

THE SUSPENDED CHIME (K-977)



Use these instructions to learn:

- How to build an effects pedal for two digital effect options (chorus & chorus/delay).

The Suspended Chime uses the Accutronics BTSE-16FX Digital Sound Effector module to provide two effects in one pedal, chorus and chorus with delay. The blend control allows you to go from subtle to lush chorus effect. Flip the toggle switch for chorus with a 190 millisecond delay adding spatial depth to your tone.

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



TABLE OF CONTENTS

TOOL LIST	2
PARTS LIST DRAWINGS.....	3 - 5
FINAL ASSEMBLY REFERENCE DRAWING.....	6
SOLDERING TIPS	7
STEP BY STEP ASSEMBLY INSTRUCTIONS	8 - 12
Section 1 – Mount Large Components	8
Section 2 – Wire Large Components	9
Section 3 – Prepare the BTSE-16FX Module	10
Section 4 – Mount Components to Terminal Strips	10
Section 5 – Install the BTSE-16FX Module	11
Section 6 – Finishing Up	12
<u>ASSEMBLY DRAWINGS</u> (4 Drawings)	13, 14

These are the last 2 pages. They should be separated and used as a reference to help assemble the kit correctly.

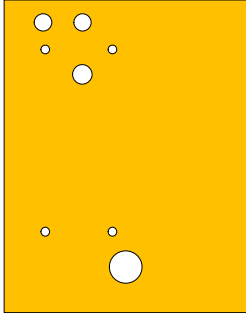
TOOL LIST

- Wire Strippers
- Needle Nose Pliers
- Cutting Pliers
- Desoldering Pump
- Solder (60/40 rosin core)
- Soldering Station
- Phillips Head Screwdrivers
- Slotted tip screwdrivers (2 or 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

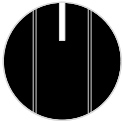
PARTS LIST 1

Stranded Wire (22 AWG) - White
K-PUL1569-WHITE (6 FT)

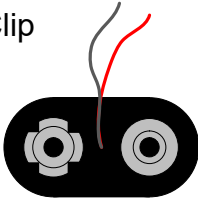
Enclosure
P-H1590BBCE-O (1)



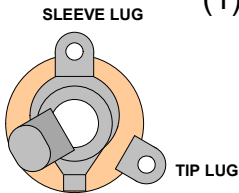
Knob
P-K680 (1)



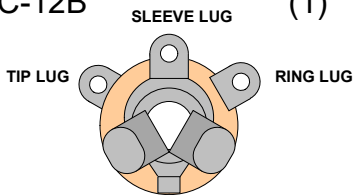
Battery Clip
S-H155 (1)



1/4" Mono Jack (Output Jack)
W-SC-11 (1)



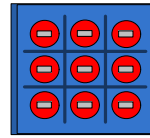
1/4" Stereo Jack (Input Jack)
W-SC-12B (1)



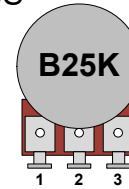
DC Power Jack
S-H750 (1)



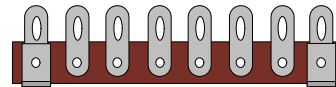
3PDT Foot Switch
P-H501 (1)



Potentiometer, 25KL
R-VAM25KL-SS (1)

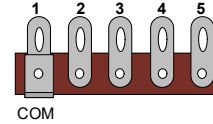


Terminal Strip with 8 Terminals
P-0802H (2)

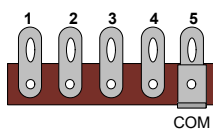


Terminal Strips with 5 Terminals

P-0501H01 (1)
1st Lug Common



P-0501H05 (1)
5th Lug Common



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



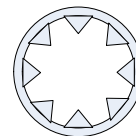
#4 Nut
S-HHN440 (4)



#4 Lock Washer
S-HLW4 (4)

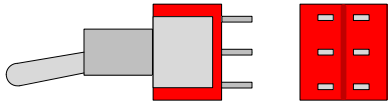


3/8" Lock Washer
S-HLW38 (1)

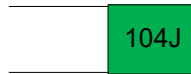


PARTS LIST 2

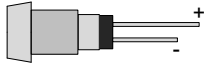
DPDT Mini Toggle Switch
P-H541 (1)



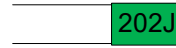
0.1 μ F Capacitor 100V
C-PEID1-100 (5)



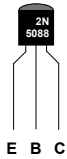
Light Emitting Diode
P-L400 (1)



0.002 μ F Capacitor 100V
C-PEID002-100 (1)



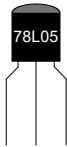
NPN BJT (2N5088)
P-Q2N5088 (2)



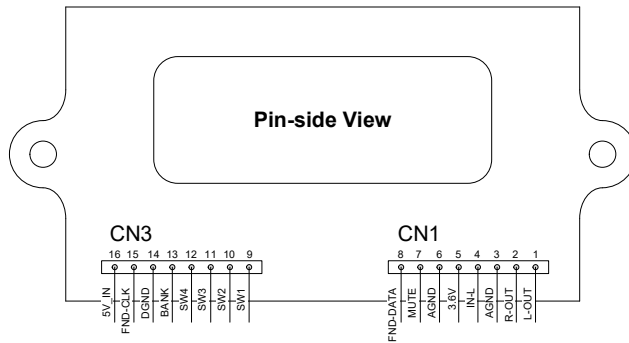
4700 μ F Polarized Capacitor 16V
C-ET4700-16 (1)



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



Digital Sound Effector (BTSE-16FX)
P-RKBTSE-16FX (1)



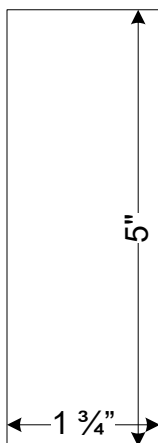
Double Sided Foam Tape (1" x 1")
(1)



Suspended Chime Sticker
(1)



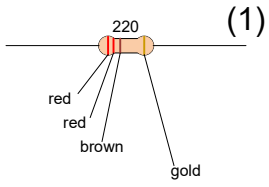
Insulating Tolex, 1 3/4" x 5"
S-G312 (1)



PARTS LIST 3

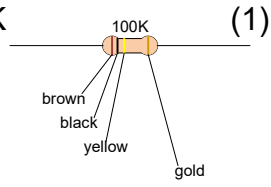
220Ω Resistor ½ W

R-A220



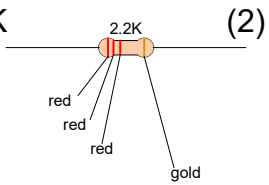
100kΩ Resistor ½ W

R-A100K



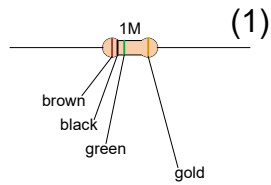
2.2kΩ Resistor ½ W

R-A2D2K



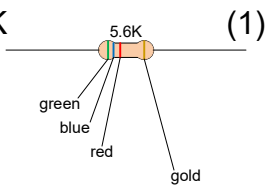
1MΩ Resistor ½ W

R-A1M



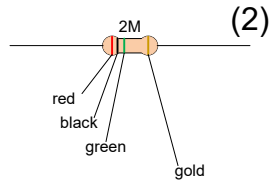
5.6kΩ Resistor ½ W

R-A5D6K



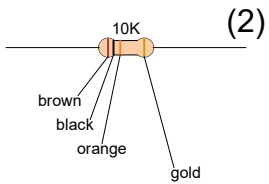
2MΩ Resistor ½ W

R-A2M



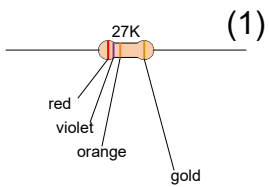
10kΩ Resistor ½ W

R-A10K



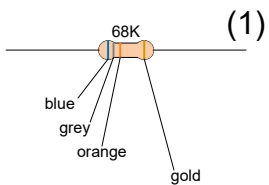
27kΩ Resistor ½ W

R-A27K



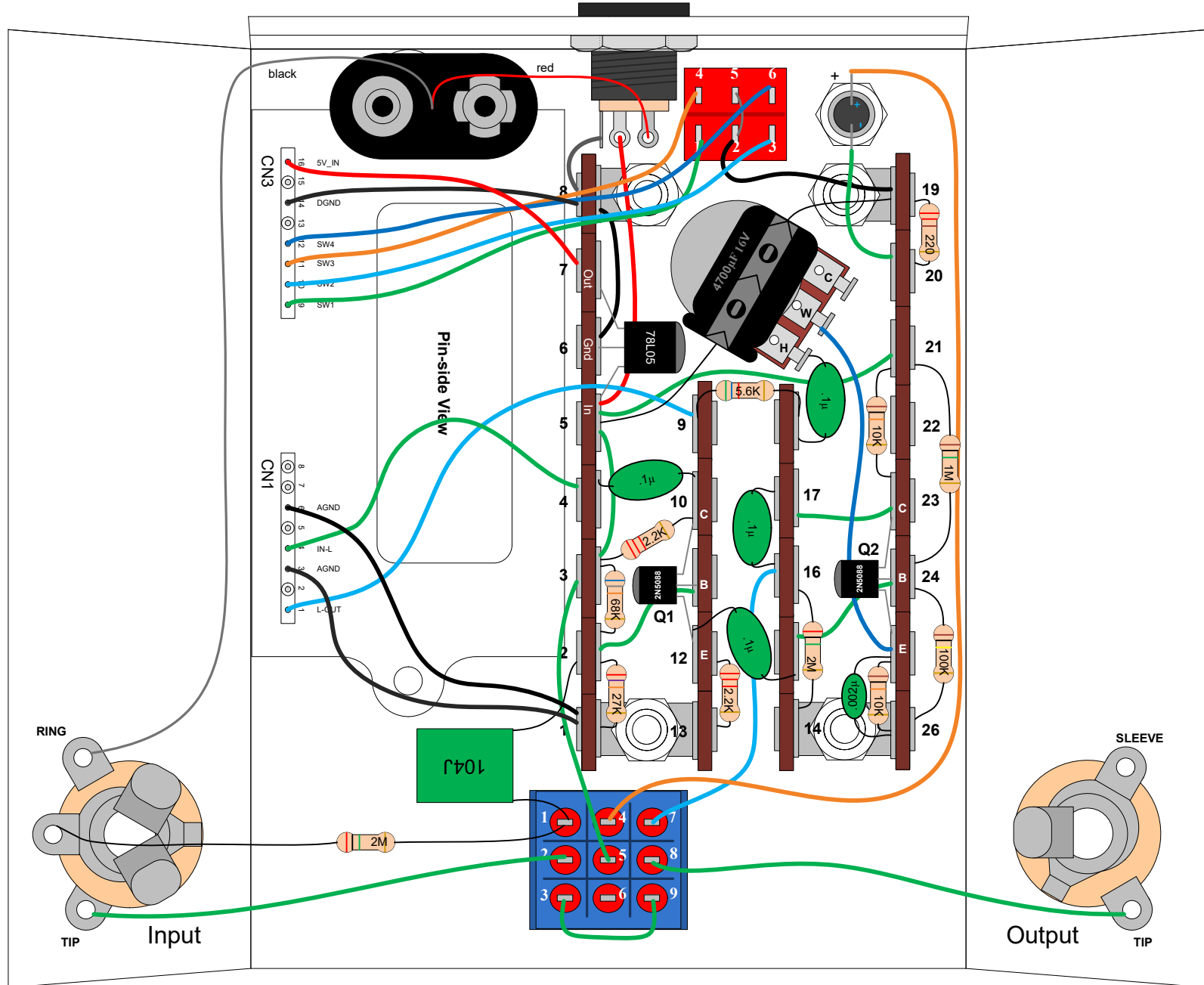
68kΩ Resistor ½ W

R-A68K



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.

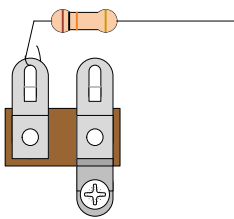


SOLDERING TIPS

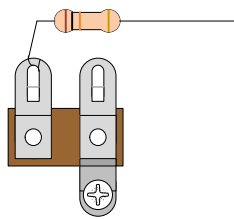
It is important to make a good solder joint at each connection point. A cold solder joint is a connection that may look connected but is actually disconnected or intermittently connected. (A cold solder joint can keep your project from working.)

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.*

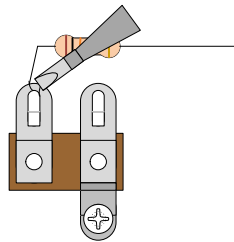
1. Bend the component lead or wire ending and wrap it around the connection point.
 - Make sure it is not too close to a neighboring component which could cause an unintended connection.
2. Wrap the component lead so that it can hold itself to the connection point.
3. Touch the soldering iron to both 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.



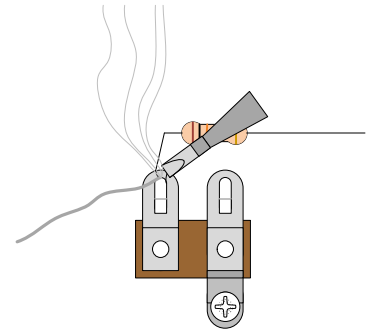
1. Bend the component lead and wrap it around the connection point.



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

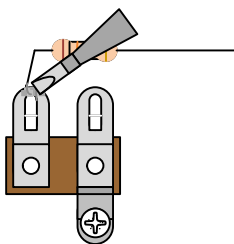


3. Heat up both component lead and connection point with the soldering iron.

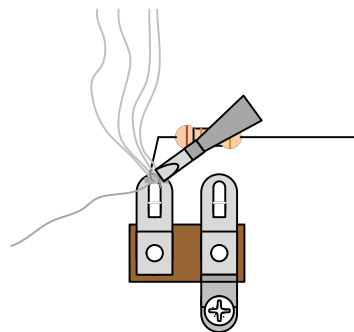


4. Apply solder to both component lead and connection point.

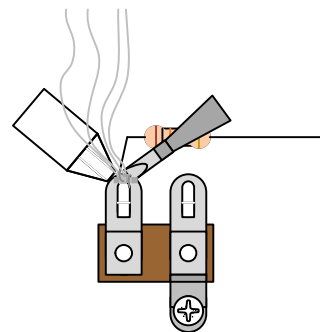
De-Soldering Tip



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

Please refer to DRAWING 1 and DRAWING 2.

Orient the enclosure with the two 1/4" holes on top.

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

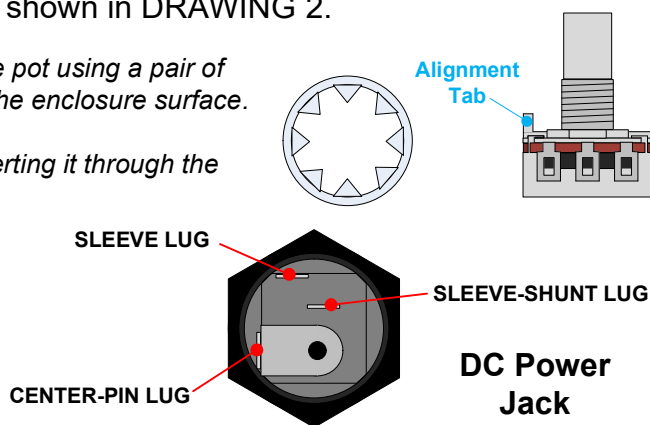
- Mount the LED in the 1/4" hole in the upper right corner. Align the LED leads so that the anode (+) lead is closer to the top side of the enclosure as shown in Drawing 2.
- Mount the toggle switch in the 1/4" hole to the left of the LED. Make sure its solder lugs are oriented as shown in Drawing 2.

(The switch terminals work the same with respect to a 180 degree rotation).

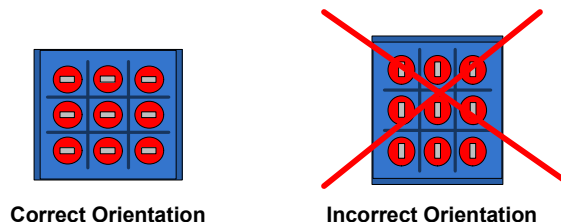
- Use the 4 screws, hex nuts and lock washers to fasten the 4 terminal strips to match DRAWING 2. The end of #1 may need to be snipped off using wire cutters to fit the footswitch.
- Mount the 25KL pot in the 9/32" hole below the toggle switch. Orient the pot so its solder lugs are angled toward the right side of the enclosure as shown in DRAWING 2.

- *Bend back and remove the alignment tab on the top of the pot using a pair of pliers before mounting so that it can mount flush against the enclosure surface.*
- *Place the 3/8" lock washer over the pot's shaft before inserting it through the enclosure hole.*

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



- Mount the input jack in the 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 makes soldering the connections easier.
- Mount the output jack in the 3/8" hole on the right side of the enclosure. Make sure the two solder lugs are in their most upright position before tightening the nut.
- Mount the footswitch in the 15/32" hole in the center of the enclosure. The lock washer mounts on the inside between the enclosure surface and one hex nut. Then the nylon washer goes under the other mounting nut on the outside of the enclosure. Make sure that the footswitch is oriented to match DRAWING 2.



(The switch terminals work the same with respect to a 180 degree rotation).

Note that each terminal strip terminal has been numbered (1 to 26) as shown in DRAWING 2 and will be referred to as a "terminal #_" when connecting different components and wires throughout the assembly instructions.

SECTION 2 – Wire Large Components

Please refer to DRAWING 3.

Stripping wire, 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 $\frac{1}{4}$ " of insulation off each end. Twist each end of the stranded wire, and apply a small amount of solder to each end (i.e. tin the wire ends). This will prevent the stranded wire from fraying and will make the final soldering much easier.

Tip: Push the wires down toward the bottom of the enclosure after making the connections to leave more room for mounting the components later in the instructions.

- Strip and tin a $1 \frac{5}{8}$ " piece of wire and connect the input jack's tip lug to footswitch lug 2.
- Strip and tin a $1 \frac{5}{8}$ " piece of wire and connect the output jack's tip lug to footswitch lug 8.
- Strip and tin a $1 \frac{1}{2}$ " piece of wire and connect footswitch lugs 3 and 9.
- Strip $\frac{1}{2}$ " of insulation off the end of the wire spool, twist and tin it. When this tinned wire end cools, cut off the bare portion of wire and connect it from the DC power jack's center-pin lug to terminal #8. *(Leave room at #8 for more wire connections).*
- Strip and tin a $2 \frac{1}{2}$ " piece of wire and connect footswitch lug 5 to terminal #3.
- Strip and tin a 2" piece of wire and connect terminals #3 and #5.
- Strip and tin a 3" piece of wire and connect terminals #5 and #21.
- Strip and tin a 2" piece of wire and connect the DC power jack's sleeve lug to terminal #5.
- Strip and tin a 3" piece of wire and connect footswitch lug 7 to terminal #16
- Strip and tin a 6" piece of wire and connect footswitch lug 4 to the LED's anode (+) terminal.
(Connect the wire end and anode lead by bending and crimping them around each other. Solder them once they are tightly connected to each other).
- Strip and tin a $1 \frac{1}{2}$ " piece of wire and connect terminals #2 and #11.
- Strip and tin a 2" piece of wire and connect terminals #6 and #8. *(Leave room at #8).*
- Strip and tin a 1" piece of wire and connect the LED's cathode (-) lead to terminal #20.
(Connect the wire end and cathode lead by bending and crimping them around each other. Solder them once they are tightly connected to each other).
- Cut a $1 \frac{1}{2}$ " piece of wire. On one end strip and tin the usual $\frac{1}{4}$ ". On the other end, strip and tin $\frac{1}{2}$ ". Connect the $\frac{1}{2}$ " end to both toggle switch lugs 2 and 5. Connect the $\frac{1}{4}$ " end to terminal #19.
- Strip and tin a $2 \frac{1}{2}$ " piece of wire and connect the pot's "W" (wiper) lug to terminal #25.
- Strip and tin a $1 \frac{1}{2}$ " piece of wire and connect terminals #17 and #23.
- Strip and tin a $1 \frac{1}{2}$ " piece of wire and connect terminals #15 and #24.



SECTION 3 – Prepare the BTSE-16FX Module

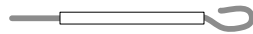
Six of the 16 pins will not be used: 2, 5, 7, 8, 13 and 15. To help identify these unused pins and help prevent shorting these pins with other connections we will insulate them.

- Insulate the unused module pins:

1. Strip a piece of insulation off of the wire provided about 2 ¼" long.
2. Cut this piece of insulation into six 3/8" length pieces.
3. Push each piece of insulation onto a different one of the six unused module pins.

- Connect the module wires:

For each of these wires, strip and tin ¼" on each end. 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.



Tip: To prevent accidentally shorting adjacent pins you may find it useful to stagger each hook's placement on the pins.

1. Cut five 2 ½" lengths of wire and connect one end of each to a different one of pins 3, 4, 6, 14 and 16.
2. Cut five 3" lengths of wire and connect one end of each to a different one of pins 1, 9, 10, 11 and 12.

Set the module aside until installation later in the instructions.

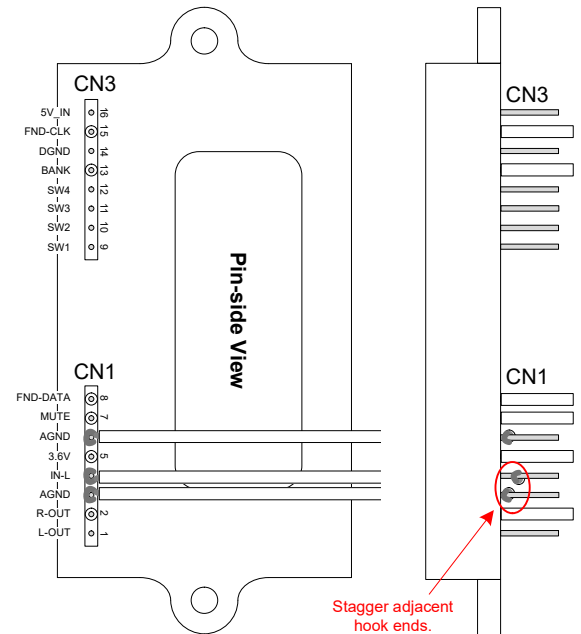
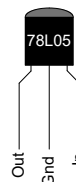
SECTION 4 – Mount Components to Terminal Strips

Please refer to **DRAWING 4**.

Connect and solder all 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).

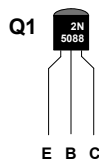
- Connect a 2M resistor from footswitch lug 1 to the input jack's sleeve lug. **Do not solder the footswitch connection, yet.**
- Connect a 0.1µF cap from footswitch lug 1 to terminal #2. **Solder both connections now.**
- Connect the 27K resistor from terminal #1 to #2.
- Connect the 68K resistor from terminal #2 to #3.
- Connect a 2.2K resistor from terminal #3 to #10.
- Connect a 0.1µF cap from terminal #4 to #10. (Mount this cap upside down between the two terminal strips leaving more room for other connections).
- Connect the 78L05 to terminals #5, #6 and #7:

- "Out" lead connects to #7
- "Gnd" lead connects to #6
- "In" lead connects to #5



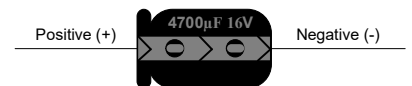
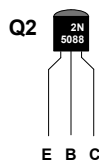
- Connect the 220 ohm resistor from terminal #19 to #20.
- Connect a 0.1 μ F cap from the pot's "H" (hot) lug to terminal #18.
- Connect the 5.6K resistor from terminal #9 to #18.
- Connect a 10K resistor from terminal #21 to #23.
- Connect a 100K resistor from terminal #24 to #26.
- Connect the 1M resistor from terminal #21 to #24. *Tip: Connect the terminal #24 lead of this resistor toward the bottom of the lug to leave more room for connecting Q2's collector and base leads.*
- Connect the remaining 10K resistor from terminal #25 to #26. *(Push this resistor down leaving more room for the next component).*
- Connect the .002 μ F cap from terminal #25 to #26.
- Connect the remaining 2M resistor to terminals #14 and #16.
- Connect a 0.1 μ F cap from terminal #16 to #17.
- Connect the remaining 2.2K resistor from terminal #12 to #13.
- Connect the remaining 0.1 μ F cap from terminal #12 to #15.
- Connect one of the 2N5088 transistors to terminals #10, #11 and #12 as listed below.

Terminals #10: Collector
Terminals #11: Base
Terminals #12: Emitter



- Connect the remaining 2N5088 transistor to terminals #23, #24 and #25 as listed below.

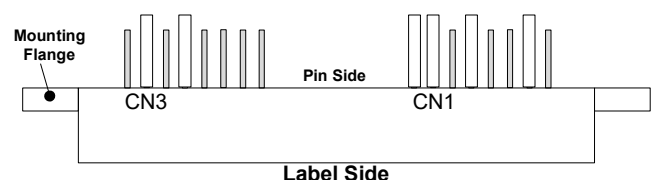
Terminals #25: Emitter
Terminals #24: Base
Terminals #23: Collector



- Connect the 4700 μ F cap with its positive end at terminal #5 and its negative end at #19.

SECTION 5 – Install the BTSE-16FX Module

- Remove the backing from one side of the foam tape and attach it to the center of the label side of the module.
- Remove the backing from the other side of the foam tape and insert the module pin-side-up in the enclosure to match the orientation of DRAWING 4. *(The module's mounting flange on the CN3 end should touch the top side of the enclosure).*
- Press and hold the module down against the enclosure surface for several seconds allowing the module to stick.



Connect the BTSE-16FX module pins as listed:

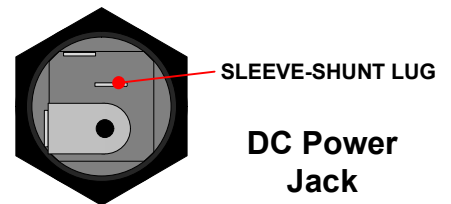
Tip: Route the wires along the module surface leaving room for the battery to fit on top of the module.

CN1 pins

- Connect pin 1 to terminal #9.
- Connect pin 3 to terminal #1.
- Connect pin 6 to terminal #1.
- Connect pin 4 to terminal #4.

CN3 pins

- Connect pin 9 to toggle switch lug 1.
- Connect pin 10 to toggle switch lug 3.
- Connect pin 11 to toggle switch lug 4.
- Connect pin 12 to toggle switch lug 6.
- Connect pin 14 to Terminal #8.
- Connect pin 16 to Terminal #7.
- Locate the battery snap connector. Connect and solder the red lead to the sleeve-shunt lug of the power jack.
- Connect and solder the black lead of the battery snap connector to the input jack's ring lug.

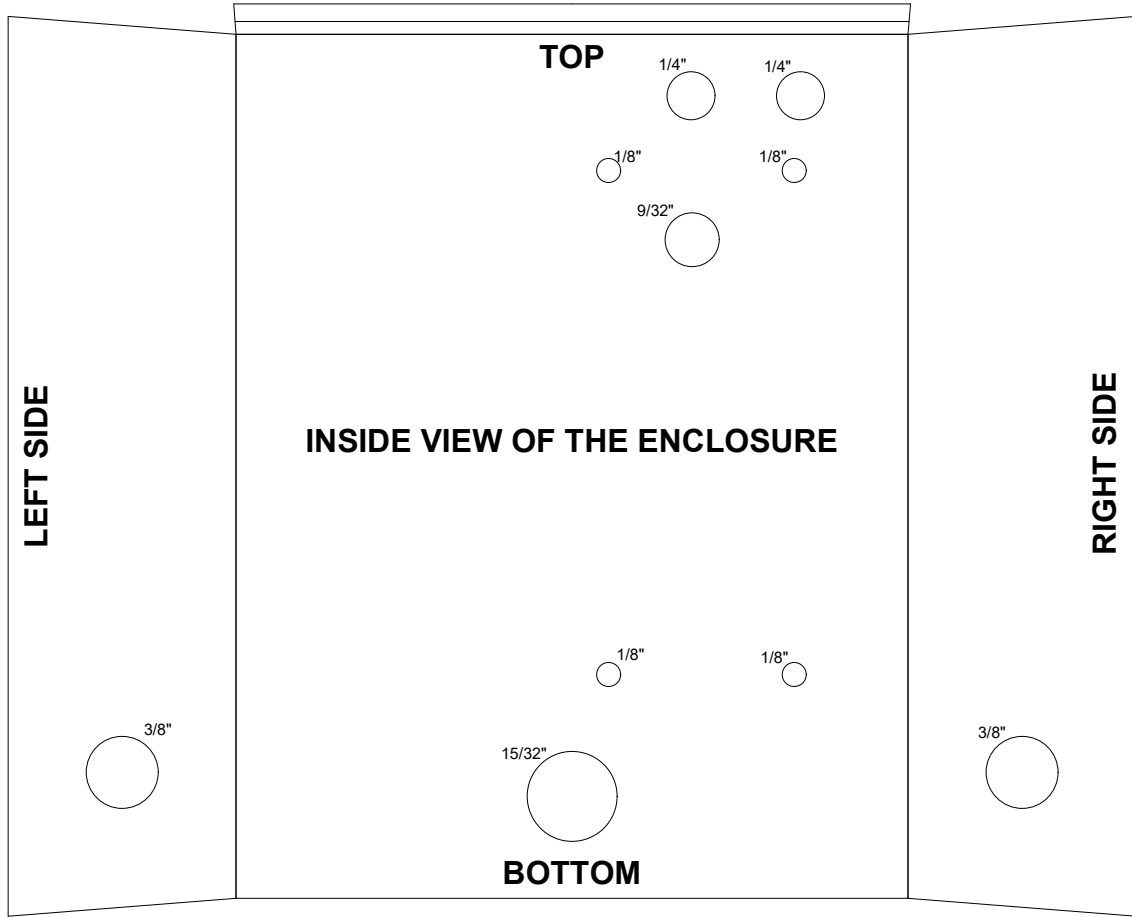


SECTION 6 – Finishing Up

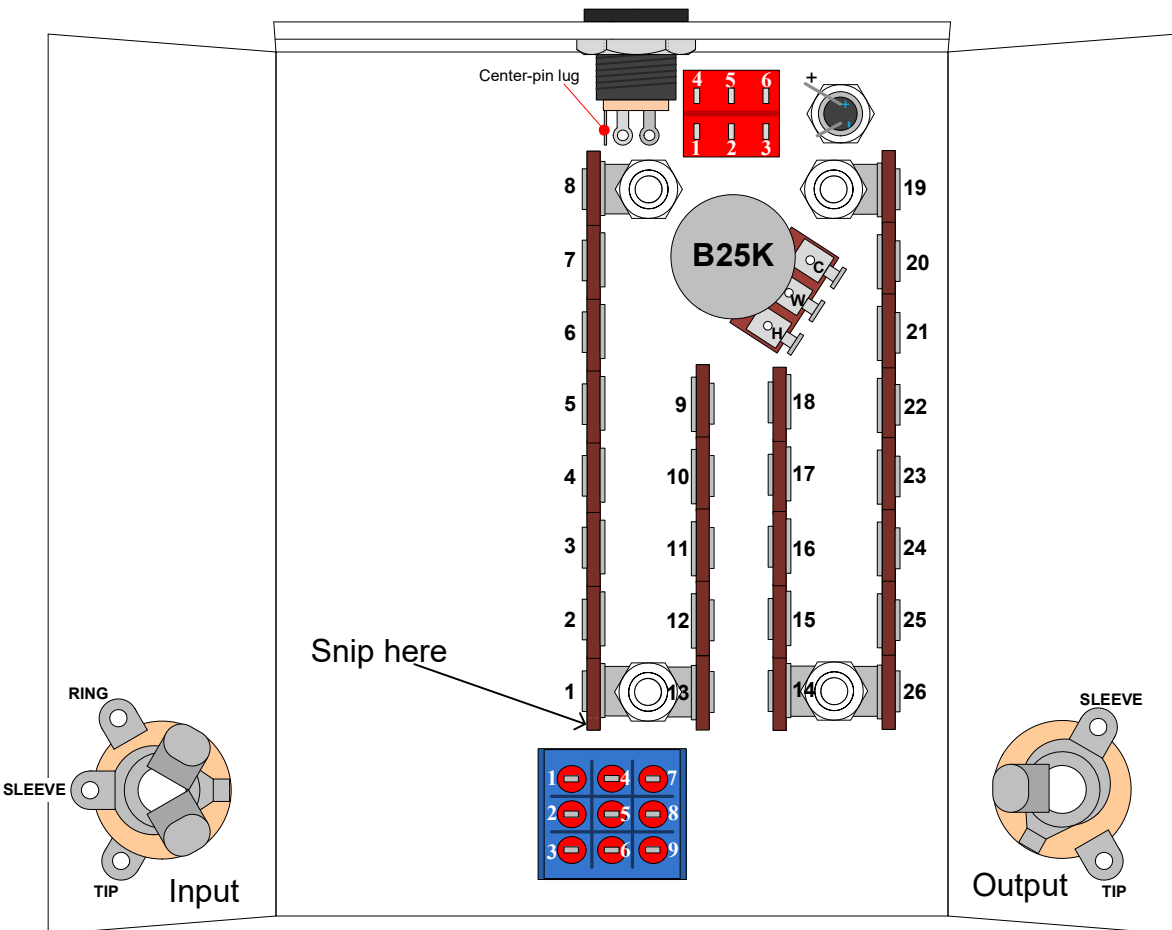
Take the time now to carefully double check your connections and make sure they match up with DRAWING 4.

- If you are going to use a 9V battery, consider wrapping it in the piece of tolex provided and place the battery on top of the BTSE-16FX module. The tolex can help prevent the battery from moving around inside the enclosure when the cover is attached. Attach the enclosure cover using the screws provided.
- Fasten the knob to the potentiometer shaft by tightening the knob's set screw.
- Plug your guitar into the input jack on the right side of the pedal. This turns power on when you are not using an AC adapter for power. *When using a battery for power, remember to unplug from the input jack of the pedal to turn it off and save battery life.*
- Plug another guitar cable from the output jack (left side) to your amp's input.

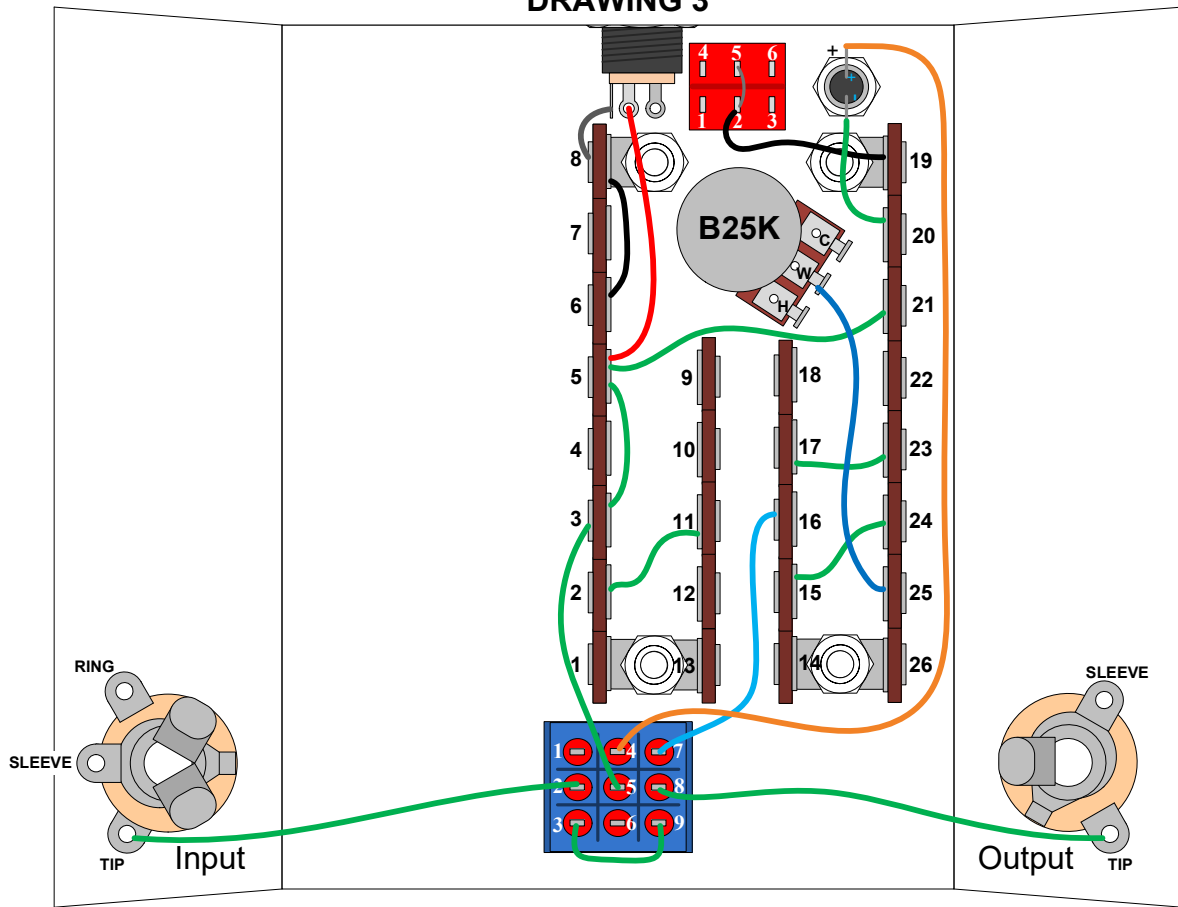
DRAWING 1



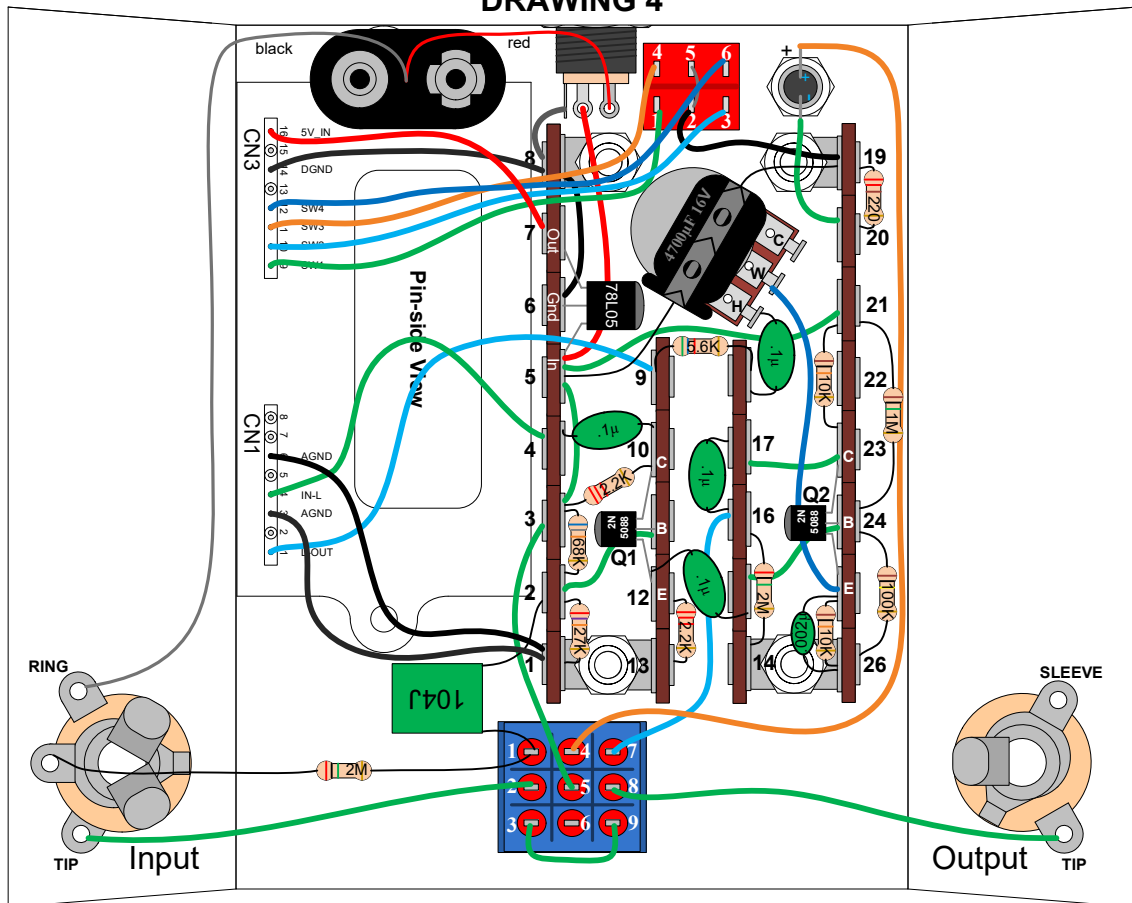
DRAWING 2



DRAWING 3



DRAWING 4



The Suspended Troubleshooting Supplement

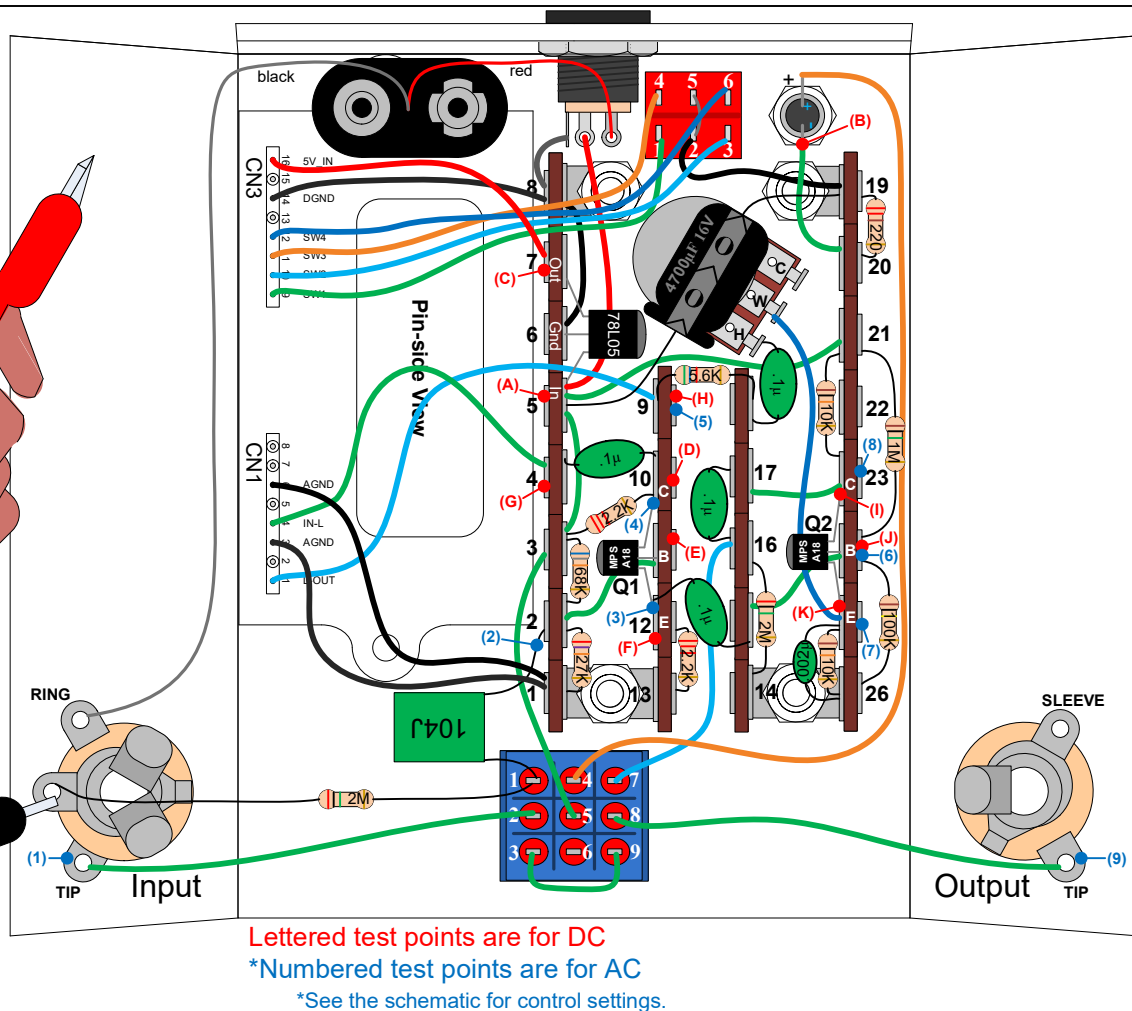
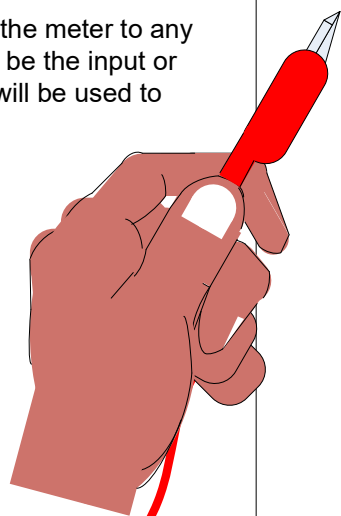
After thoroughly double-checking your connections, the next step is to take DC voltage measurements to help locate problem areas.

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 voltages 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

A = 9.2 VDC Power	H = 0.0 VDC BTSE L-OUT
B = 6.8 VDC LED (-)	I = 8.8 VDC Q2 Collector
C = 5.0 VDC BTSE 5V_IN	J = 0.8 VDC Q2 Base
D = 7.2 VDC Q1 Collector	K = 0.3 VDC Q2 Emmiter
E = 2.6 VDC Q1 Base	
F = 2.0 VDC Q1 Emitter	
G = 0.0 VDC BTSE IN-L	



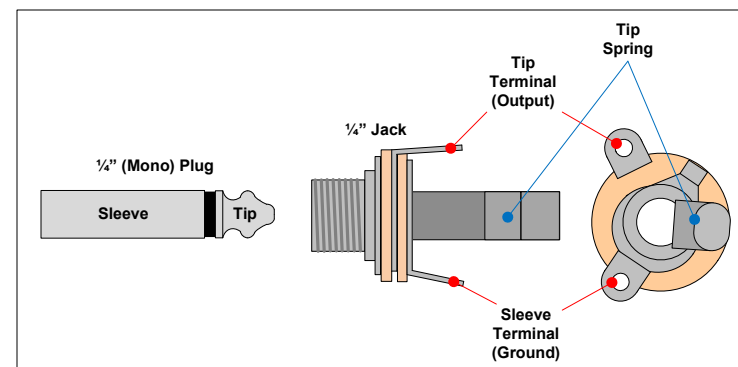
Measuring AC Voltages from the Guitar Signal

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 1/4" 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 are at rest.

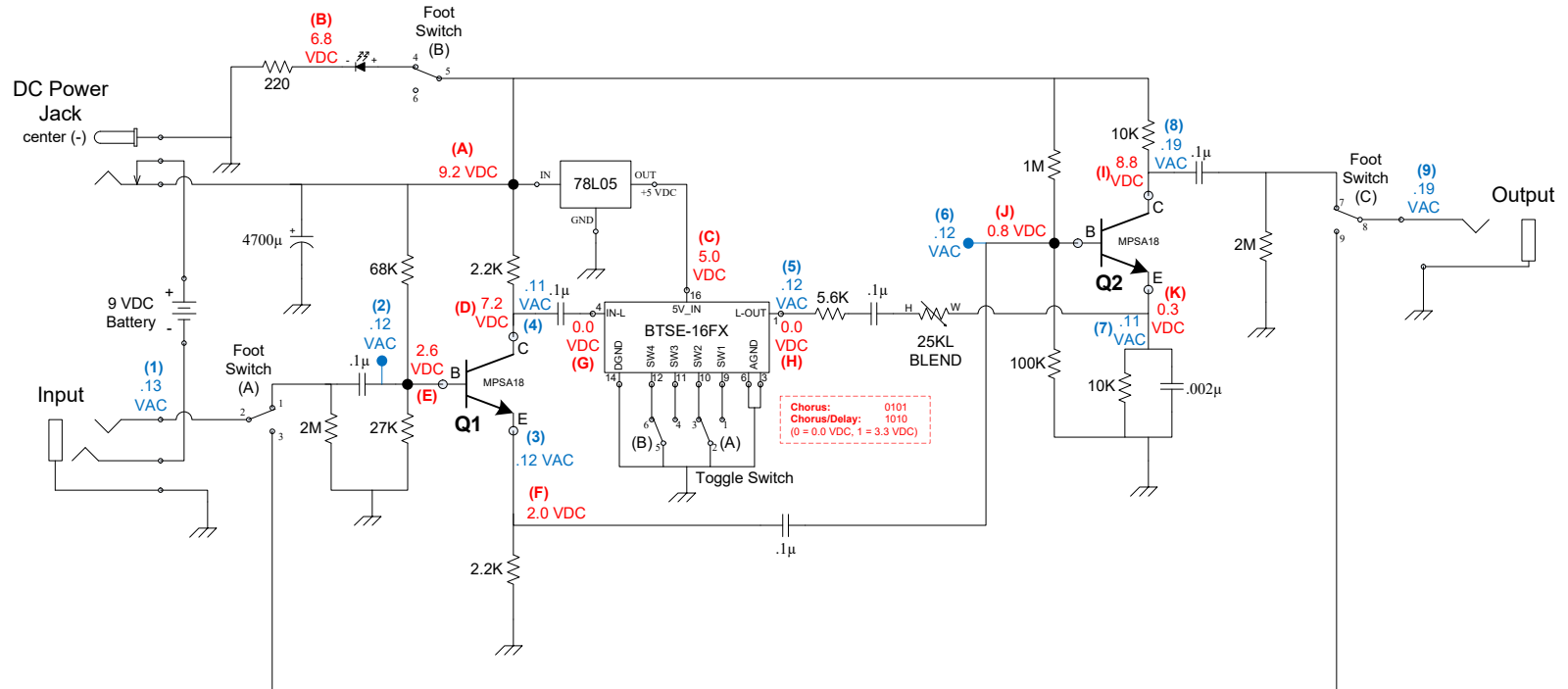
Once you are able to measure the output signal from your guitar directly, plug the guitar into the input jack of your kit and use the AC test points to measure the guitar signal along the signal path. Start with test point one and move along in order. You should be looking to identify the last test point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



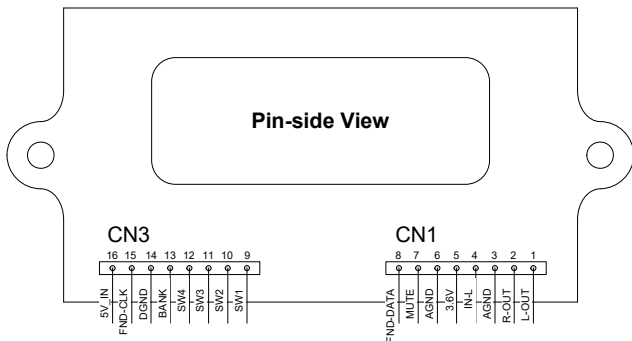
Control settings for Voltage Measurements

- Blend (25KL) = full clockwise rotation (max)
- Toggle Switch: Chorus mode
- Guitar: Strat Neck Pickup (full volume and tone settings)

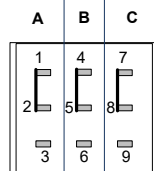
- Letters A to K = DC Voltage Measurements
- Numbers 1 to 9 = AC Signal Voltage Measurements



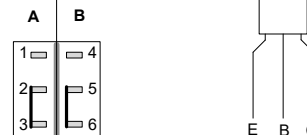
BTSE-16FX
Digital Sound Effector



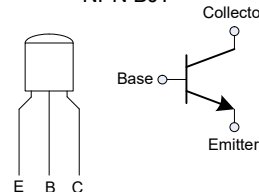
P-H501
3PDT
Footswitch



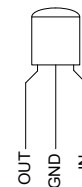
P-H541
Effect Toggle
Switch



MPSA18
NPN BJT



78L05
Voltage
Regulator

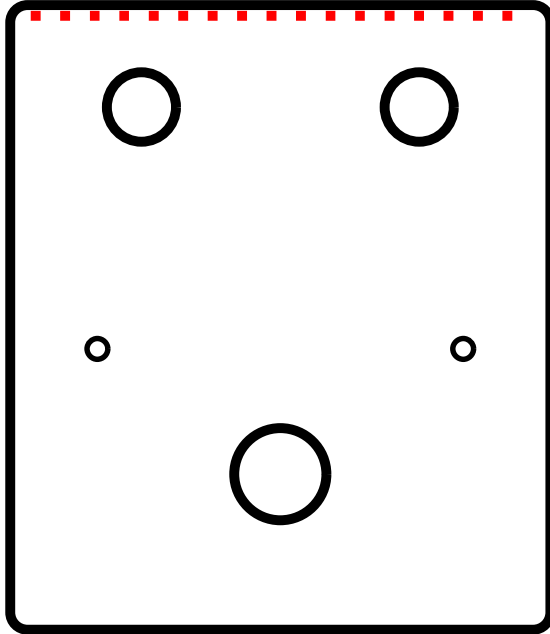


www.modkitsdiy.com
Copyright © 2015 by modkitsdiy.com

"The Suspended Chime" (K-977)
Schematic

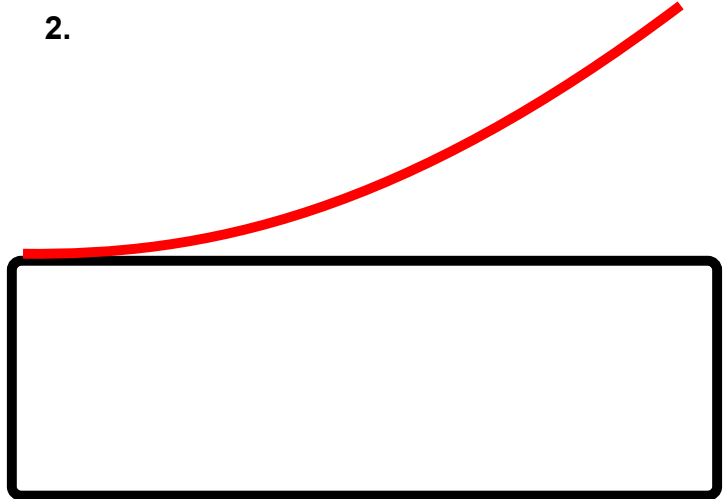
APPLYING THE STICKER TO MOD PEDAL ENCLOSURES

1.



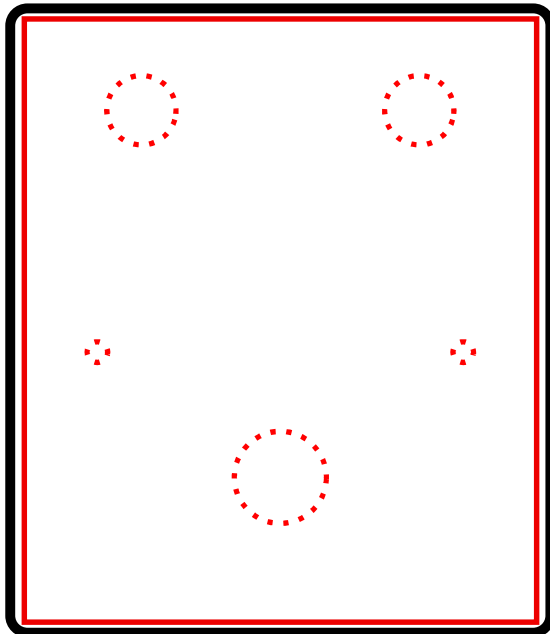
- Locate the top of the pedal as well as the top of the sticker. Page one of the instructions for your kit will have an image of the pedal that can be used for reference.

2.



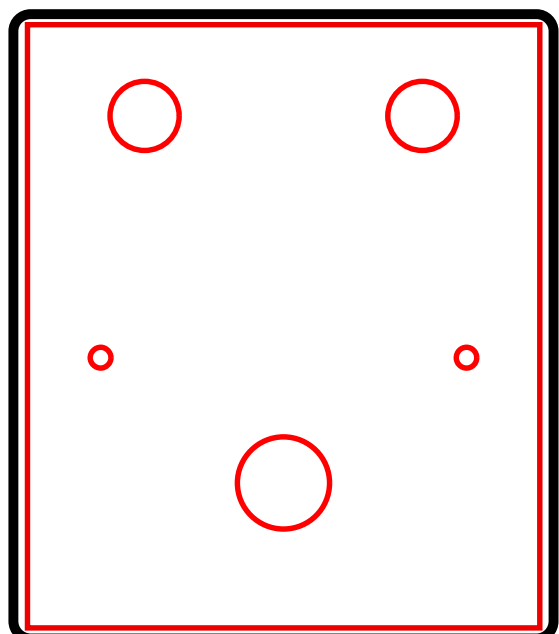
- Peel the backing from the sticker. Carefully line up the top edge of the sticker with the top of the pedal. Press down to apply the sticker only to the edge. Run a finger across the edge to push any air out from beneath the sticker. Continue this motion as you work your way down the pedal until the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