

# Build Your Own Clone Echo Royal Kit Instructions



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[www.byoelectronics.com/board](http://www.byoelectronics.com/board)

When posting a tech support thread on the BYOC forum, please post it in the correct lounge, and please title your thread appropriately. If everyone titles their threads "HELP!" then it makes it impossible for the people who are helping you to keep track of your progress. A very brief description of your specific problem will do. It will also make it easier to see if someone else is having or has had the same problem as you. The question you are about to ask may already be answered. Here is a list of things that you should include in the body of your tech support thread:

1. A detailed explanation of what the problem is. (more than, "It doesn't work, help")
2. Pic of the topside of your PCB.
3. Pic of the underside of your PCB.
4. Pic that clearly shows your footswitch/jack wiring and the wires going to the PCB
5. A pic that clearly shows your wiring going from the PCB to the pots and any other switches (only if your kit has non-PC mounted pots and switches)
6. Is bypass working?
7. Does the LED come on?
8. If you answered yes to 6 and 7, what does the pedal do when it is in the "on" position?
9. Battery or adapter (if battery, is it good? If adapter, what type?)

Also, please only post photos that are in focus.

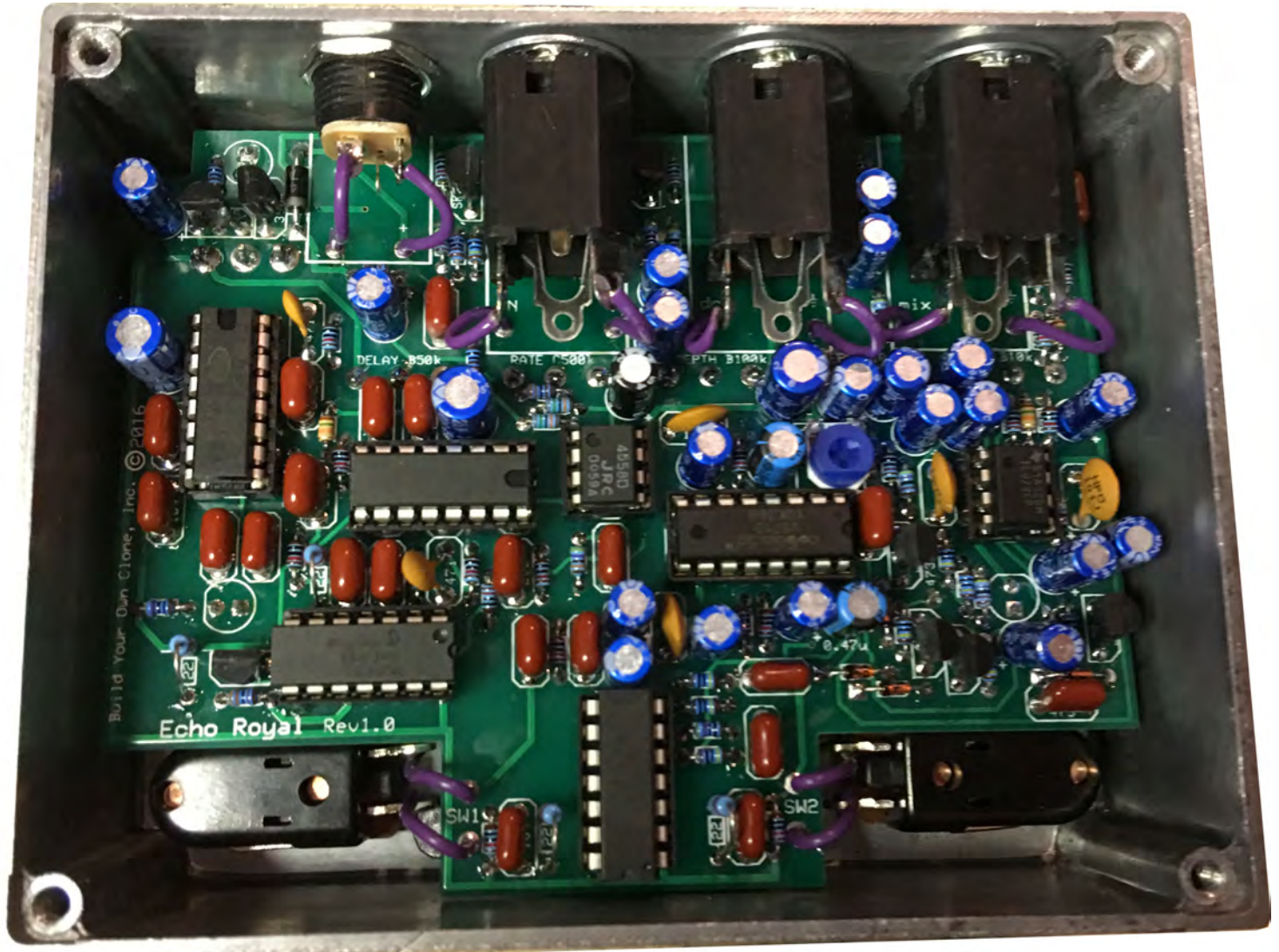
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**This is what your kit should look like when it's complete. Your kit may come with different color capacitors, switches ect. Don't be alarmed by this. They all still do the exact same thing.**



## Parts Checklist for the Echo Royal Kit

### Resistors: (Metal Film (5 Bands) / Carbon Film (4 Bands))

- 4 - 22R/22 (Red/Red/Black/Gold/Brown) / (Red/Red/Black/Brown)
- 4 - 470R/471 (Yellow/Purple/Black/Black/Brown) / (Yellow/Purple/Brown/Brown)
- 3 - 1k/102 (Brown/Black/Black/Brown/Brown) / (Brown/Black/Red/Brown)
- 2 - 3k3/332 (Orange/Orange/Black/Brown/Brown) / (Orange/Orange/Red/Brown)
- 23 - 10k/103 (Brown/Black/Black/Red/Brown) / (Brown/Black/Orange/Brown)
- 4 - 15k/153 (Brown/Green/Black/Red/Brown) / (Brown/Green/Orange/Brown)
- 1 - 22k/223 (Red/Red/Black/Red/Brown) / (Red/Red/Orange/Brown)
- 7 - 47k/473 (Yellow/Purple/Black/Red/Brown) / (Yellow/Purple/Orange/Brown)
- 2 - 150k/154 (Brown/Green/Black/Orange/Brown) / (Brown/Green/Yellow/Brown)
- 1 - 470k/474 (Yellow/Purple/Black/Orange/Brown) / (Yellow/Purple/Yellow/Brown)
- 10 - 1M/105 (Brown/Black/Black/Yellow/Brown) / (Brown/Black/Green/Brown)

Visit [www.byocelectronics.com/resistorcodes.pdf](http://www.byocelectronics.com/resistorcodes.pdf) for more information on how to differentiate resistors.

### Capacitors:

- 4 - 100p ceramic disc cap (may say "101" on the body)
- 2 - 470p ceramic disc cap (may say "471" on the body)
- 2 - .0027u/2n7 film cap (may say "272" on the body)
- 2 - .0068u/6n8 film cap (may say "682" on the body)
- 3 - .01u/10n film cap (may say "103" on the body)
- 1 - .027u/27n film cap (may say "273" on the body)
- 5 - .047u/47n film cap (may say "473" on the body)
- 4 - .082u/82n film cap (may say "823" on the body)
- 6 - .1u/100n film cap (may say "104" on the body)
- 2 - .47uf Aluminum Electrolytic
- 6 - 1uf Aluminum Electrolytic
- 8 - 4.7uf Aluminum Electrolytic
- 5 - 10uf Aluminum Electrolytic
- 1 - 15uf Aluminum Electrolytic
- 1 - 47uf Aluminum Electrolytic
- 3 - 100uf Aluminum Electrolytic

Visit [www.byocelectronics.com/capcodes.pdf](http://www.byocelectronics.com/capcodes.pdf) for more info on how to differentiate capacitors.

### Diodes:

- 1 - 1N4001 diode
- 4 - 1N4148 diodes

### IC's:

- 1 - TL072
- 1 - 4558
- 1 - 571
- 2 - PT2399
- 1 - MCP4251/104
- 1 - 16F688 or 16F684
- 2 - DIP8 sockets



2 - DIP14 sockets

3 - DIP16 sockets

**Transistors:**

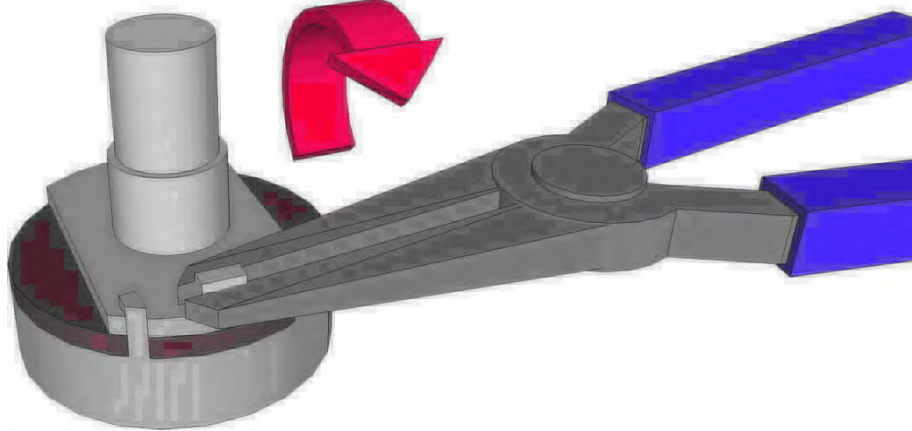
1 - 78L05

3 - 2N3904

4 - 2N5457 (or 2N5458, J111, J112, J113)

1 - 2SK246

**Potentiometers: SNAP OFF THE SMALL TABS ON THE TOP OF THE POTS OFF WITH A PAIR OF NEEDLE NOSE PLIERS. IF YOUR POTS HAVE COVERS, REMOVE THEM BEFORE CONTINUING. YOU MIGHT HAVE TO CUT A SLIT IN THE COVER WITH A BLADE AND USE A SMALL SCREWDRIVER TO GET LEVERAGE.**



1 - B10k MIX

1 - B50k DELAY

1 - B50k Solder Lug TAP MULTIPLIER

2 - B100k DEPTH, REPS

1 - C500k RATE

1 - 50k Trimpot

**Hardware:**

1 - predrilled enclosure w/ 4 screws

1 - Echo Royal Printed Circuit Board

2 - momentary footswitch

3 - Enclosed jacks

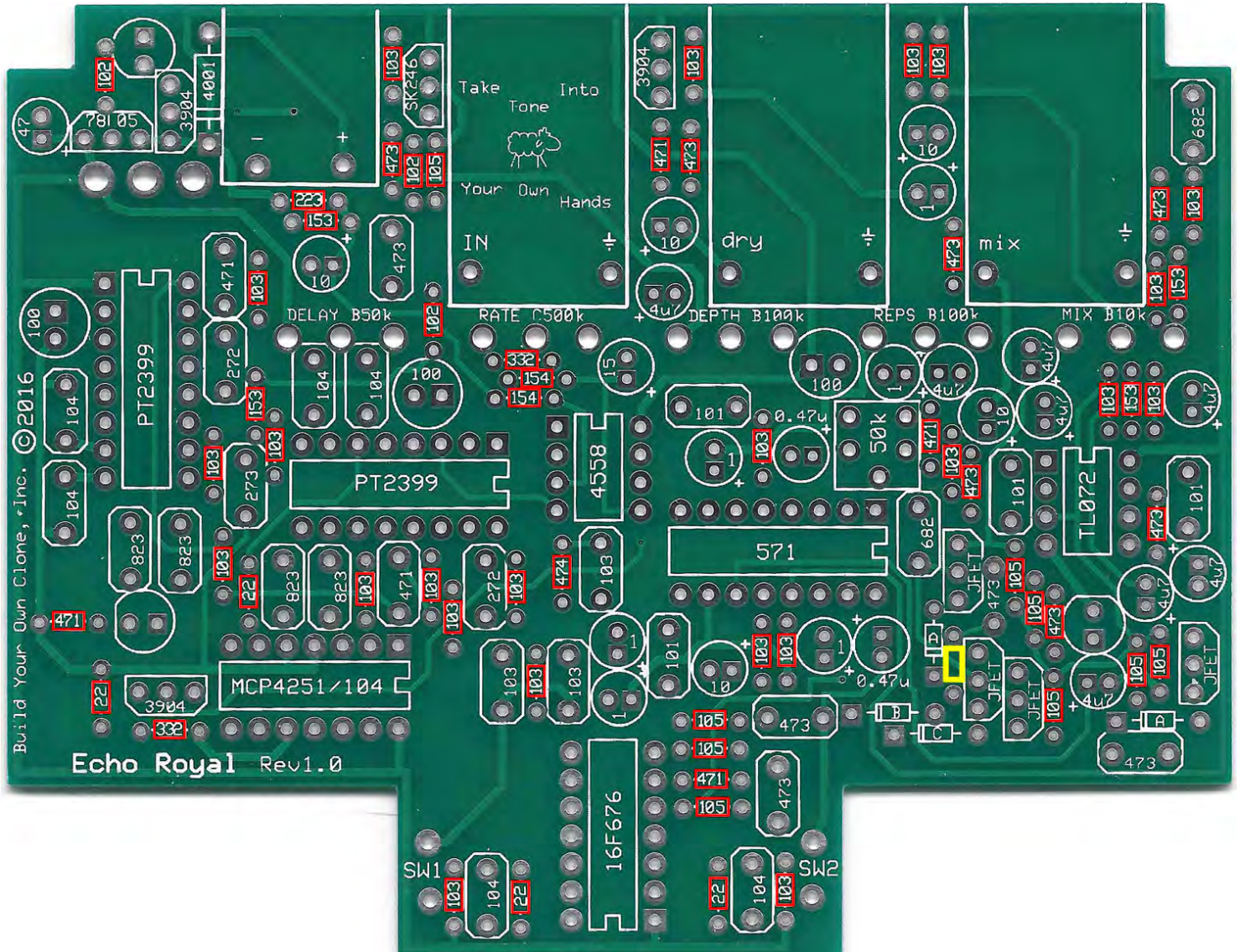
4 - rubber bumpers

3 - lock washers (for in and out jacks)

hook-up wire

## Populating the Circuit Board

**Step 1:** Add all the resistors. Resistors are not polarized and can be inserted into the PCB in either direction, meaning you don't have to worry about orienting them. **The resistor highlighted in yellow is 1M.**



**Your kit will come with mostly 1/8 watt resistors. If you receive 1/4 watt resistors, simply bend them so the body is vertical on the PCB. Below is an example**





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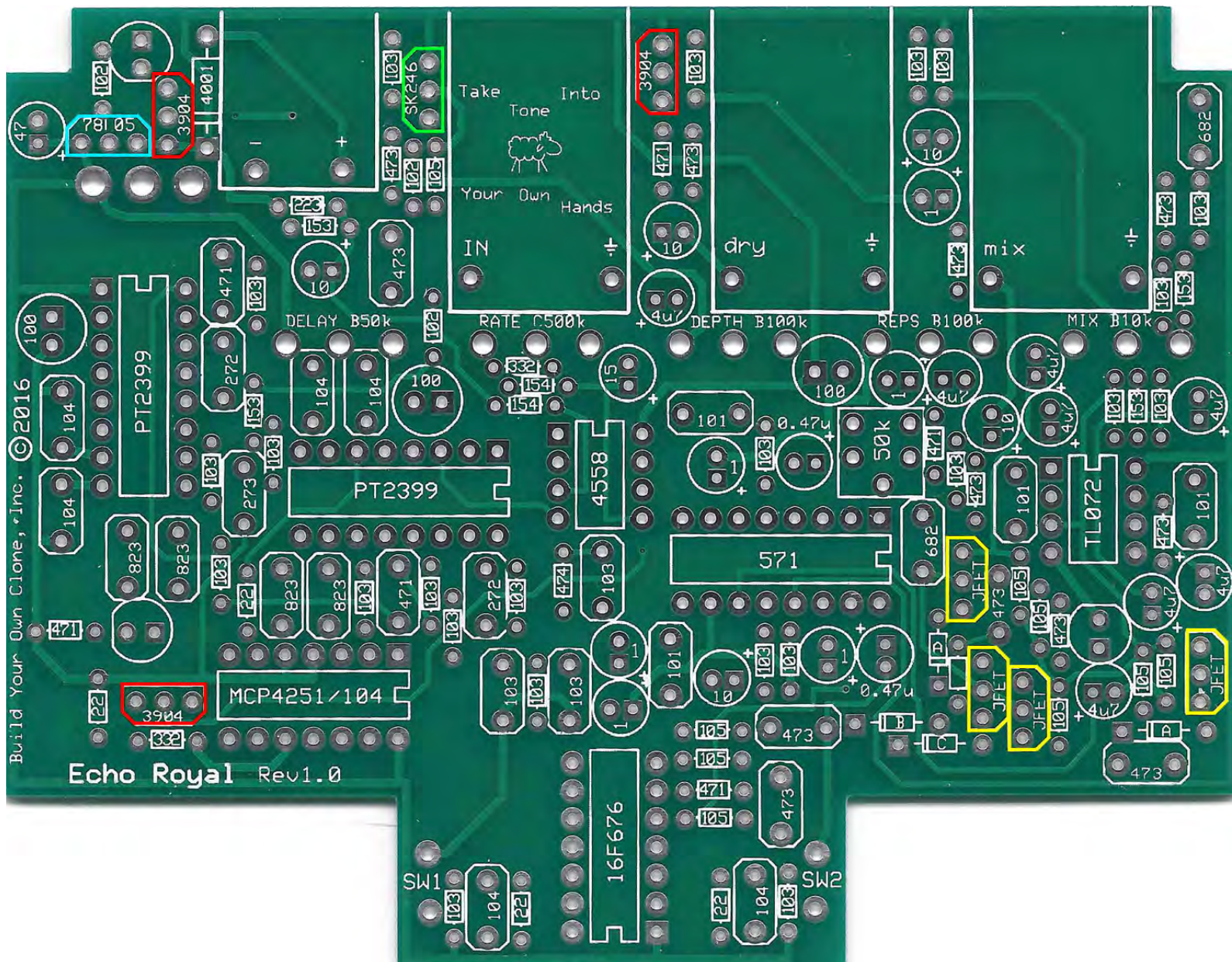


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**Step 4:** Add the transistors. Be sure to match the flat side of the transistor with the flat side of the transistor on PCB layout. Red outline is 2N3904, blue outline is 78L05, green outline is 2SK246, and the yellow outline is for the JFETs.



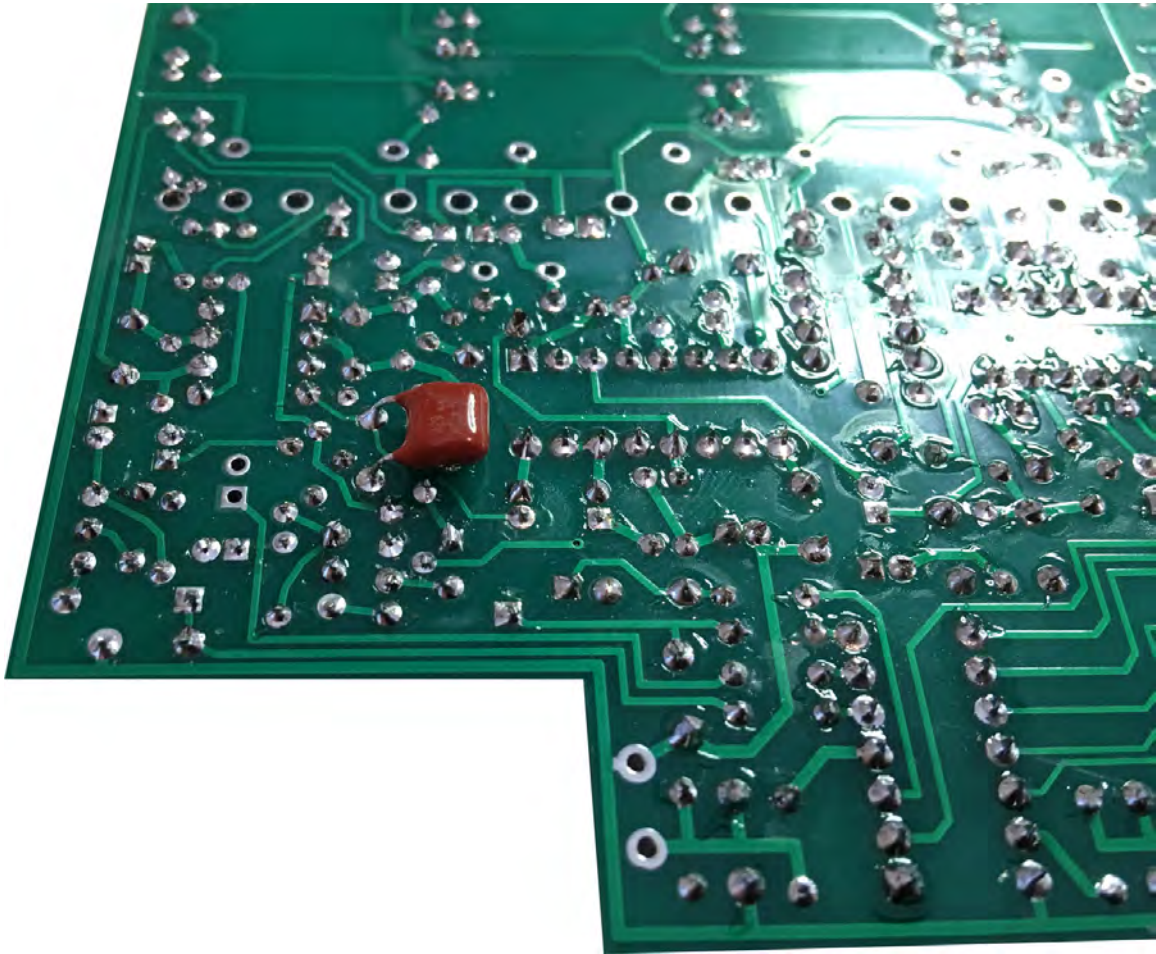


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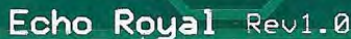




**When placing the .047uF film capacitor on the underside of the PCB, bend it so it lies as flat as you can on the PCB. It is recommended to bend the capacitor away from the LED hole as shown below.**



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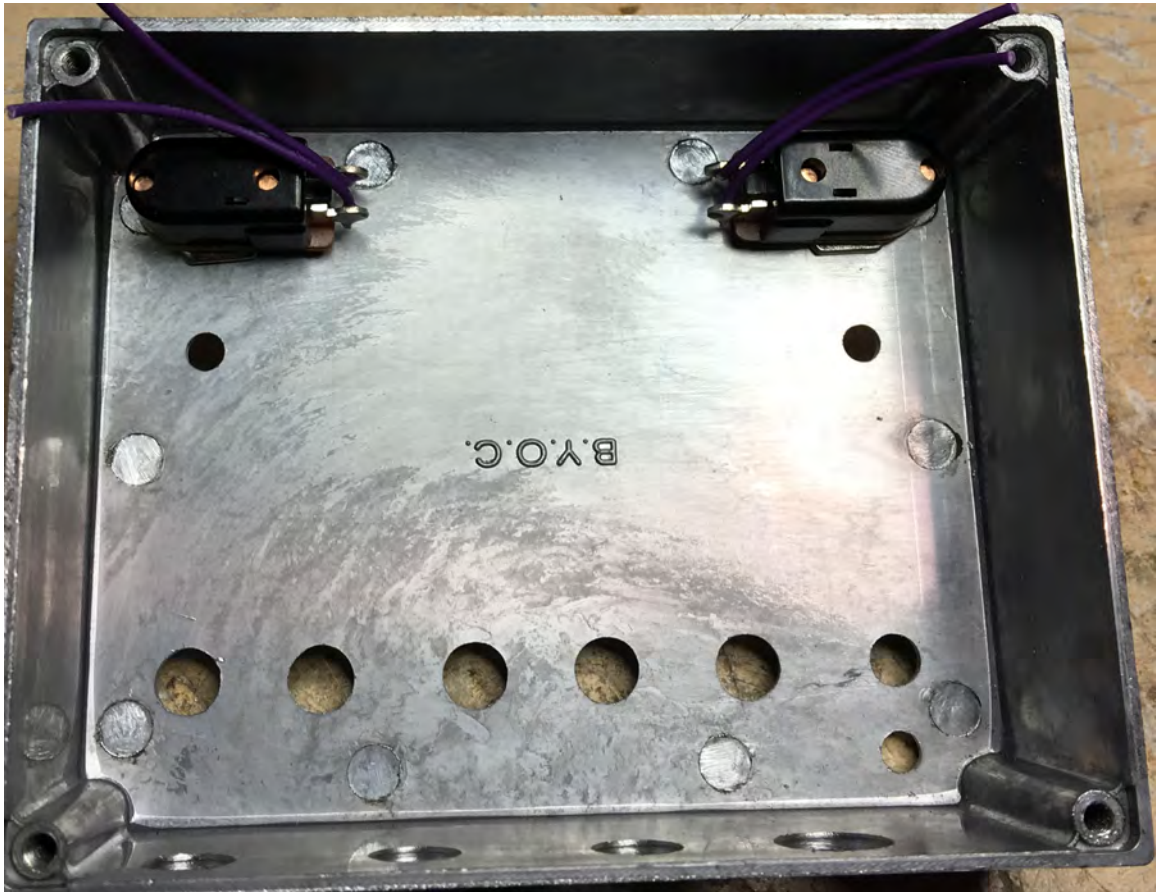
# Main PCB Assembly

**Step 1:** Prepare the footswitches. Cut four 2 inch pieces of wire and solder them to the footswitches as shown.





**Step 2:** Install the footswitches in the enclosure. Orient the footswitches so the solder lugs are facing each other

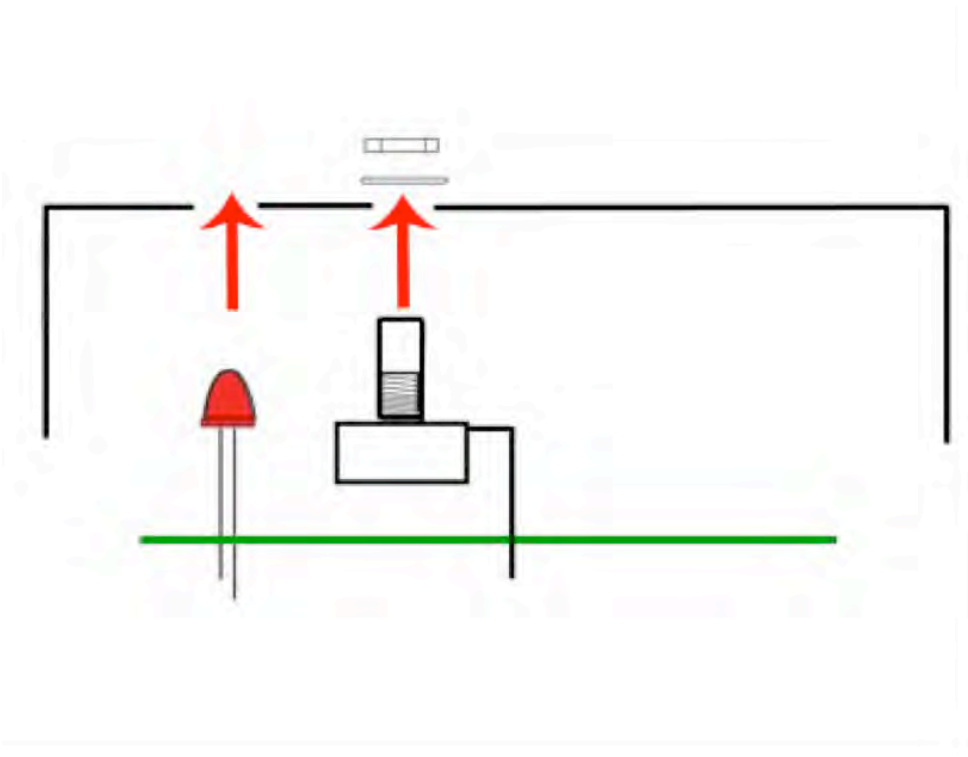


**Step 3:** Flip the PCB over so that the bottom or solder side is up. Insert the potentiometers, toggle switch, and the LEDs into the bottom side of the PCB. **IF YOUR POTS HAVE COVERS, REMOVE THEM BEFORE CONTINUING. YOU MIGHT HAVE TO CUT A SLIT IN THE COVER WITH A BLADE AND USE A SMALL SCREWDRIVER TO GET LEVERAGE.** **DO NOT SOLDER ANYTHING YET!!!**

The LEDs will have one lead that is longer than the other. **THIS WILL GO INTO THE SQUARE SOLDER HOLE.**



Originally, the Division control was on a switch. We decided to change it to a potentiometer. The only thing that needs to be changed is instead of adding a toggle switch, wire in the B50k solder lug potentiometer to the toggle switch holes as shown above.

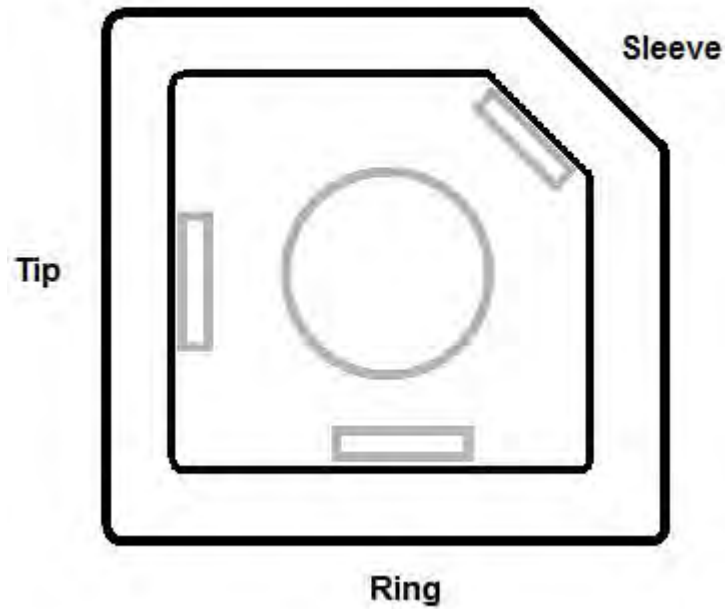


**Step 4:** Hold the PCB in one hand so that the component side of the PCB is in the palm of your hand and the bottom side with the pots, toggle switch and LED is facing up. Now use your other hand to guide the predrilled enclosure onto the PCB assembly so that the pots, toggle switch and LED all go into their respective holes. Once the PCB assembly is in place, secure it by screwing on the washers and nuts for the pots. Only tighten them with your fingers. **You do not want them very tight yet.** Make sure you've removed the nuts and washers from the pots and that you've also snapped the tabs off the pots as well before installing.

**Step 4:** Turn the entire pedal over so that the component side of the PCB is facing up. Lift the PCB up off the pots about 2mm just to make sure that the back of the PCB does not short out against the pots. Make sure the PCB is level and symmetrically seated inside the enclosure.

**Step 5:** Solder the pots, toggle switch and LEDs. You will be soldering on the component side (top) of the PCB. After you have soldered them in place, be sure to tighten up their nuts. **TIP:** only solder one lug of each component at first. This will secure everything in place and still allow you to wiggle things around if you need to adjust the fit of anything. Once you have everything perfect, go ahead and solder everything else.

# Enclosed Jack



You will want to place the jacks into the enclosure so the sleeve terminal is facing the right like the picture above. Be sure to remember the lock washers so the jacks don't spin on their own.

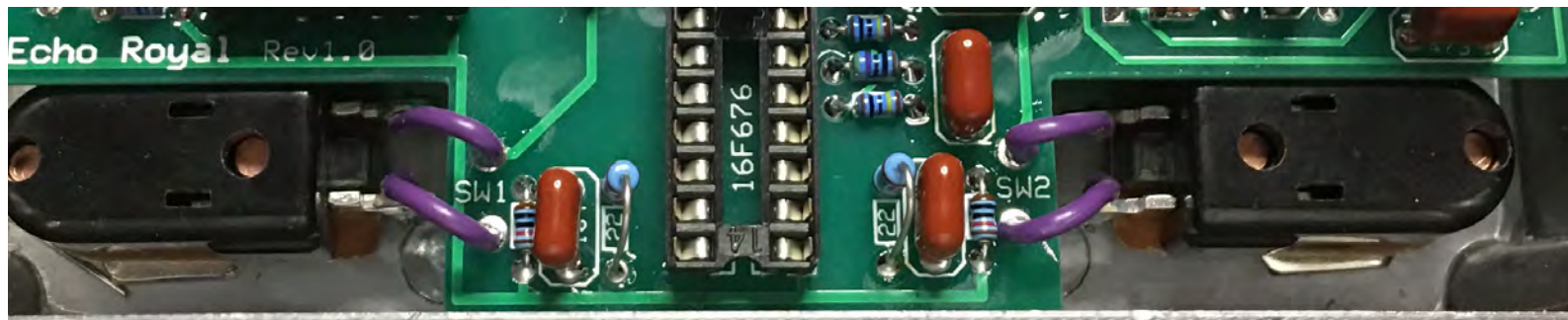




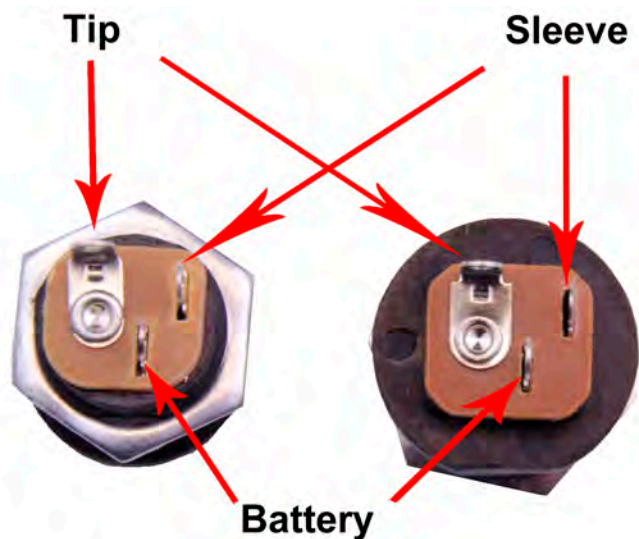
This is what your build should look like at this point. Notice the tip terminal of the AC jack is upwards, and to the left. Also note that the SLEEVE terminals of the enclosed jacks are all facing right.

# WIRING

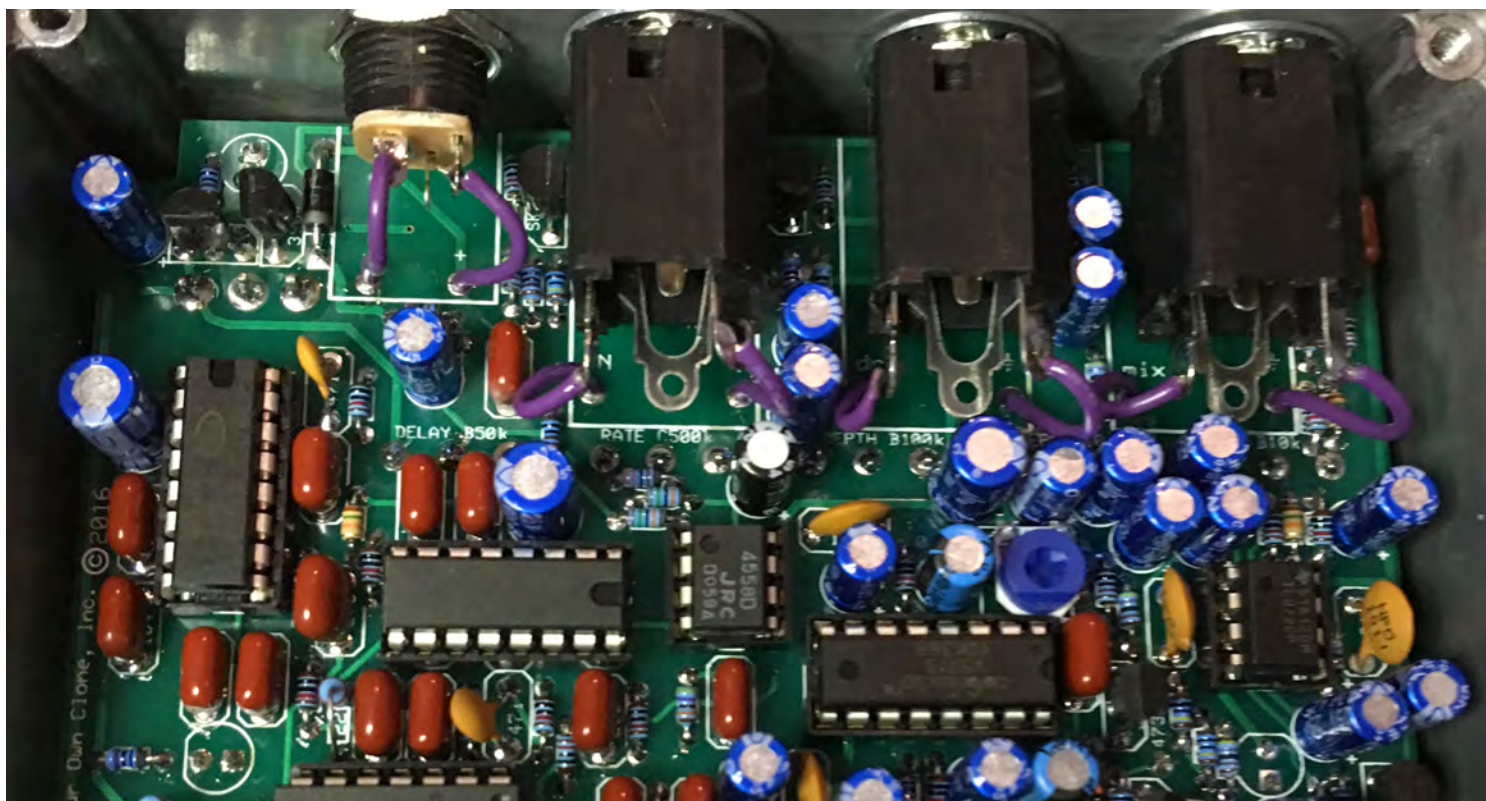
**Step 6:** attach the footswitches to the “SW1” and “SW2” spots as shown below





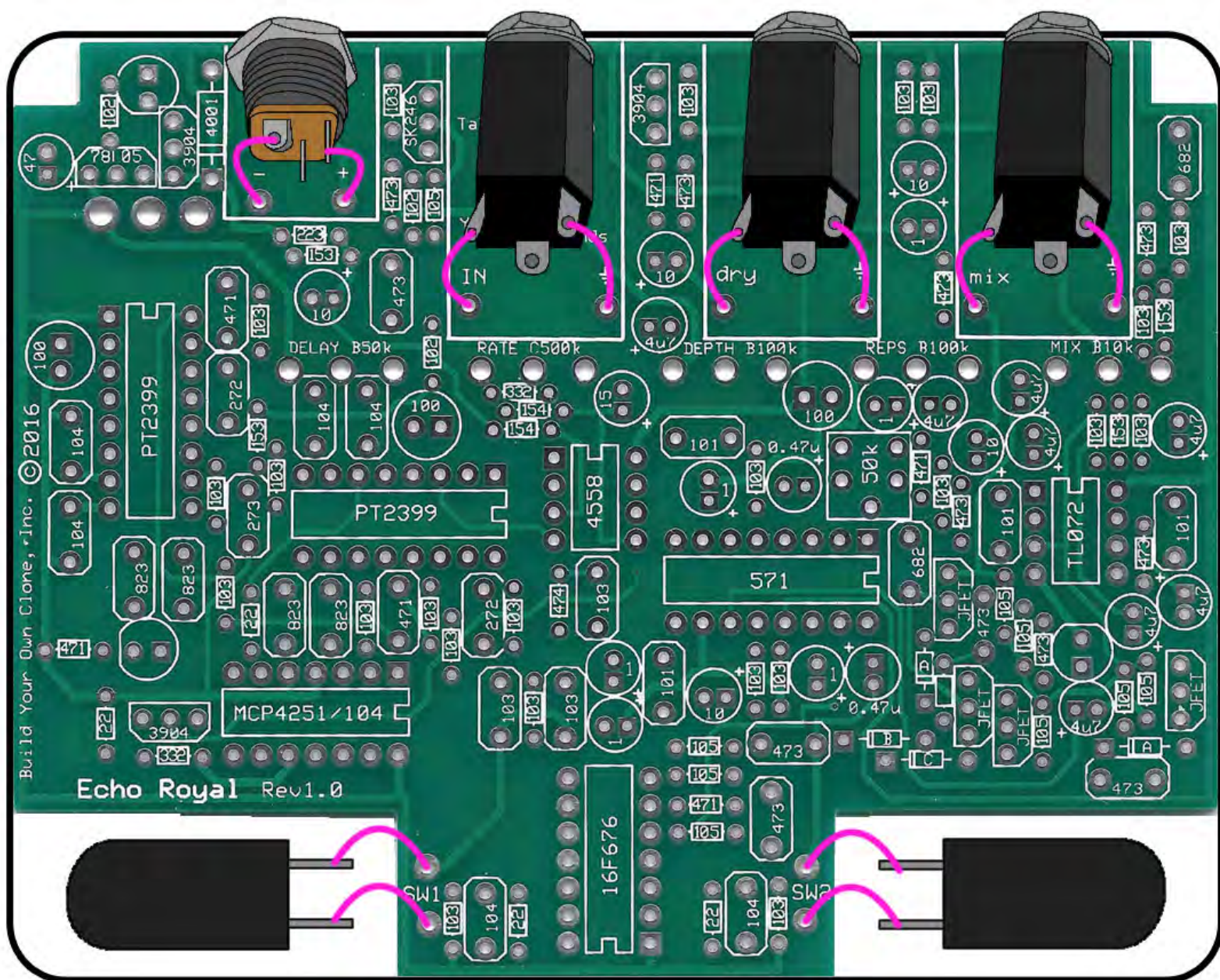


**Step 7:** Connect the TIP (negative) terminal of the DC adapter jack to the eyelet on the PCB labeled “-“. Connect the SLEEVE of the DC adapter jack to the eyelet on the PCB labeled “+” farthest to the right. Also connect the enclosed audio jacks to the PCB. The SLEEVE connection will go into the ground spots, and the TIP connection will connect to the ‘in’, ‘dry’, and ‘mix’ eyelets as shown below.





Echo Royal Rev1.0





# Operating Overview



**Blend:** Controls the dry to delay ratio.

**Repeats:** Controls the amount of repeats in the delay.

**Depth:** Depth control for the modulation.

**Rate:** Rate control for the modulation

**Delay:** Sets the delay time.

**Tap Multiplier:** Used for Tap Tempo switch. The sweep is divided into five sections. The five sections are listed below.

**On/Off:** Turns the effect on.

**Tap Tempo:** Allows the delay time to be set by tapping what tempo you want.

**Power supply:** 2.1mm negative tip

**Current Draw:** 80mA

**Input Impedance:** 1M Ohm

**Output Impedance:** 47k Ohm

## Operating Instructions

To engage the delay effect, hit the left footswitch. When the delay effect is active, the **Blend** control is a dry/delay(wet) blend. With the knob at noon, you will get a 50/50 mixture, all the way left is just the dry signal, and all the way right is the wet signal.

The **Repeats** knob controls how many times the delayed signal will repeat. There is the ability to put the effect into self-oscillation.

The **Depth** knob controls the depth of the modulated signal, all the way left means that there will be no modulation, all the way right means that there is intense modulation.

The **Rate** knob controls how fast the modulation rises and falls. All the way left is a slow rate, all the way right is a faster rate.

The **tap multiplier** knob allows you to tap out 1-to-1 quarter notes, dotted eighth notes, eighth notes, triplets, and sixteenth notes.

The **Delay** knob controls the rate of delay. All the way to the left is a quick, ‘slap-back’ type delay, all the way right is a longer delay time, and can reach upwards of a second of delay time.

### Tap Tempo

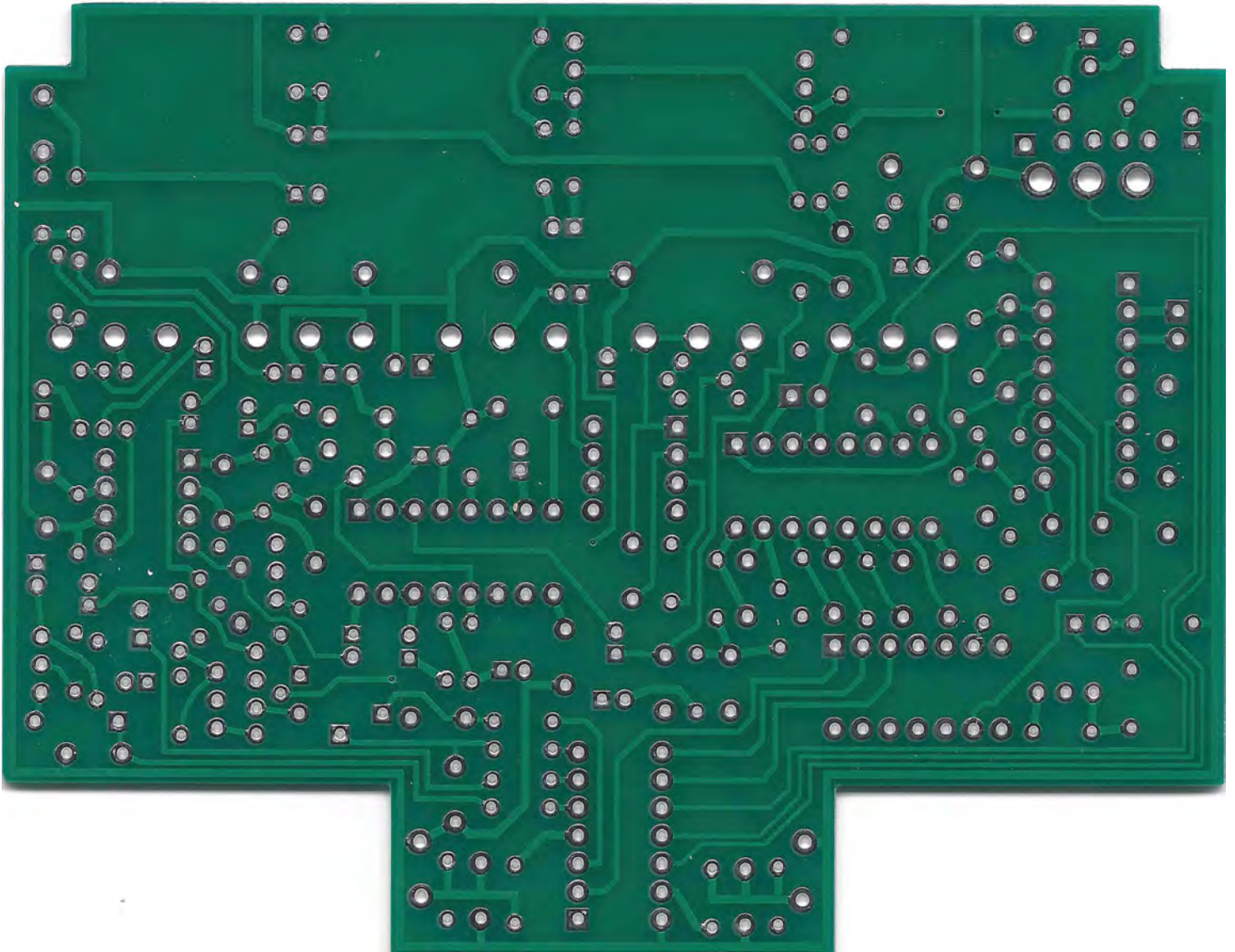
To enable tap tempo mode, simply start tapping on the **Tap Tempo** footswitch. The Tap Tempo feature is where the **Tap Multiplier** potentiometer comes into play. The divisions are:

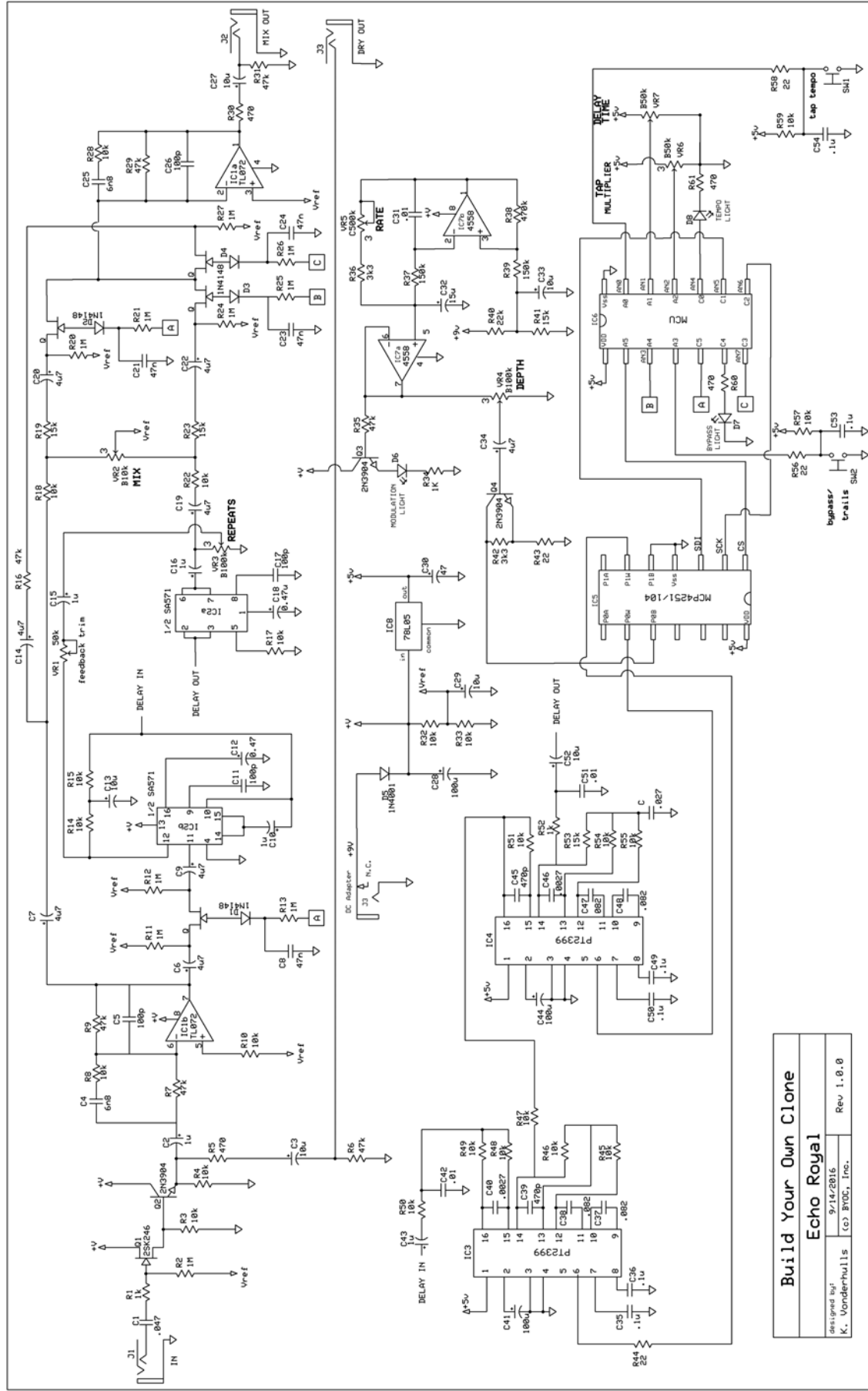
- Quarter
- Dotted Eighth
- Eighth
- Triplets
- Sixteenths

### Trails Mode

To enable trails mode, that is to say, the delayed signal will continue through it’s delay cycle when the pedal is disengaged, delaying the signal only until the point you disengaged the effect; press and hold the **on/off switch** for three seconds until you see the **Tap Tempo indicator LED** blink in quick succession. To disable Trails Mode, hold the on/off switch for another three seconds.

**Back-side PCB Photo**





Build Your Own Clone

Echo Royal

Designed by  
K. Vonderhulst

9/14/2016

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Rev 1.0.0



For hi-res schematic visit <http://www.byoelectronics.com/echoroyalschematic.pdf>

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