THIRD MAN HARDWARE

FUZZ-A-TRON

INSTRUCTION MANUAL

Contents

Introduction

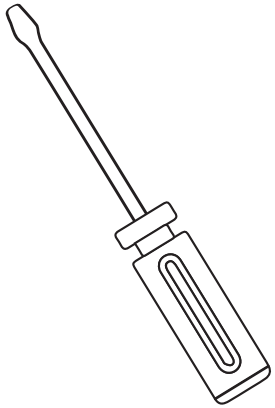
The Fuzz-A-Tron is the first audio product of Third Man Hardware's new line of consumer electronic kits. Kit building provides an enjoyable hands-on experience that results in practical products, continuing to serve you for many years to come.

Unpack your kit and check each part against the Parts List. Do not throw away any packaging material until you have accounted for all the parts.

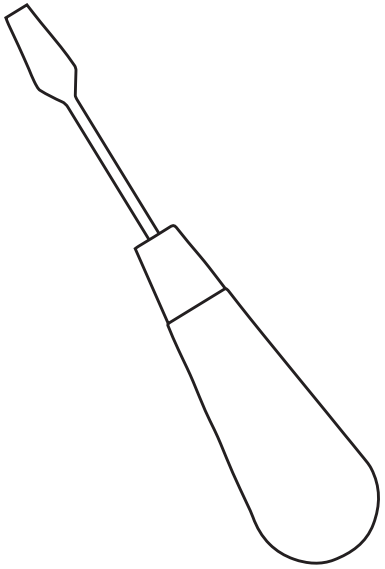
Please read through the entire build instructions before starting. This will give you an overview of the entire process and may help to eliminate mistakes along the way.

Tools

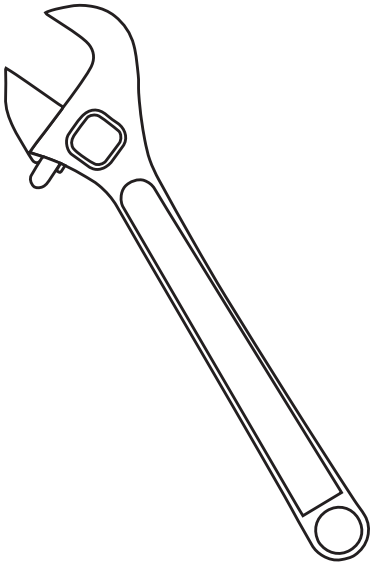
Pictured below are the typical kit assembly tools.



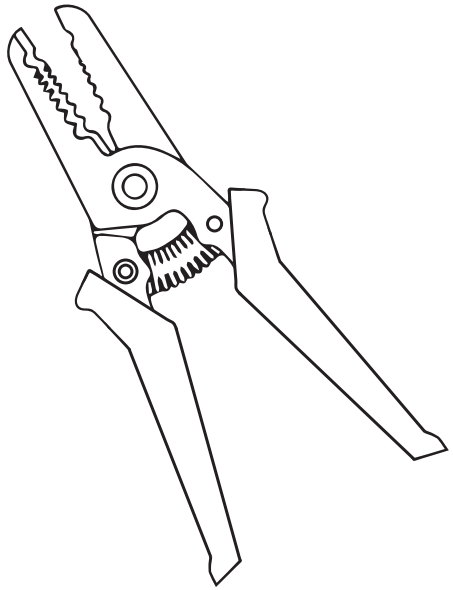
Mini Screwdriver



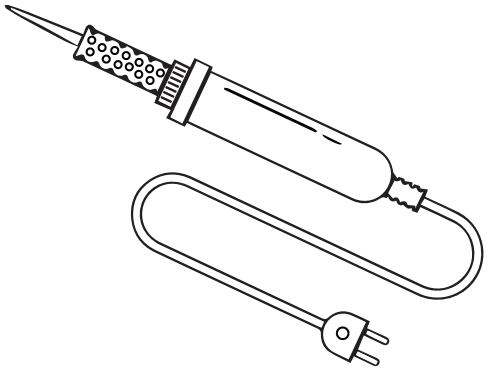
5-in-1 Screwdriver



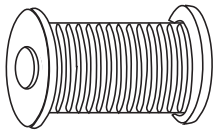
Adjustable Wrench



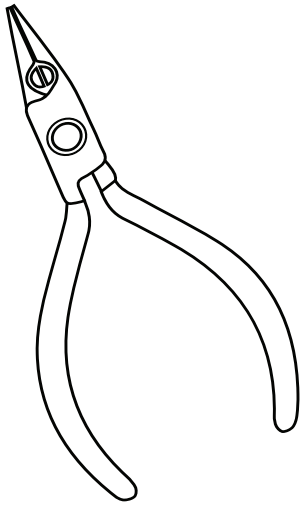
Wire Strippers



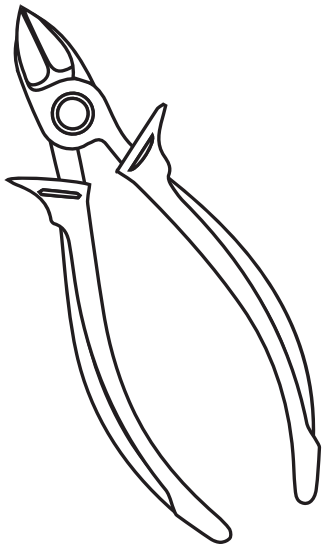
Soldering Iron (25-30 watts)



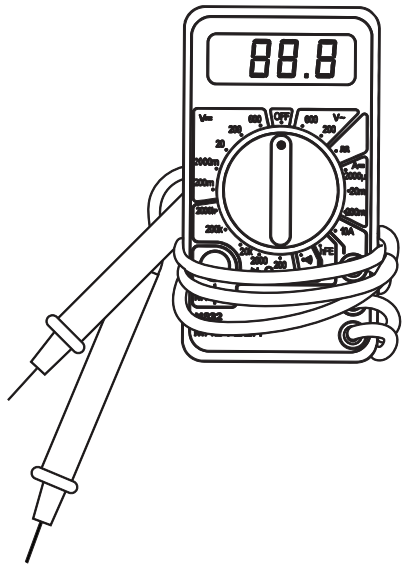
Rosin Core Solder



Small Needle Nose Pliers



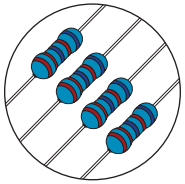
Diagonal Cutters

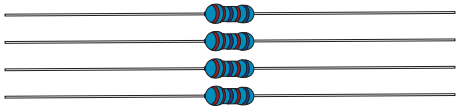


Simple Multimeter

Parts List

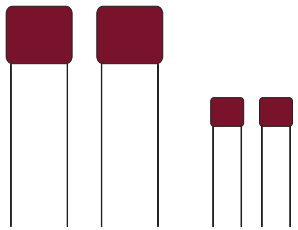
Unpack your kit and check each part against the following list.





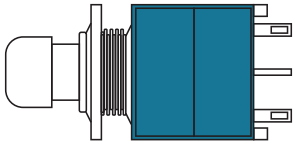
4x Resistors

330 kΩ ¼ watt resistor	R1
330 kΩ ¼ watt resistor	R2
330 kΩ ¼ watt resistor	R3
330 kΩ ¼ watt resistor	R4

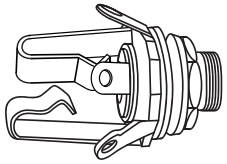


4x Capacitors

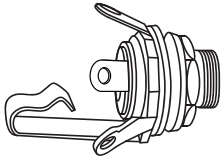
.047 µF polyester capacitor	C1
.047 µF polyester capacitor	C2
.0022 µF polyester capacitor	C3
.0022 µF polyester capacitor	C4



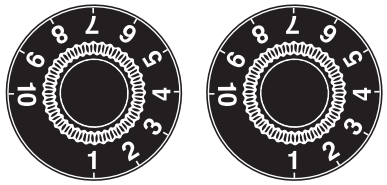
1x Footswitch



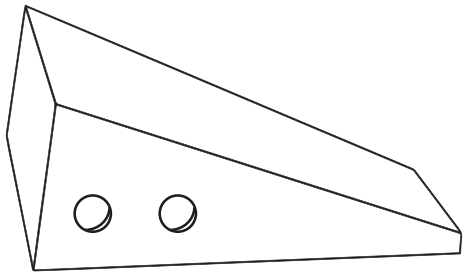
1x Tip-Ring-Sleeve Input Jack
(two spring contacts and three connector tabs)



1x Tip-Sleeve Output Jack
(one spring contact and two connector tabs)

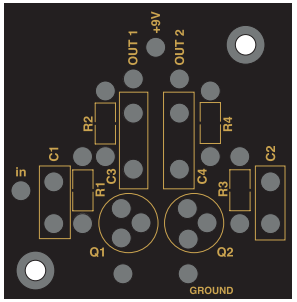


2x Control Knobs

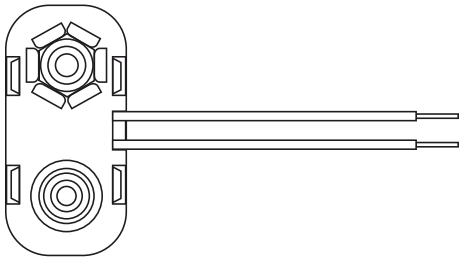


1x Chassis Box

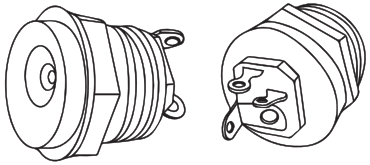
1x Bottom Cover Plate



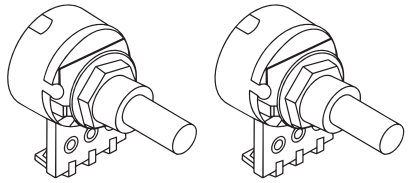
1x Circuit Board



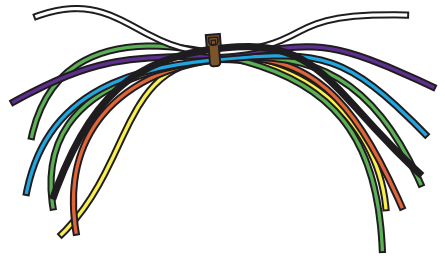
1x 9V Battery Connector Plug



1x External Power Jack

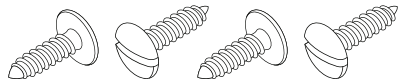


2x Potentiometers

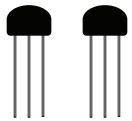


1x Color Coded Wires Pack

2x Zip Ties



4x 6-32 Screws



2x Transistors

2n3566 NPN transistor	Q1
2n3566 NPN transistor	Q2

4x Rubber Feet

Electronics Parts Mounting / PCB

MOUNTING & TESTING RESISTORS

In the following steps, you will be given detailed instructions on how to install and solder the first component on the circuit board.

The circuit board, also known as the **PCB** (printed circuit board), has foil patterns on one side and outlines of components (parts) on the other side. The "foil" side of the board will be referred to as such, and the side with the outlines will be called the "component" side of the board.

Position the circuit board as shown in **FIGURE 1** with the component side facing up.

NOTE: *Always install the parts on the component side of the PCB and solder the leads or wires to the foil side, unless a setup specifically directs you to do otherwise.*

RESISTORS
R1 330 kΩ ¼ watt resistor
R2 330 kΩ ¼ watt resistor
R3 330 kΩ ¼ watt resistor
R4 330 kΩ ¼ watt resistor

Locate the first part, a **330 kΩ ¼ watt RESISTOR** (ORG-ORG-YEL) and cut it from the tape if necessary. Bend the resistor leads to fit the hole spacing on the circuit board.

R1: Start the resistor leads into the holes at the resistor location **R1**. The color bands may be positioned in either direction.

Press the resistor down against the top of the circuit board. Then turn the board over and bend the leads outward slightly to hold in place. Solder the resistor leads to the circuit board as follows:

1. Push the soldering iron tip against both the lead and the circuit board foil. Heat for 2-3 seconds.

2. Then apply solder to the other side of the connection. It is important to let the heated lead and the circuit board foil melt the solder, NOT the soldering iron.

3. As the solder begins to melt, allow it to flow around the connection. Then remove the solder and the iron and let the connection cool.

4. If you are using lead solder, the solder joint should appear shiny not dull. If the joint appears dull reheat the connection and flow a bit more solder onto the joint and let it cool. The dull appearance is called a "cold" solder joint and means you don't have a good connection.

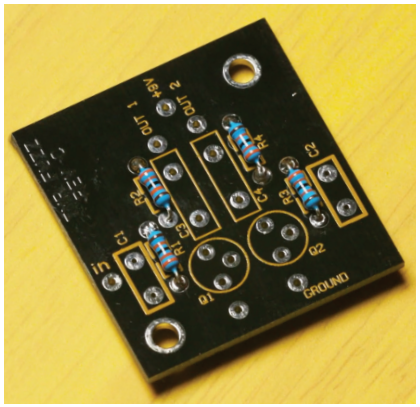
Using the same procedure, install the remaining resistors (**R2**, **R3**, **R4**). You may wish to install all the remaining resistors, then turn the board over and solder. The resistors do not have a polarity and can be installed in either direction.

Next cut off the excess leads as close to **PCB** as you can.

WARNING: *Hold each lead as you clip it so that the end will not fly toward your eyes.*

Your board should resemble **FIGURE 1**.

FIGURE 1



MOUNTING TRANSISTORS & CAPACITORS

TESTING RESISTORS
Set your multi-meter to the Ω function and press the red lead to one side of the resistor and the black lead to the other side. You should get a reading close to 330kΩ. Due to play in the tolerance of the resistors you may get a reading that is slightly higher or lower. This is ok and shouldn't affect the operation of the circuit.

After you have checked the solder connection, proceed with the assembly on this and the following pages. Use the same soldering technique for each connection.

NOTE: *When soldering, sometimes tiny blobs of molten solder can drip off the work you are doing and drop inside the chassis. Always check for stray solder blobs and remove them before finishing your kit as they can dislodge and bridge unwanted connections.*

TRANSISTORS
Q1 2n3566 NPN transistor
Q2 2n3566 NPN transistor

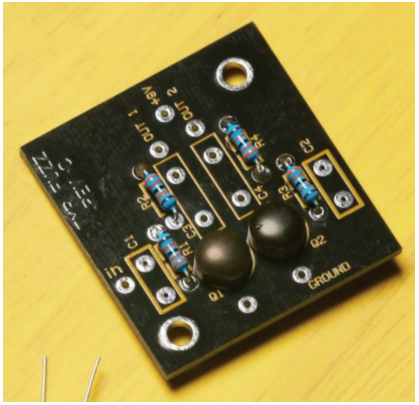
Locate two **2n3566 TRANSISTORS.**

The leads are arranged in a triangular pattern. When you install the transistors, at locations **Q1** and **Q2**, align the leads with the matching holes on the circuit board. When the leads are properly aligned the transistor will easily mount against the circuit board.

First solder only one lead on each transistor. Make sure that the transistor is sitting flush with the **PCB**. If not heat the solder and push the transistor flat. Once the transistors are flat against the **PCB**, solder the rest of the leads on the foil side.

Your board should resemble **FIGURE 2**.

FIGURE 2



CAPACITORS
C1 .047 µF polyester capacitor
(labeled as 473J on the side of the cap)
C2 .047 µF polyester capacitor
C3 .0022 µF polyester capacitor
(labeled as 222K on the side of the cap)
C4 .0022 µF polyester capacitor

Next, install the four capacitors at locations **C1**, **C2**, **C3**, and **C4**. The capacitors are non-polarized and can be installed in either direction.

First install the **.047µF** capacitors as they have a lower profile. Start the leads into the holes and push the capacitor body down against the circuit board. Turn the circuit board over and solder one of the leads to the foil. Check to make sure the capacitor is flush to the **PCB** and if so solder the other lead to the foil. Repeat for both **.047µF** caps.

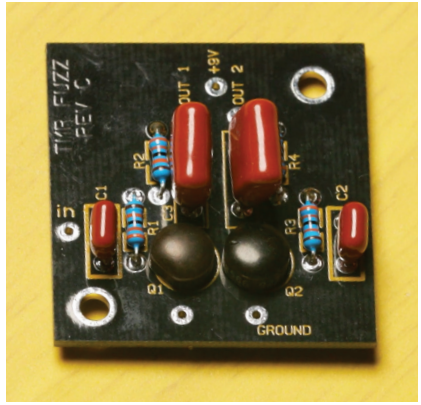
Next Install the **.0022µF** capacitors. Again start the leads into the holes and push the capacitor body down against the circuit board. Turn the circuit board over and solder one of the leads to the foil. Again check to make sure that the cap is positioned as close the **PCB** as possible and if so solder the other lead to the foil. Repeat for both **.0022µF** caps. When you've finished soldering the caps, clip the leads close to the joint.

NOTE: *Save aside one long cut off capacitor lead. You will use it in a future step.*

If your multi-meter has a capacitance function, now is a good time to check the values of the capacitors. Set your meter to the µF setting and touch the red probe to one side and the black probe to the other side. You should get a reading corresponding to the values.

Your board should resemble **FIGURE 3**.

FIGURE 3



Chassis Assembly / Adding Wire Leads

CONNECTING WIRES TO POTENTIOMETERS

Locate the **CHASSIS BOX** and both the **500k** and **50k POTENTIOMETERS.**

NOTE: *We will the use the chassis as a soldering template for wiring in the potentiometers. It is much easier and cleaner to solder this step with the pots outside of the chassis. The holes in the top of the chassis will serve as the perfect spacer and provide a "3rd hand" to hold the pots in place while you solder. When done, the pots can be secured inside the chassis with ease.*

First bend the registration tabs flat on both potentiometers: **FIGURE 4A**.

Next, flip the chassis box right side up. Place the shaft of **500k POTENTIOMETER** into the right-hand hole. There is no need to remove the nut or washers yet. Place the shaft of **50k** pot in the left-hand hole. Make sure that the terminals face down toward the bottom side (shallow side) of the chassis box: **FIGURE 4B**.

Locate the **COLORED WIRES**. There are 11 color coded wires that you will connect to the circuit board in the next steps.

You will need to **STRIP** and **TIN** the ends of the wires as the assembly proceeds. To strip the wire, insert it into your wire strippers about ¼" from the end and bite down with the strippers. Use the notch in the stripper sized for the gauge of wire you are using. In this case it is 20-gauge wire. Lightly pull the stripper toward the end of the wire pulling the insulation jacket off.

Next you will need to flow a little solder on to the bare wire end you have just stripped. This is called **TINNING** (tinning helps the solder flow and bond to the components and acts as a sort of primer). It is helpful to lightly twist the stranded wire together to make the wires tight before tinning.

Next wedge the wire into the spring on your wire stripper (it will hold the wire steady for you) and heat the bare end of the wire for 2-3 seconds, touch the solder to the wire. Allow the solder to flow into the wire strands. You may find that you start to melt the wire jacket if the iron is held too long, but with a little practice the act of tinning will become second nature.

TIP: *When connecting wires to components like ¼" jacks and potentiometers, it is helpful to bend the tinned end of the wire into an "L" shape to help hold it in the terminal connection. In addition to threading through the holes in the terminals, you may also wrap the wire around the terminal of the hardware to make a better mechanical connection before soldering it in place.*

FIGURE 4A

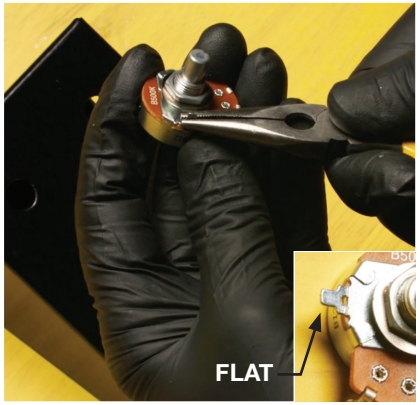
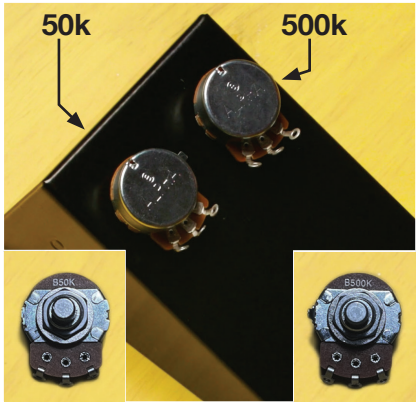


FIGURE 4B



INSTALLING THE HARDWARE COMPONENTS

Solder the colored wires to the connections listed below. See **FIGURE 5**.

1. Solder the **YELLOW** wire to **LUG T1** (fuzz signal output).

2. Solder the **ORANGE** wire to **LUG T3** (fuzz signal output 2).

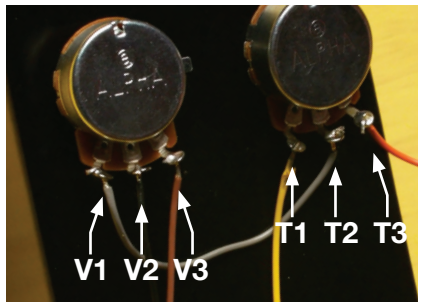
3. Solder the **SHORT GREY** wire from **LUG T2** to **LUG V1** (blended fuzz signal from tone to volume pot).

4. Solder the **BLACK** wire to **LUG V2** (fuzz signal output, after volume pot).

5. Solder the **BROWN** wire to **LUG V3** (pot ground wire).

Once you are done soldering the wires to the two pots, remove them from the chassis and set them aside.

FIGURE 5



The chassis mounted components are the **EXTERNAL POWER JACK**, **¼" JACKS** (**INPUT JACK** and **OUTPUT JACK**), and the **FOOTSWITCH.**

Make sure of the holes are clear of powder coating and that the inside of the chassis is free of overspray (we will have gone over the chassis and removed excess at the factory, but it is good to double check).

You may need to lightly sand the backs of the holes inside of the chassis to remove any powder coat overspray to ensure a good ground connection between the chassis mounted components and the chassis box. A rat tailed file or a ream may be used to remove excess powder coat from the inside of the holes.

NOTE: *Take care when sanding, filing or reaming as not to damage the powder coat finish on the outside of the chassis.*

The chassis ground connection provides shielding for all of the chassis mounted components. If the ground connection is not good, interference will find its way into the high gain fuzz circuit. You will generate excess noise, and possibly pick up radio stations through your amp.

Locate the Tip-Ring-Sleeve **INPUT JACK**. This is the jack with two spring contacts and three connector tabs.

Mount the jack at the location shown in **FIGURE 6A**. Insert the jack with the connectors positioned as shown to facilitate wiring in later steps.

NOTE: *The input jack has two connections on it. One that connects to the tip of the ¼" input lead when a plug is inserted, and one the connects to the sleeve or barrel of the ¼" input lead (guitar cable). The tip is the hot wire, (where the instrument signal is passing) and the sleeve is the ground of the instrument coming through the cable. We can use this connection as a switch to turn on and off the power to the Fuzz-A-Tron by breaking the ground connection to the circuit when the plug is removed from the jack. This is helpful in saving battery life.*

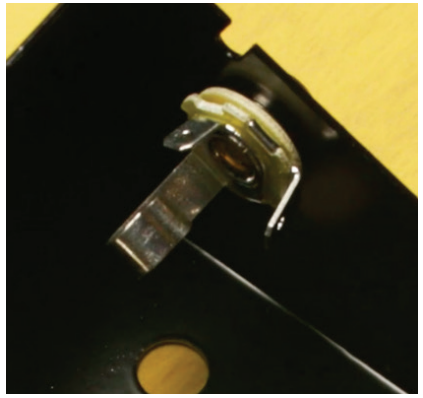
Next locate the Tip-Sleeve **OUTPUT JACK**. This is the jack with one spring contact and two connector tabs.

Mount the jack at the location shown in **FIGURE 6B**. Insert the jack with the connectors positioned as shown to facilitate wiring in later steps.

Locate the **FOOTSWITCH** with its mounting hardware. The mounting hardware consists of two hex nuts, a lock washer and one plastic washer. Remove one of the nuts and the plastic washer and set them aside.

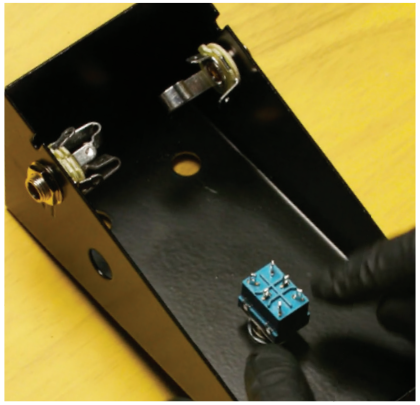
FIGURE 6A

FIGURE 6B



Position the cabinet as shown in **FIGURE 6C**. When you install the **FOOTSWITCH**, be sure to position the lugs as shown. Leave one nut and the lock washer on the shaft and thread the switch through the hole in the center of the chassis box. Turn the cabinet over and secure the switch with the plastic washer and the hex nut. Keep the switch straight while you tighten the nut.

FIGURE 6C



TESTING THE GROUND CONNECTION

Now is a good time to check the ground connection of the chassis mounted components. Set your multimeter to test continuity (Ω with a speaker tone sign, or the diode test position **FIGURE 7A**). You can test this setting by touching your multimeter test leads together. You should hear a beep tone when they make contact.

1. Place one lead on the center lug of the **INPUT JACK** and the other lead on the lug labeled green on **OUTPUT JACK**. See **FIGURE 7B.** You should hear a beep. If not, remove the jack and clear any powder coat obstructing the ground connection. Retest.

2. Again, place one lead on the center lug of the **INPUT JACK** and the other on the threads of the **FOOTSWITCH**.

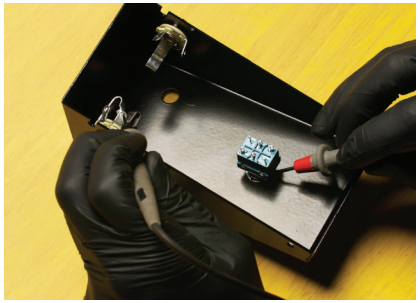
FIGURE 7A

See **FIGURE 7C.** You should hear a beep. If not, remove the jack and clear any powder coat obstructing the ground connection. Retest.

3. You will test continuity again in an upcoming step when installing the tone and volume potentiometers into the chassis.

FIGURE 7B

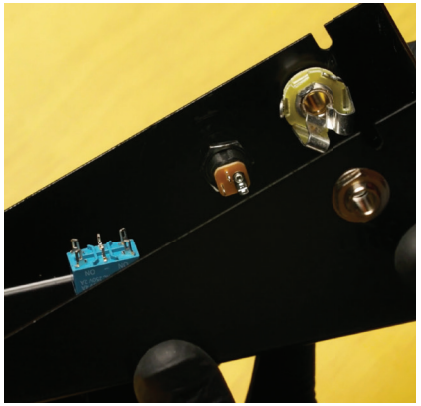
FIGURE 7C



Locate the **EXTERNAL POWER JACK**.

Remove the hex nut and set it aside. Insert the connector into the large hole on the **IN** side of the chassis box. Slide the connector in from the outside and affix it using the hex nut. Position the leads as illustrated in **FIGURE 8**.

FIGURE 8



WIRING THE COMPONENTS

Next you will make the connection using the remaining wires for the wire pack and install the circuit board that you assembled earlier.

When you connect wires be sure to route them as directed. Note the numbered contacts. Refer to these numbers when following the wiring instructions.

Connect one end of the **WHITE** wire to the lug labeled **WHT** (**FIGURE 9A**) on the **INPUT JACK**. Route the wire under the **EXTERNAL POWER JACK** and connect the other end to **LUG 2** of the **FOOTSWITCH**.

Connect one end of the **BLUE** wire to the **FOOTSWITCH LUG 3** (**FIGURE 9B**).

Leave the other end free for now (it will be connected to the **PCB** in a later step).

Connect one end of the **VIOLET** wire to the lug labeled **VIO** (**FIGURE 9C**) of the **OUTPUT JACK**. Route the wire to the **FOOTSWITCH** and connect the end to **LUG 5**.

Connect the **GREEN** wire to the lug labeled **GRN** (**FIGURE 9D**) on the **OUTPUT JACK**. Route the wire down and around by the **FOOTSWITCH** and leave it disconnected (it will be connected the **PCB** in a later step).

Solder a 1" **BARE** wire (or saved lead from one of the capacitors) to **LUG 6** (**FIGURE 9E**) of the **FOOTSWITCH**. This will be used to mount the circuit board in a later step. For now position it so that it points up.

FIGURE 9A

FIGURE 9C

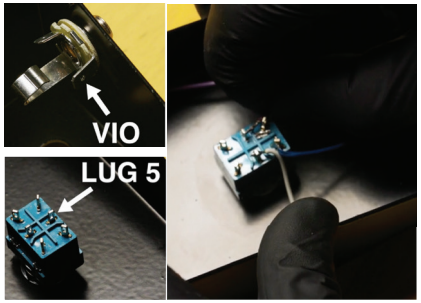


FIGURE 9B

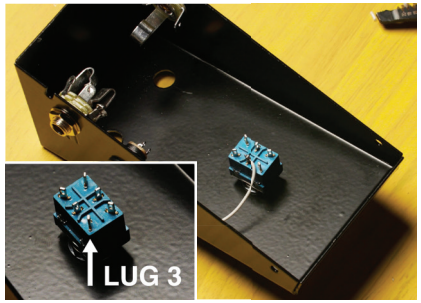


FIGURE 9D

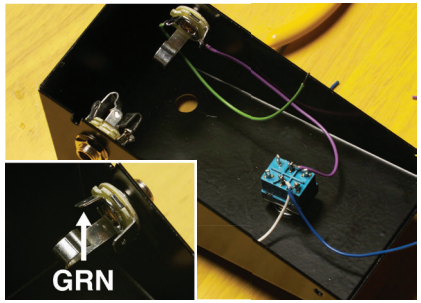
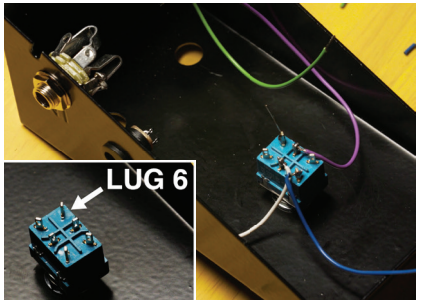


FIGURE 9E



Locate the **9V BATTERY CONNECTOR.**

Tin the **RED** wire of the **9V BATTERY CONNECTOR**. Solder the **RED** wire of the **9V CONNECTOR** to the **EXTERNAL POWER JACK** lug labeled **J2** (**FIGURE 10A**). Leave the **BLACK** wire of the **9V CONNECTOR** free.

FIGURE 10A

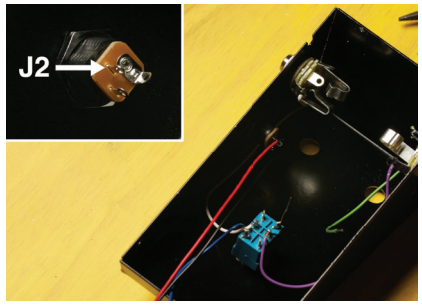
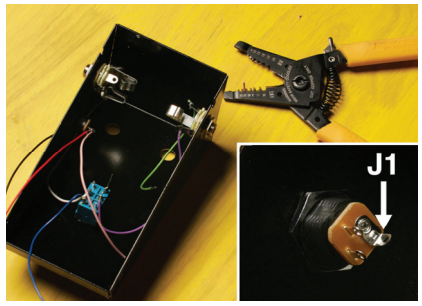


FIGURE 10B



Now strip and tin one end of the **PINK** wire and solder it onto **LUG J1** of the **EXTERNAL POWER JACK** (**FIGURE 10B**).

Next, strip and tin the other end of the **PINK** wire and run it to the tab of the **INPUT JACK** labeled **PINK**. See **FIGURE 10C**. Do not solder in place yet.

NOTE: *Route the wire under the input jack, not over it, as it will get pinched by the hinged bottom panel when closing the bottom lid.*

Next take the **BLACK** wire from the **9V BATTERY CONNECTOR** and thread it through the same hole on the **INPUT JACK**. Solder both the **BLACK** wire and the **PINK** wire in place (**FIGURE 10C**).

Connect the loose **RED** wire (not the one from the battery connector) to the lug labeled **J3** on the **EXTERNAL POWER JACK** (**FIGURE 10D**). The other end will be connected to the **PCB** in a later step.

Again, the **INPUT JACK** has two connections. One connects to the tip of the ¼" input lead when a plug is inserted, and the other to the sleeve or barrel of the ¼" input lead. The tip is the hot wire, where the instrument signal is passing. The sleeve is the ground of the instrument coming through the cable. We can use this connection as a power switch to turn the Fuzz-A-Tron on and off by breaking the ground connection when the plug is removed from the jack.

FIGURE 10C

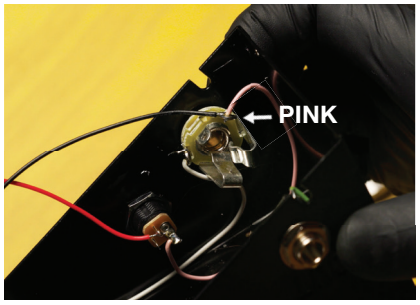
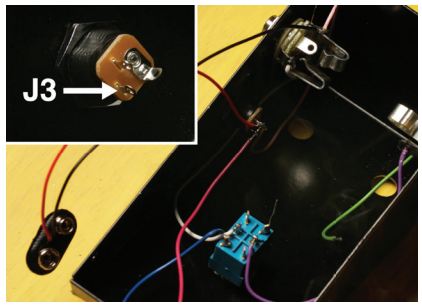
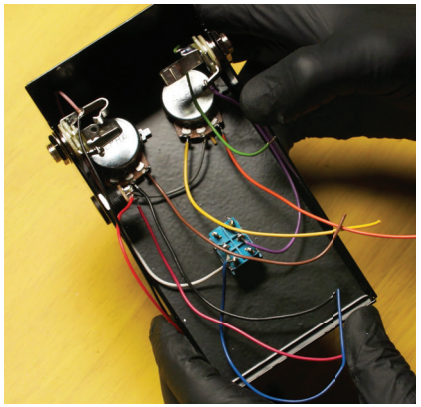


FIGURE 10D



Next install the **POTENTIOMETERS** that you wired earlier in the chassis box. Remove the nuts and one washer on each (leaving one washer on the shaft of the pot) and affix them to the chassis with the terminals and wires facing toward the **FOOTSWITCH**. See **FIGURE 11**.

FIGURE 11



WIRING & INSTALLING THE PCB

Now test the chassis ground continuity of the **POTENTIOMETER** cases.

1. Place one lead on metal case of the **500k** tone pot and the other lead on the bare metal of the inside of the chassis box. You should hear a beep. If not, remove the pot and clear any powder coat obstructing the ground connection. Test for both **POTENTIOMETERS.**

Finally, connect the **BLACK** wire from **LUG V2** on the **50k** pot to **LUG 4** (**FIGURE 12**) of the **FOOTSWITCH**. Route it under the short **GRAY** wire (that connects the two pots) and under the **WHITE** wire (conncected to the switch). Connect the **ORANGE** wire from **LUG T3** of the **500k** pot to **OUTPUT 1** on the **PCB**.

Connect the **YELLOW** wire from **LUG T1** of the **500k** pot to **OUTPUT 2** on the **PCB**.

Connect the **BROWN** wire from **LUG V3** on the **50k** pot to one of the **GROUND** holes on the **PCB**.

Connect the **GREEN** wire from the **OUTPUT JACK** to the other hole labeled **GROUND** on the **PCB**.

Connect the **BLUE** wire from the **FOOTSWITCH** to hole labeled **IN** on the **PCB**.

Connect the **RED** wire from the **EXTERNAL POWER JACK** to the hole labeled **+9V** on the **PCB**.

Your board should now resemble **FIGURE 13**.

Next you will install the **PCB** and secure it to the **FOOTSWITCH**. Be sure to position the **PCB** so that it uses the right side of the chassis as a brace to square the **PCB** within the chassis. See **FIGURE 14A.**

Refer to **FIGURE 14B** and thread the **BARE** wire (connected to **LUG 6**) of the **FOOTSWITCH** through the hole in the corner of the **PCB**. Bend the wire over and thread it into **LUG 1** of the **FOOTSWITCH**. Position the board against the right side of the chassis as shown. Solder the **BARE** wire at **LUG 1** of the **FOOTSWITCH** and to the foil where it comes through the **PCB**.

NOTE: *You may have to loosen the nut on the switch to rotate it into position. Once the switch is aligned don't forget to retighten the nut.*

With the **PCB** in position (against the right side of the cabinet as shown in **FIGURE 14B**), check all wiring and solder connections. Use zip ties to secure the wires as shown in **FIGURE 14C**.

FIGURE 12

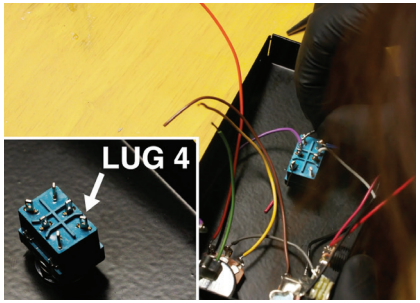


FIGURE 13

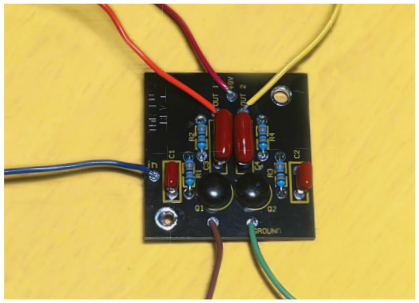


FIGURE 14A

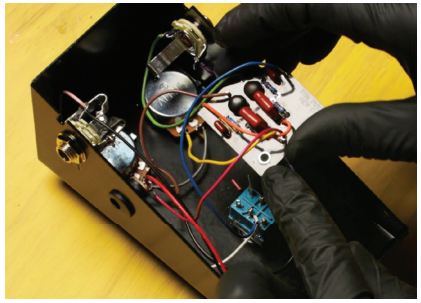


FIGURE 14B

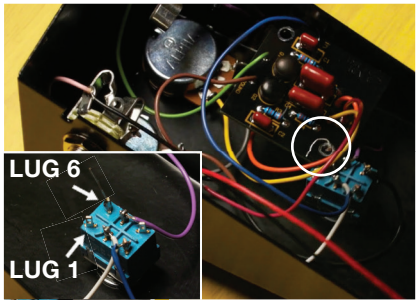
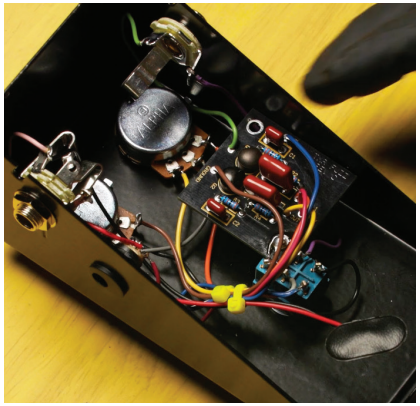


FIGURE 14C



Final Assembly

COMPLETING THE CHASSIS BOX & FINISHING TOUCHES

Locate the **BOTTOM COVER PLATE** of the chassis box. Install a stick-on **RUBBER FOOT** in each corner on the flat side of the bottom plate.

Find the four **6-32 SCREWS**. You will use them to mount the bottom panel to the chassis box. Note that the bottom panel has a square edge and an angled edge. The square edge is situated at the rear of the chassis (nearest to the **FOOTSWITCH**). The chassis and bottom panel are designed in such a way as to allow the box to "hinge" open. See **FIGURE 15A**. Start with the rear screws (the square end of the bottom panel). Place the bottom panel inside the chassis and screw in the back two screws. Thread in the front two screws finger tight.

Now check the chassis ground continuity of the bottom plate to the chassis. Touch one test lead of your multimeter to the bottom plate and the other to the bare metal on the inside of the chassis (**FIGURE 15B**). You should hear a beep. If not remove the bottom plate and sand, or file off any powder coat behind the screw holes that is obstructing contact between the plate and the chassis box.

If you are using a **9V BATTERY**, now would be a good time to install it. Connect the **BATTERY** to the **BATTERY CONNECTOR** and position it behind the **FOOTSWITCH** (at the narrow end of the chassis) laying flat, and hinge the box shut. Tighten the front two screws.

Turn the shafts of both **POTENTIOMETERS** counterclockwise. Locate the two black **CONTROL KNOBS** and use a small flathead screwdriver to loosen the set screws. Install the knobs on the pot shafts, center them as desired and tighten the set screws.

Locate the **STICKER SHEET** included with the kit and paste on stickers as you see fit. Please see our reference in **FIGURE 16**.

You have now completed the assembly of your Fuzz-A-Tron guitar pedal. Congratulations!

FIGURE 15A

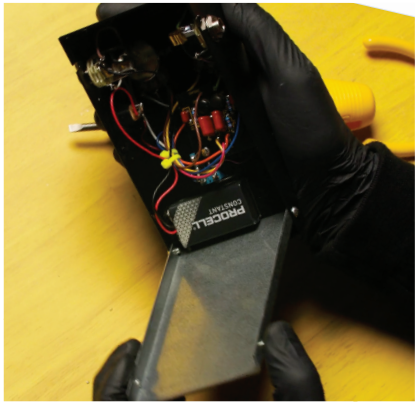
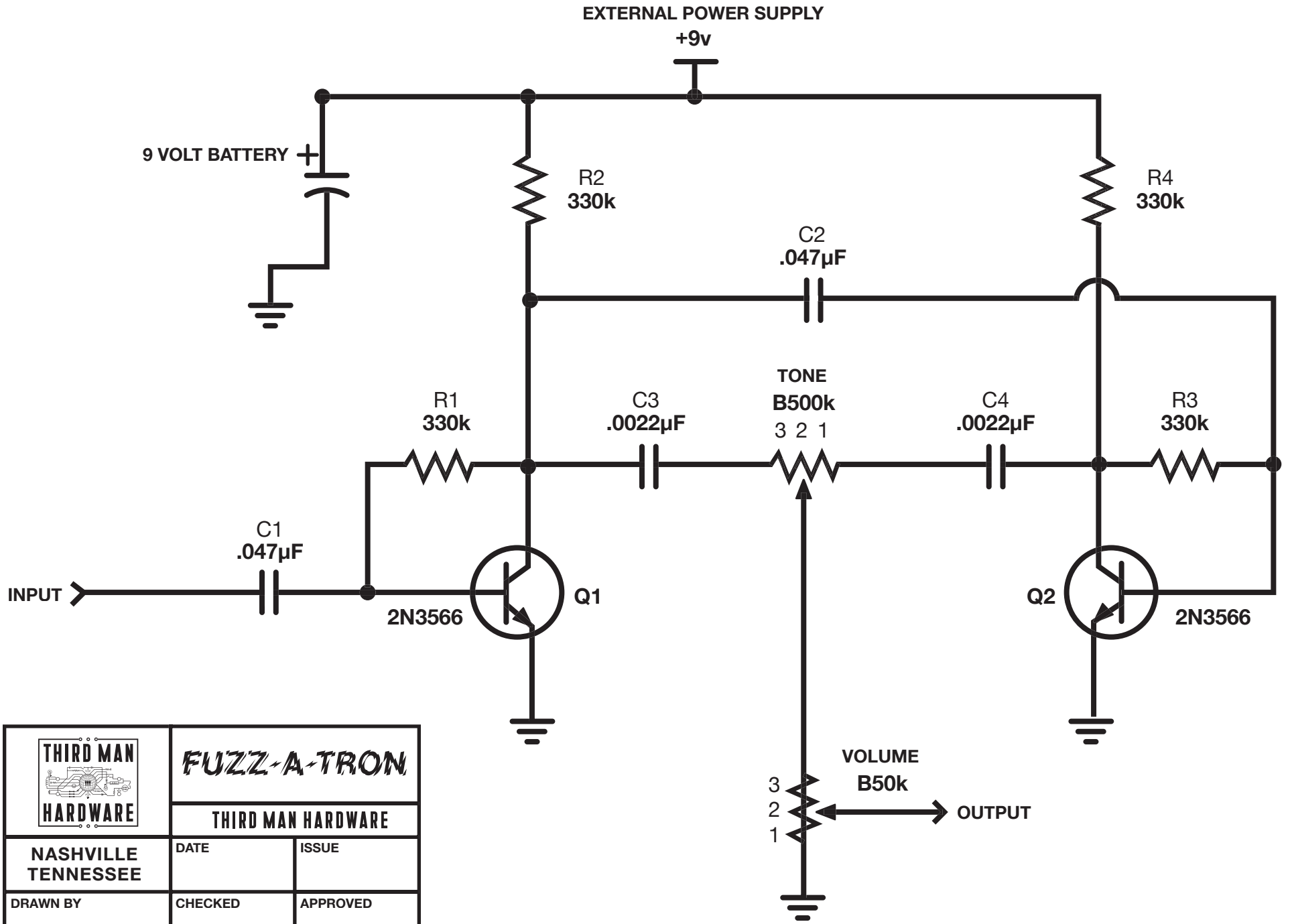


FIGURE 15B

FIGURE 16



THIRD MAN HARDWARE	FUZZ-A-TRON	
	THIRD MAN HARDWARE	
NASHVILLE TENNESSEE	DATE	ISSUE
DRAWN BY	CHECKED	APPROVED