAWING 2.

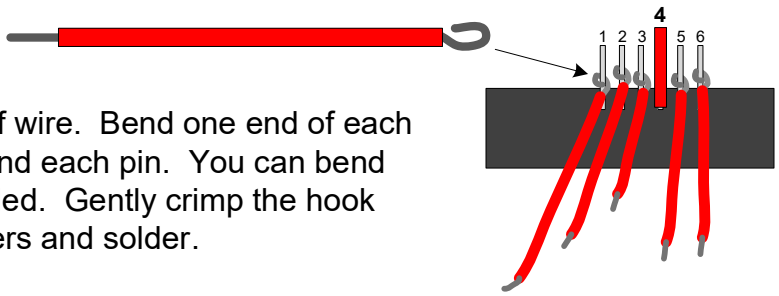
SECTION 2 – Prepare BTDR Reverb Module



Pin 4 will not be used. Strip a 3/8" piece of insulation from the wire provided to use as an insulating sleeve for pin 4. Gently press this piece of insulation over pin 4 of the reverb module.

Now cut:

- One 5" piece of wire for pin 1
- Three 3" pieces of wire for pins 2, 5 and 6
- One 2" piece of wire for pin 3



Strip and tin ¼" on each end of these pieces of wire. Bend one end of each wire to form a small hook that can be slid around each pin. You can bend the pins out slightly to allow more room if needed. Gently crimp the hook ends of the wires to their respective pin numbers and solder.

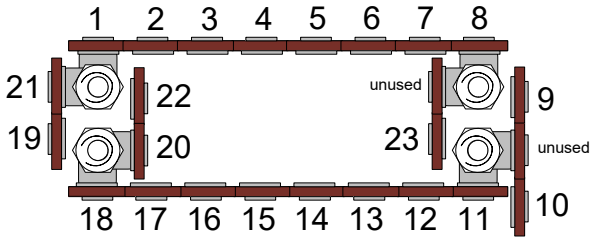
Be careful not to accidentally short adjacent pins by soldering two wire hook ends too close to each other. You may find it necessary to stagger each hooks placement on the pins.

Set the module aside until installation later in the instructions.

SECTION 3 – Wire Large Components

Please refer to DRAWING 3.

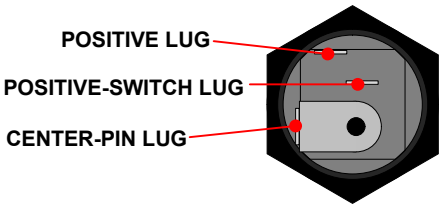
Please note that each terminal has been numbered as illustrated here and will be referred to as a "**terminal #_**" when connecting different components and wires throughout the assembly instructions.



Strip and tin a 6" piece of wire and connect to terminal #19 and the anode (+) terminal on the LED. Solder the connection on the LED and trim the excess lead.

Strip and tin a 2 ½" piece of wire and connect to Footswitch lug 1 and the cathode (-) terminal of the LED.

Strip and tin a 1 ½" piece of wire and connect to Footswitch lug 2 and the ground lug of the input jack. (Do not solder the ground lug connection, yet).



Strip and tin a 3" piece of wire and connect to the DC power jack's center-pin lug and the ground lug of the input jack. (Do not solder the ground lug connection, yet).

Strip and tin a 4 ½" piece of wire and connect to 500KL pot lug 2 and terminal #9.

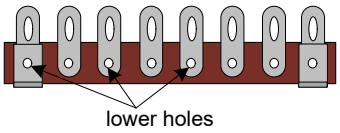
Strip and tin a 5" piece of wire and connect 500KL pot lug 1 and terminal #12.

Strip and tin a 3" piece of wire and connect to 500KL pot lug 3 and the ground lug of the input jack. Now solder the connections at the input jack ground lug.

Strip and tin a 2 ½" piece of wire and connect to terminals #11 and #16. *Connect via the lower terminal holes to leave more room for mounting the terminal strip components.* *Do not solder at terminal #16, yet.*

Strip and tin a 2" piece of wire and connect to 100KL pot lug 2 and terminal #5.

Strip and tin a 2 ½" piece of wire and connect to terminal #23 and terminal #22. *(Connect via the lower terminal holes to leave more room for mounting the terminal strip components).*



Strip and tin a 5" piece of wire and connect to the input jack's tip lug and terminal #10. *Route this wire along the surface of the enclosure to leave more room when mounting the terminal strip components.*

Strip and tin a 2" piece of wire and connect to the DC power jack's positive lug and terminal #22. *(Push this wire down into the area between terminals #19, #20, #21 and #22 to make room for terminal strip components).*

Double check all your connections at this point because it will be very difficult to make corrections after the components are soldered into place.

SECTION 4 – Mount Components to Terminal Strips

Please refer to DRAWING 4.

Connect and solder all of the following components to their respective terminals as listed. *(Make sure that none of the component leads are so close together that it could cause an unintended short).*

Connect a 1K resistor from the output jack's ground lug to lug 3 of the 100KL pot.

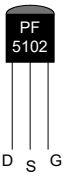
Connect a .1μF capacitor to terminals #12 and #13. *(Push this capacitor down toward the bottom surface of the enclosure to make room for other components).*

Connect a 6.8K resistor to terminals #13 and #23. *(Leave enough lead length on the resistor so you can push it down a little, leaving more room for other components).*

Connect the .047μF capacitor to terminals #11 and #13.

Connect the 7.5K resistor to the lower holes of terminals #14 and #16. *Be careful not to mistake the 7.5K (violet, green, red) for the 1.5K (brown, green, red) as they look very similar.* *You can solder the lower hole connections at terminal #16 now.*

Connect a PF5102 to terminals #13, #14 and #15:



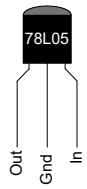
- D (Drain) lead connects to #13
- S (Source) lead connects to #14
- G (Gate) lead connects to #15

Connect the .02μF capacitor to terminals #4 and #5.

Connect the 1K resistor to terminals #19 and #22.

Connect the 6.8K resistor to terminals #4 and #22. *(Make sure to leave room at both terminals for mounting other components).*

Connect the 78L05 to terminals #17, #20 and #22:



- "Out" lead connects to #17
- "Gnd" lead connects to #20
- "In" lead connects to #22

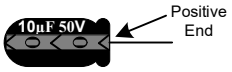
Connect the 3M resistor to terminals #1 and #2*.

Connect the 56K resistor to terminal #9 and the output jack's tip lug.

Connect the 39K resistor to terminal #10 and the output jack tip lug.

Connect the .1μF capacitor to the input jack's tip lug and terminal #2*.

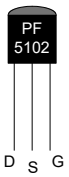
Connect the 10μF capacitor to terminals #3* and #16. The positive lead of this cap must be connected to terminal #3.



*Terminals #2 & #3 are crowded with components. Make sure you leave space on these terminals for the mounting of the PF5102 at terminals #2, #3 and #4.

Connect the 1.5K resistor to terminals #3* and #16.

Connect the PF5102 to terminals #2*, #3* and #4:



- D (Drain) lead connects to #4
- S (Source) lead connects to #3
- G (Gate) lead connects to #2

Connect a 4.7K resistor to terminals #15 and #6.

Connect the other 4.7K resistor to terminals #15 and #7.

SECTION 5 – Install Reverb Module

Please refer to DRAWING 5.

Remove the backing from one side of the double sided tape. Press the sticky side onto the center of the 500KL pot.

Remove the backing from the top side of the tap and press the reverb module against it with the orientation to match DRAWING 5 (pin number label facing up).

Connect the module's pin 6 wire to terminal #6.

Connect the module's pin 5 wire to terminal #7.

Connect the module's pin 3 wire to the 100KL pot's lug 1.

Connect the module's pin 2 wire to the output jack's ground lug.

Connect the module's pin 1 wire to terminal #17.

SECTION 6 – Finishing Up

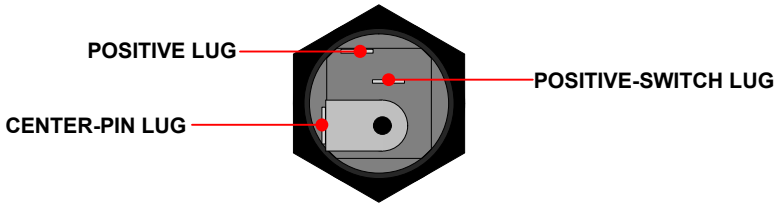
Please refer to DRAWING 6.

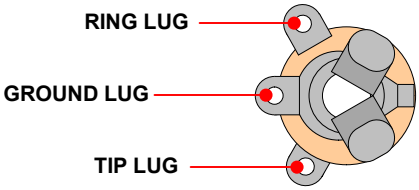
Strip and tin a 2" piece of wire and connect to Footswitch lug 6 and the 100KL pot's lug 2.

Strip and tin a 2" piece of wire and connect to Footswitch lug 5 and terminal #8 (or any other grounded terminal that may have easier access).

Strip and tin a 2" piece of wire and connect to Footswitch lug 3 and terminal #15.

Locate battery clip. Cut 2" off of the red lead. Strip 1/8" insulation off the end of the red lead. Connect and solder the red lead to the positive-switch lug of the DC power jack. Connect and solder the black lead to the ring lug on the input jack.



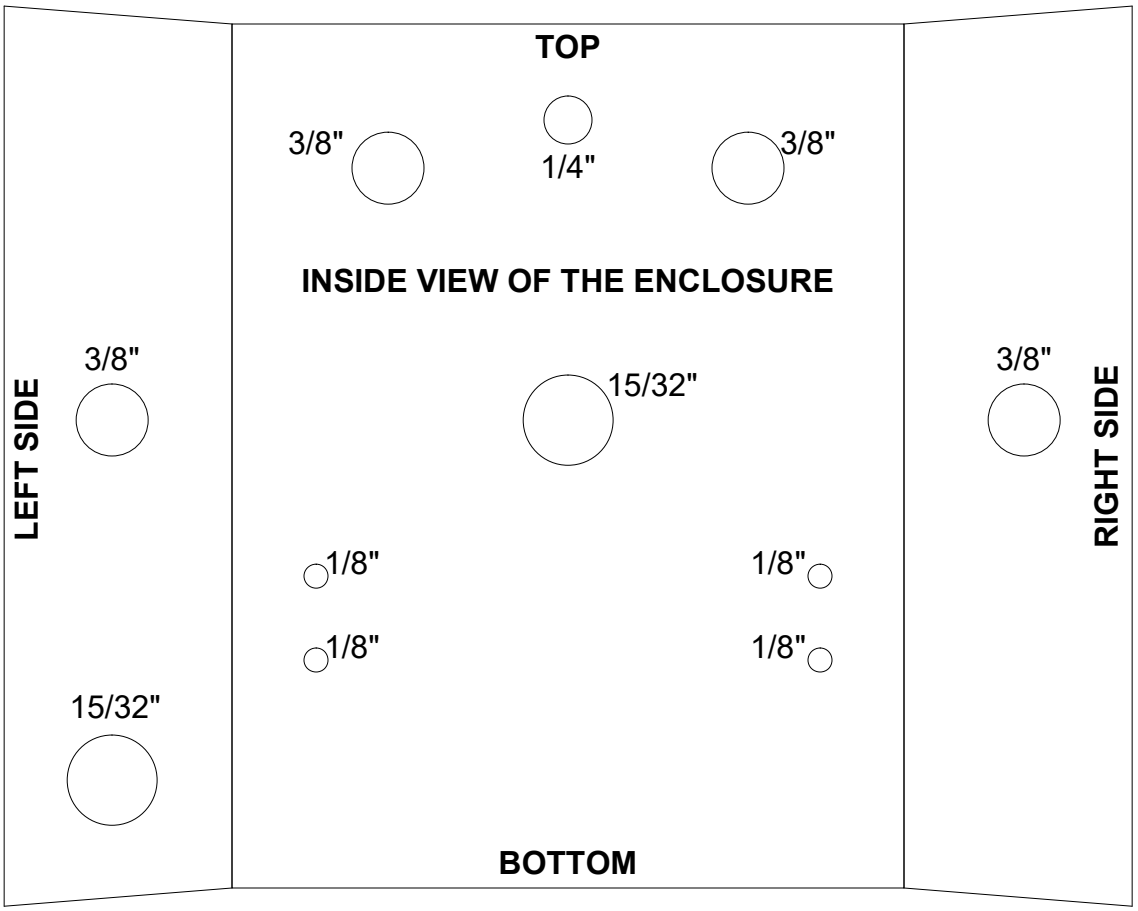


Attach the knobs provided to the potentiometer shafts. Install a 9 volt battery, close the cover using the screws provided. Plug your guitar into the input jack on right. This turns the power on. Plug a cable from the output jack and into your amplifier. The battery will last only about 1 ½ hours of continuous operation. A 9 volt, center negative power supply is highly recommended for use with this unit.

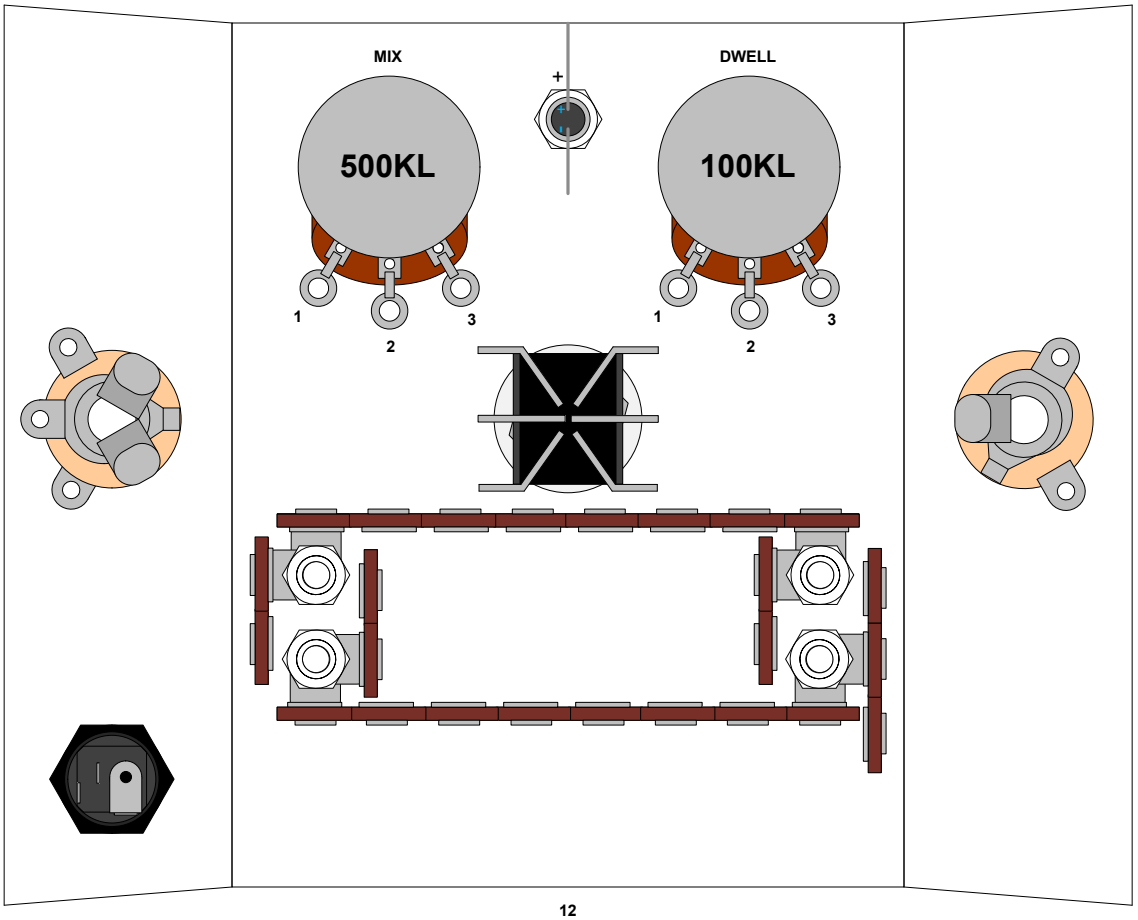
Unplug from the input jack of the unit to turn it off and save power.

Warning: The Verb Deluxe does not hold back on reverberation potential. At maximum dwell and mix settings you may be overtaken by a virtual tidal wave of sonic reflections.

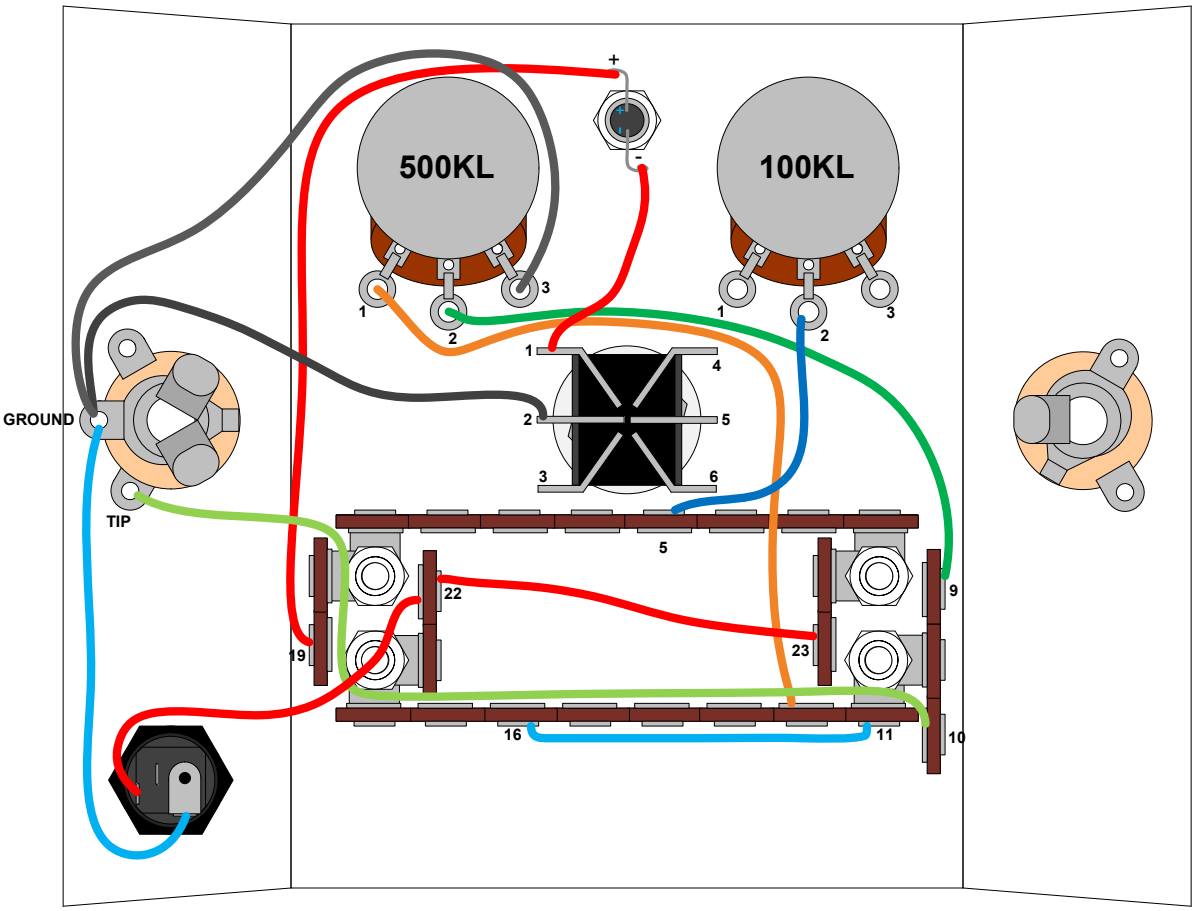
DRAWING 1



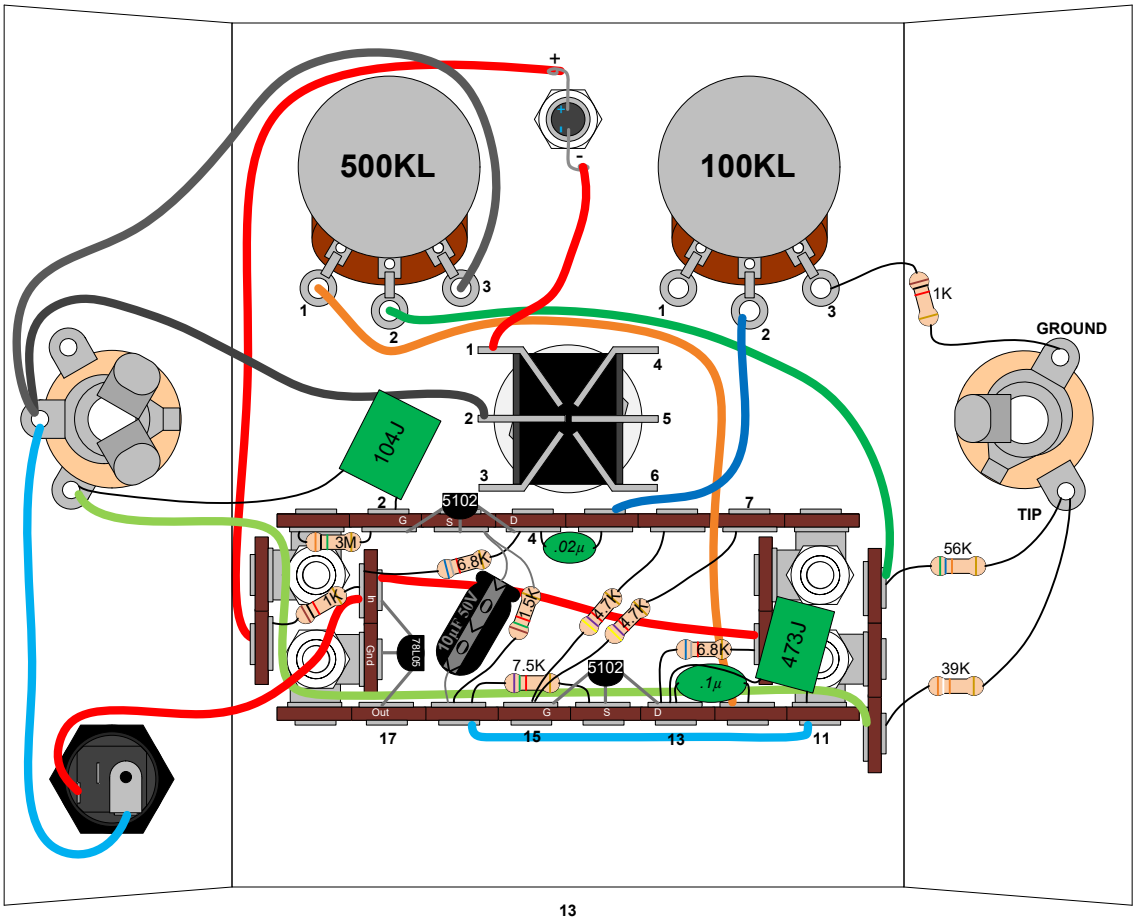
DRAWING 2



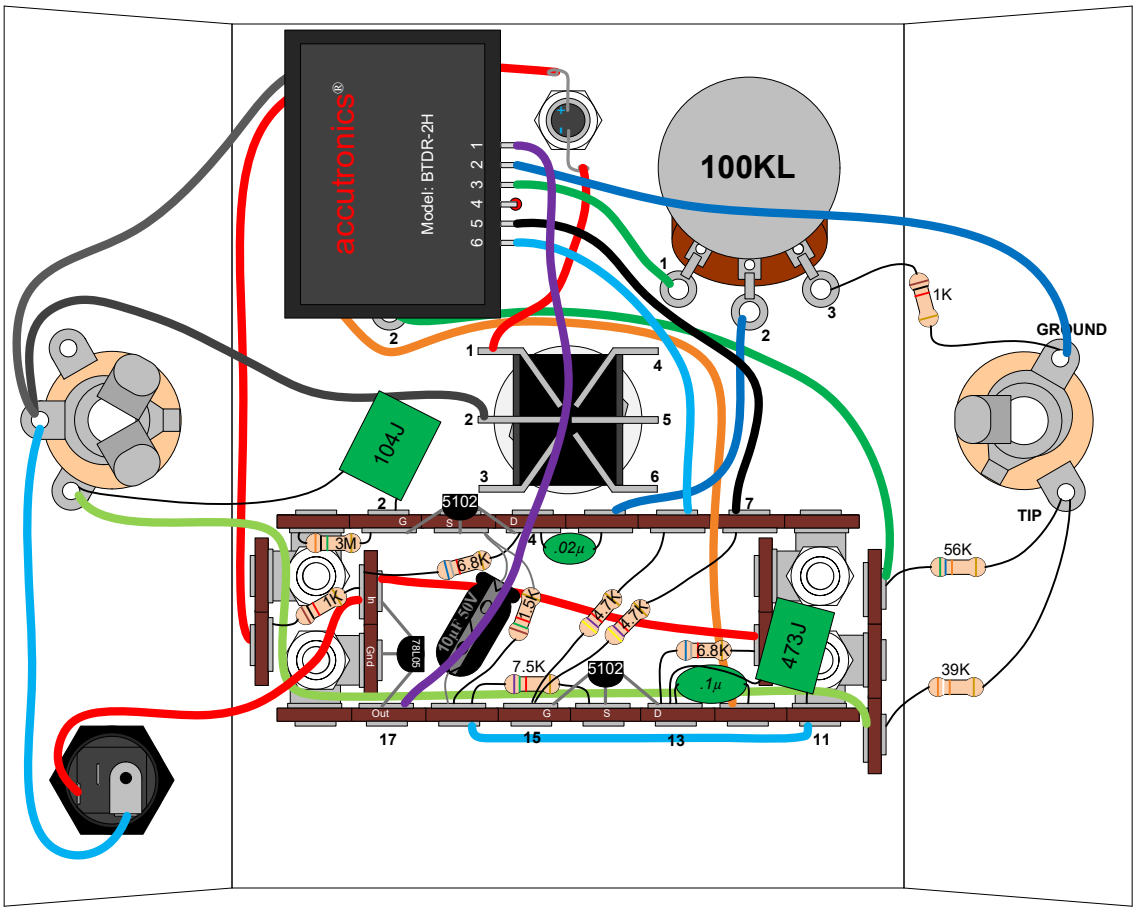
DRAWING 3



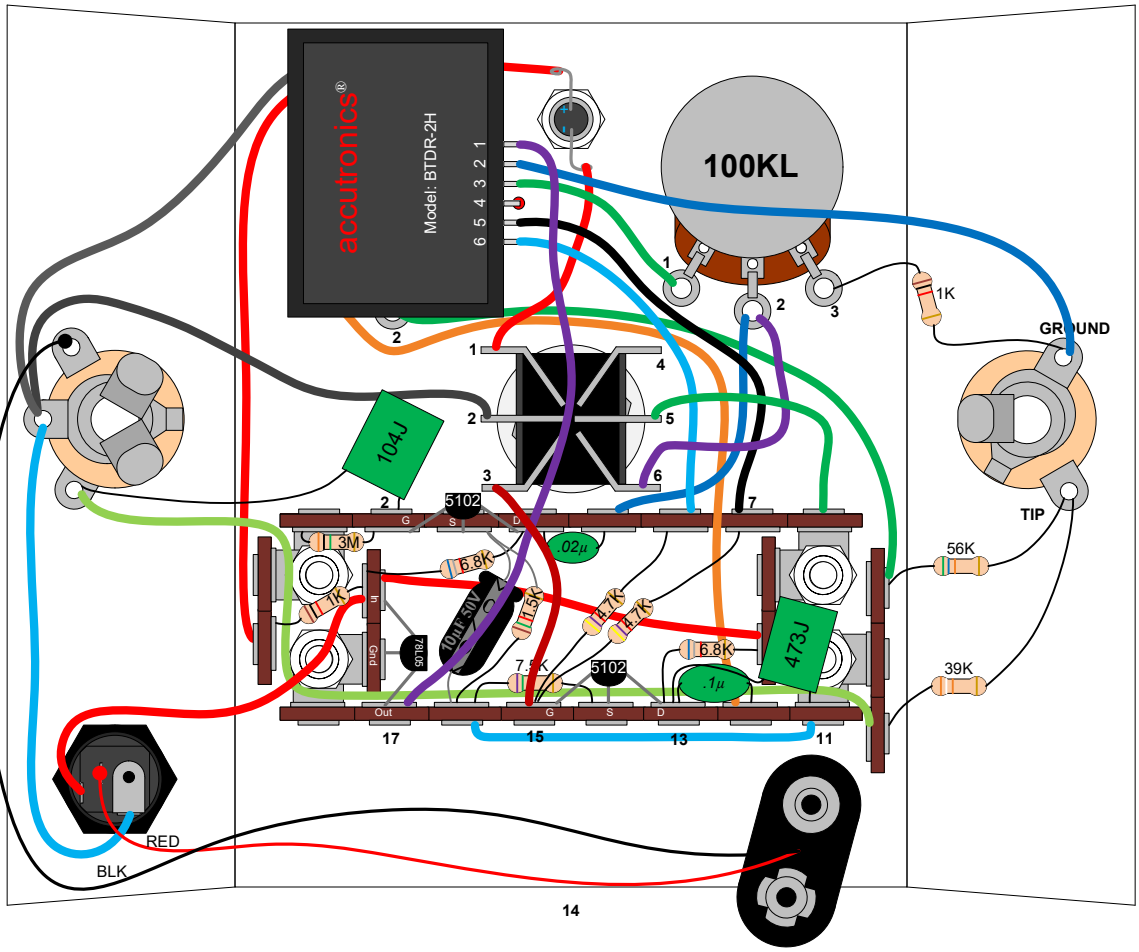
DRAWING 4



DRAWING 5



DRAWING 6



Use this troubleshooting supplement to help:

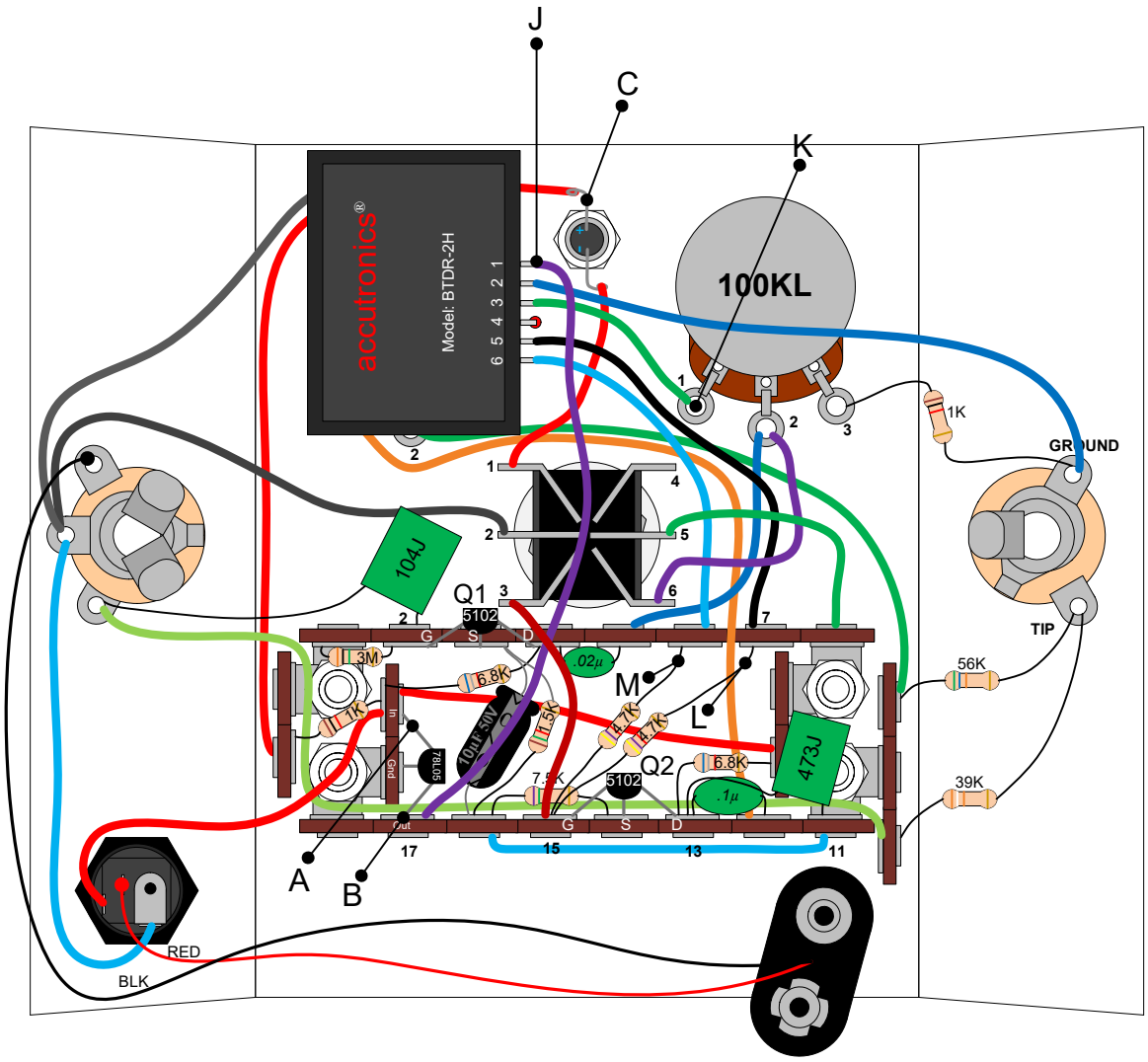
- Measure DC voltage test points to identify major discrepancies and locate problem areas.

(Keep in mind that the voltage measurements will vary slightly from kit to kit. The voltages you measure should be in the same ballpark, but do not expect to get the exact same value.)

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 output jack's ground lug. The other volt meter lead will be used to measure DC voltage at the test points shown below.

DC Voltage Test Points

A (Power Supply):	9.1 VDC
B (Vcc):	5.0 VDC
C (LED Anode):	2.0 VDC
D (Q1 **D**rain):	6.1 VDC
E (Q1 **G**ate):	0.0 VDC
F (Q1 **S**ource):	0.7 VDC
G (Q2 **D**rain):	8.3 VDC
H (Q2 **G**ate):	0.0 VDC
I (Q2 **S**ource):	0.9 VDC
J (BTDR Pin 1 - Vcc):	5.0 VDC
K (BTDR Pin 3 - Vin):	0.0 VDC
L (BTDR Pin 5 - Vout):	0.0 VDC
M (BTDR Pin 6 - Vout):	0.0 VDC

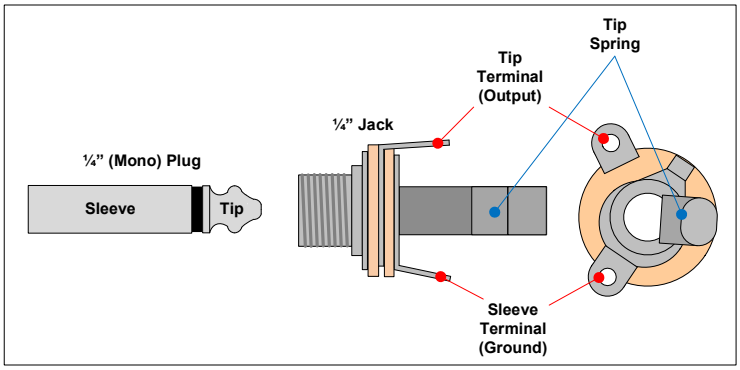


Measuring AC Voltages from the Guitar Signal

Once your DC voltages are in order, if your kit is still not working properly, you can measure AC voltages along the signal path to troubleshoot further.

You will need a volt meter that can measure the small signal AC voltages that electric guitars put out. The output signal from your guitar will likely be less than 1 V.

First, measure the output signal directly from your guitar. You can do this by plugging your guitar cable into the guitar and leaving the other end of the cable disconnected. Connect your meter across the disconnected ¼" plug's "tip" and "sleeve" sections. Make sure your guitar's volume and tone controls are turned up and strum a chord. When you strum, you should see the AC voltage reading on the meter quickly rise to some maximum value and then fall back to 0 VAC when you stop strumming and the strings come to a rest.



Once you are able to measure the output signal from your guitar directly, plug the guitar into the input jack of your kit and use the AC test points to measure the guitar signal along the signal path. Start with test point one and move along in order. You should be looking to identify the last test point where the signal seems normal and the first test point where the signal seems unusual or where it is no longer even present.

The AC voltages on the layout drawing and schematic are numbered 1 through 12 and were measured while strumming an open E chord on a strat switched to the neck pickup only position. All test points were measured with respect to ground. *AC signal voltage levels may vary dramatically from one instrument to another depending on the electronics and how hard you strum.*

AC Voltages (1 - 12) taken with both controls set to half-way point and strumming open E chord on a strat with single coil neck pickup on.

AC Voltage Test Points

1 = 0.13 VAC

2 = 0.13 VAC

3 = 2.2 VAC

4 = 1.6 VAC

5 = 0.33 VAC

6 = 0.26 VAC

7 = 0.26 VAC

8 = 0.22 VAC

9 = 0.17 VAC

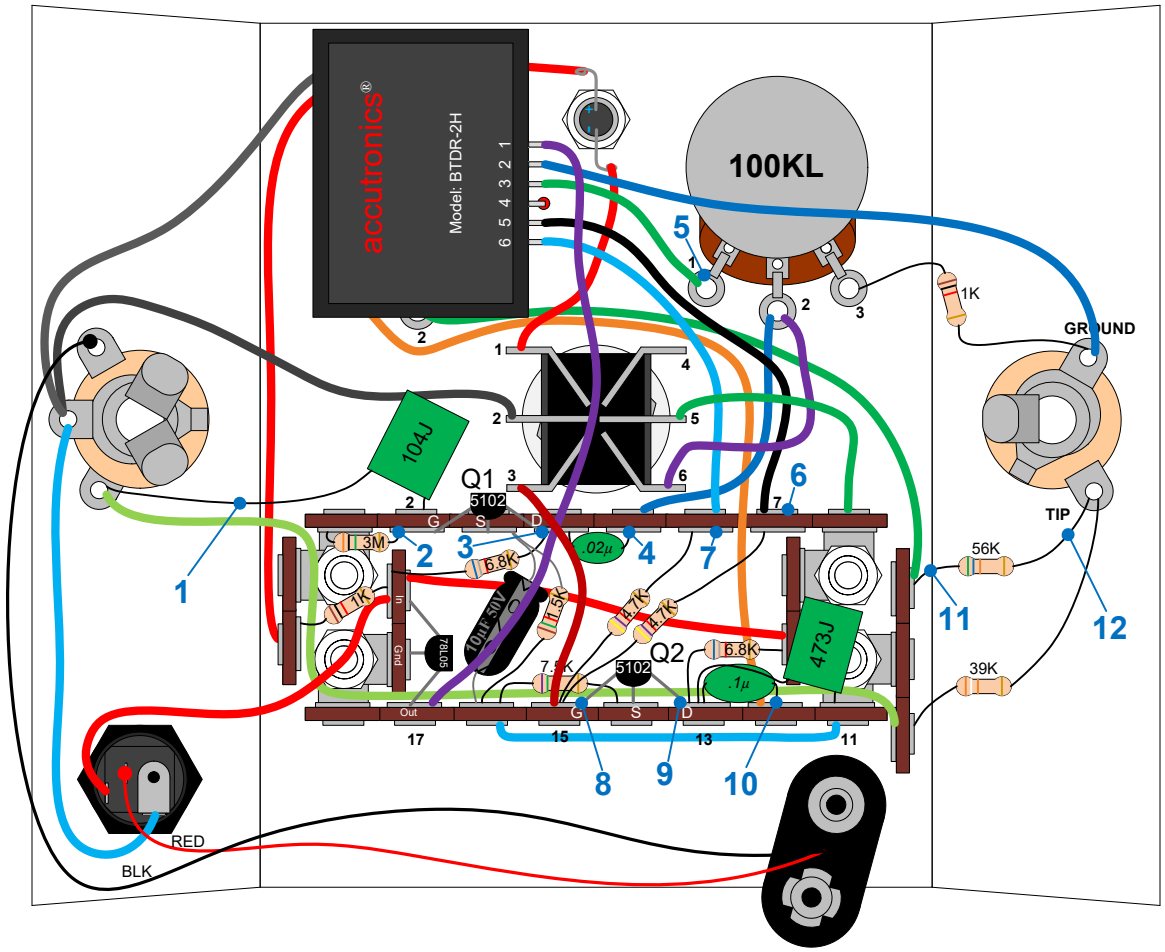
10 = 0.17 VAC

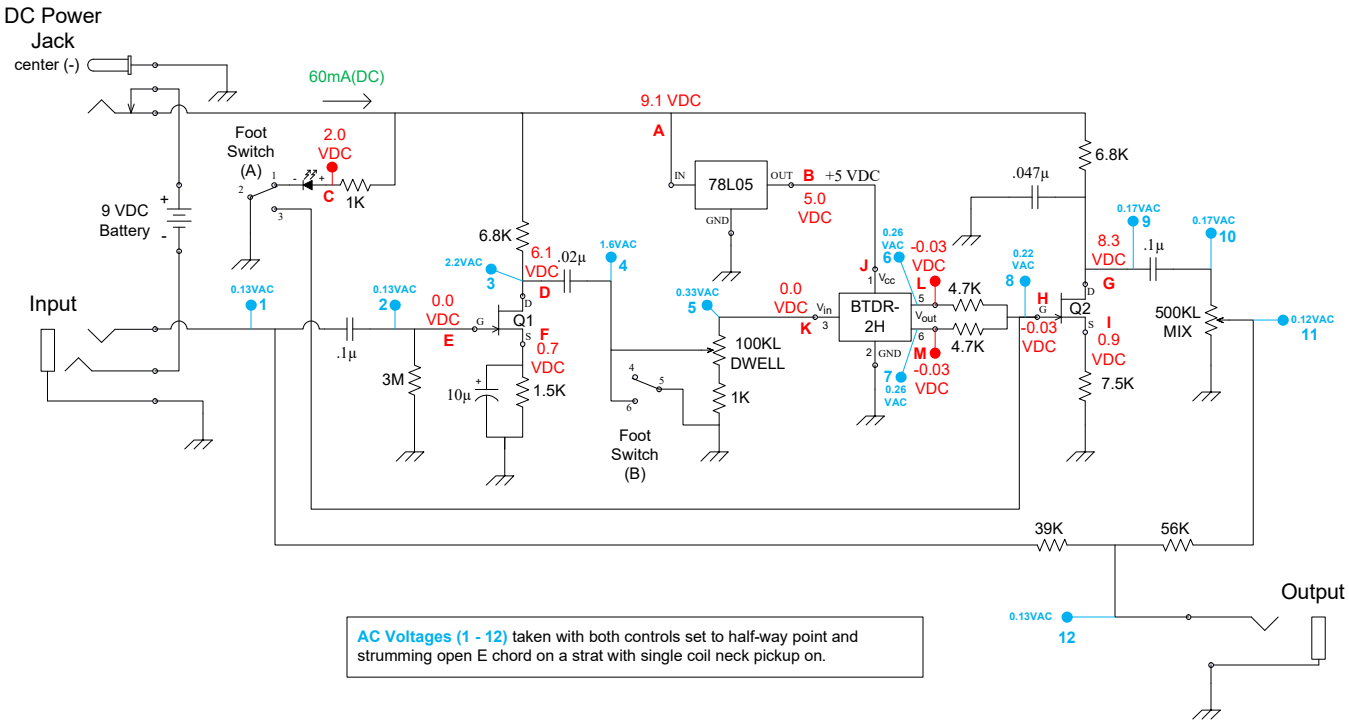
11 = 0.12 VAC

12 = 0.13 VAC

Connect your guitar to the input jack and take AC voltage measurements at each test point with both controls turned up half way. At each test point the AC voltage should increase dramatically each time you strum the guitar. (No strum = 0.0 VAC).

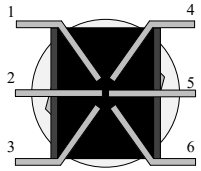
The actual values you measure will depend on your guitar's pickups and how hard you strum.



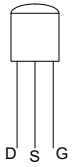


AC Voltages (1 - 12) taken with both controls set to half-way point and strumming open E chord on a strat with single coil neck pickup on.

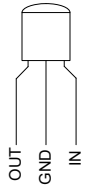
DPDT Foot Switch



PF5102 n-channel JFET



78L05 Voltage Regulator



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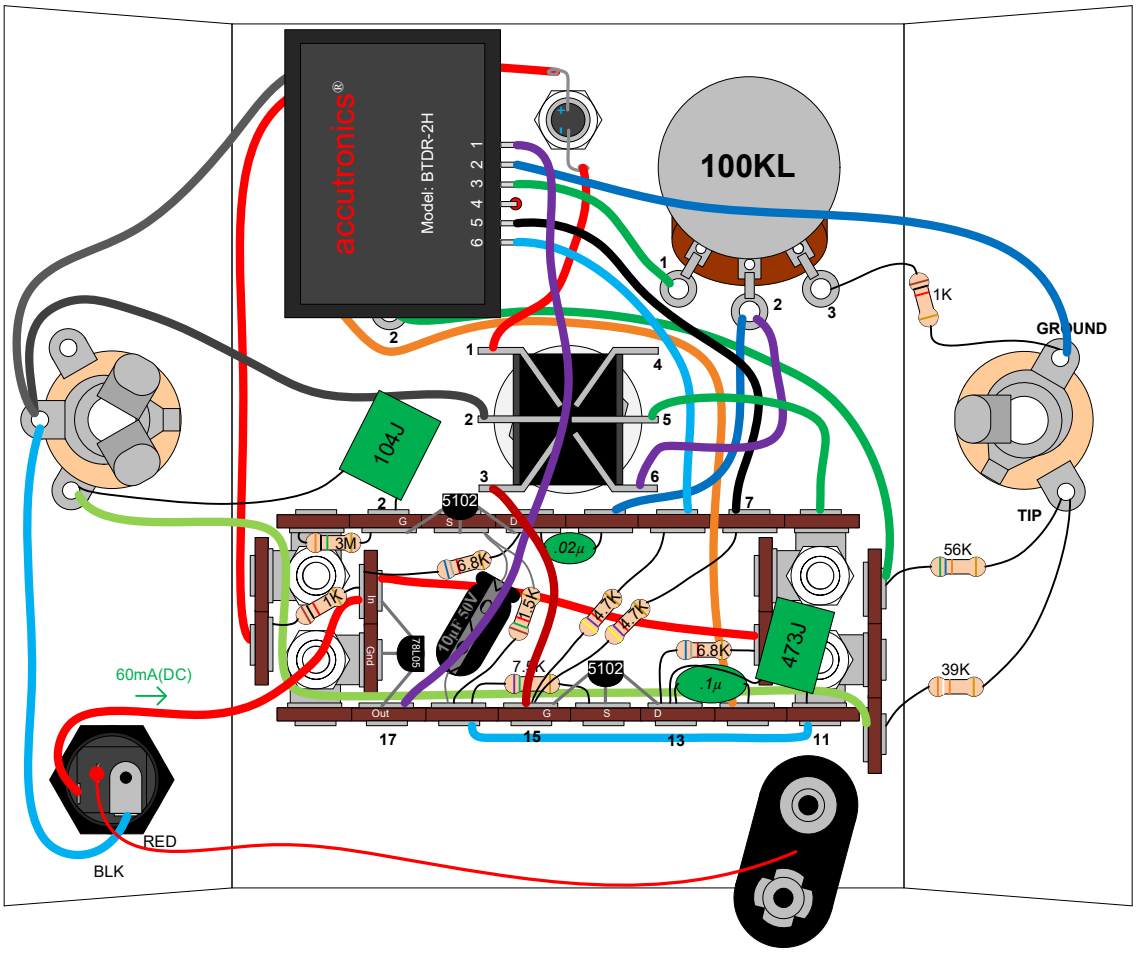
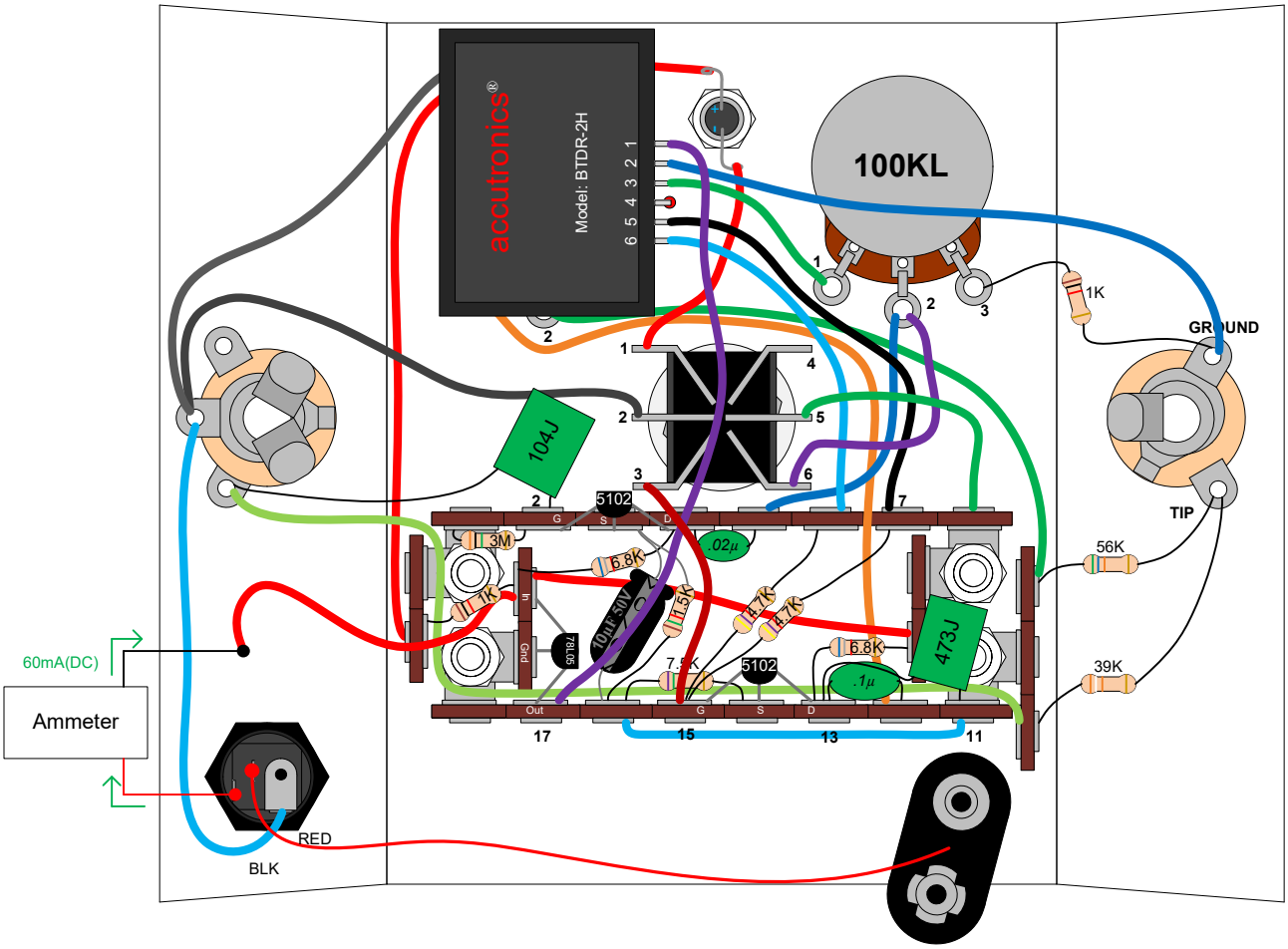
"The Verb Deluxe" (K-915) Schematic


accutronics®
Model: BTDR-2H
6 5 4 3 2 1
100KL
1K
GROUND
TIP
56K
39K
104J
473J
5102
.02µ
.1µ
6.8K
4.7K
1.5K
1K
3M
10µF 50V
78L05
60mA(DC)
RED
BLK


accutronics®
Model: BTDR-2H
6 5 4 3 2 1
100KL
1K
GROUND
TIP
56K
39K
104J
473J
5102
.02µ
.1µ
6.8K
4.7K
1.5K
1K
3M
10µF 50V
78L05
60mA(DC)
Ammeter
RED
BLK