

How To Tame A Wild Mouse

By Steve Daniels, President, Small Bear Electronics LLC

What's A Wild Mouse?

This Wild Mouse is an active tone boost--an amplifier that is tuned with a filter so that it boosts some frequencies more than others. When you want to make your guitar sound like you're playing it through a Wah pedal left in mid-travel, the Wild Mouse is what you need. It nails a variety of classic sounds ("Day Tripper", "Paperback Writer"), it's useful for funky, bluesy solos, and it is a super boost/tone shaper before or after many distortion pedals.

This manual contains complete instructions for building the pedal, and it is written for people who have never built a pedal before. (Experienced hobbyists note: You can skip sections as you need to.) I don't presume that you know any electronics, but you do need some skill with hand tools and I don't cover in here how to solder; more about these issues in the next section. That said, much of the information and many of the techniques shown here are applicable to building *lots* of other pedals and even other electronic devices.

I know that you'll enjoy building--and playing through!--the Wild Mouse. While I've done my best to make these instructions complete, I'm available by E-mail if you have questions, problems or suggestions.

Yours In Good Music,



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Can I Really Build It Myself?

Yes, IF:

- You can follow directions.
- You are comfortable with using basic hand tools: pliers, side-cutter, screwdriver
- You can use a soldering iron.

This kit includes an enclosure that is pre-drilled and powder-coated, and has text and designations already silkscreened. This cuts out an awful lot of tooling. You also get a decal of the critter, and I will show you how to apply it. Which brings me to:

What Tools And Materials Will I Need?

Here's a list of tools I used:

A 25- to 35-watt soldering iron, rosin-core solder and cleaning sponge:

Small screwdriver(s)

Small diagonal pliers and cutters

Small locking-grip ("Vise-grip") plier

X-acto knife

Self-locking tweezers or other "third hand"

Small alligator clip

Colored pencil or "Hi-liter" felt-tip marker

Some small round and flat files

A pointed steel "pick" or scratch awl

De-soldering braid (Radio Shack p/n 64-2090B)

For sealing the decal, you'll need some Krylon, or similar, clear lacquer.

- Identify The Components

<u>Resistors</u>	<u>Quantity</u>	
100,000 ohm (or 100 K ohm) (Brown, Black, Yellow, Gold)	3	
1,000,000 ohm (or 1 Megohm) (Brown, Black, Green, Gold)	1	
47,000 ohm (or 47 K ohm) (Yellow, Violet, Orange, Gold)	1	
51,000 ohm (or 51 K ohm) (Green, Brown, Orange, Gold)	1	
2,200 ohm (or 2.2 K ohm) (Red, Red, Red, Gold)	1	
68,000 ohm (or 68 K ohm) (Blue, Gray, Orange, Gold)	1	
22,000 ohm (or 22 K ohm) (Red, Red, Orange, Gold)	1	
56,000 ohm (or 56 K ohm) (Green, Blue, Orange, Gold)	1	
4,700,000 ohm (or 4.7 Megohm) (Yellow, Violet, Green, Gold)	1	
100,000,000 ohm (or 100 Megohm) (Brown, Black, Violet, Gold)	1	
4,700 ohm (or 4.7 K) (Yellow, Violet, Red, Gold)	1	

<u>Potentiometers</u>	<u>Marked</u>	
100K Reverse Audio	C100K	1
25K Linear	B25K	1
100K Audio	A100K	1
50K Audio	A50K	1



Capacitors

Metallized Polyester Film (No Polarity)

	Marked	
.0047 mf. (microfarad or μ f)	472	1
.01 mf.	103	1
.033 mf.	333	1
.047 mf.	473	1
.1 mf.	104	1
.22 mf.	224	1



Radial Electrolytic (These Are polarized: The black band is the negative side)

10 mf.	1
100 mf.	1



Diodes

The bar on the case indicates how they should be installed on the board.

	Quantity
1N5818	1
1N4732A	1



Integrated Circuit

The dot on the case indicates pin 1 and shows how to orient it on the board.

	Quantity
TL072	1



LED

The shorter lead marks the negative side.

	Quantity
High-Brightness Clear Red 5mm	1



Transistor

The flat side of its package is used to orient it on the board.

	Quantity
MPSA14	1

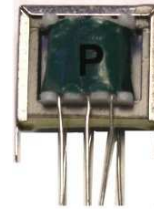


Transformer

The side that has the “P” on it is oriented with the silkscreened “P” on the board.
TM013

Quantity

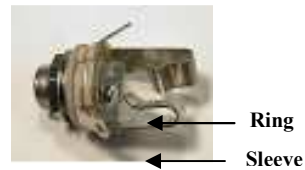
1



Jacks

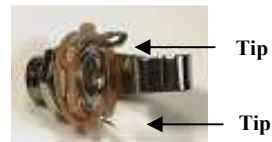
Input – Switchcraft #12B Stereo

1



Output - Switchcraft #11 Mono

1



External DC Power

1



Stomp Switch

DPDT Latching

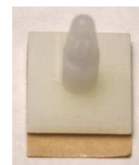
1



Adhesive PCB Standoffs

3/8"

2



Printer Circuit Board (PCB)

Enclosure

9-volt Battery Snap

Adhesive Rubber Feet (4)

Knobs (4)

This parts list identifies all of the components by the silkscreened designations that appear on the printed circuit board.

Resistors ¼ Watt, 5%

R1, R2, R6 – 100K
R4 – 1 Meg
R5 – 47K
R8 – 51K
R10 – 2.2K
R12 – 68K
R13 – 22K
R14 – 56K
R15 – 4.7 Meg
R16 – 100 Meg
R17 – 4.7K

Potentiometers

R3 – 100K Reverse Audio
R7 – 25K Linear
R9 – 100K Audio
R11 – 50K Audio

Capacitors Electrolytic 16 Volts

C1 – 100 mf.
C2 – 10 mf.

Capacitors Poly Film 50 Volts

C3 - .033 mf.
C4 - .0047 mf.
C5 - .047 mf.
C6 - .1 mf.
C7 - .01 mf.
C8 - ..22 mf.

Diodes

D1 – 1N5818 Schottky
D2 – 1N4732A 4.7 Volt Zener

Integrated Circuit

IC1 – TL072 Dual Op-amp

Transistor

Q1 – MPSA14

LED

LED1 – 5mm High-Brightness Red

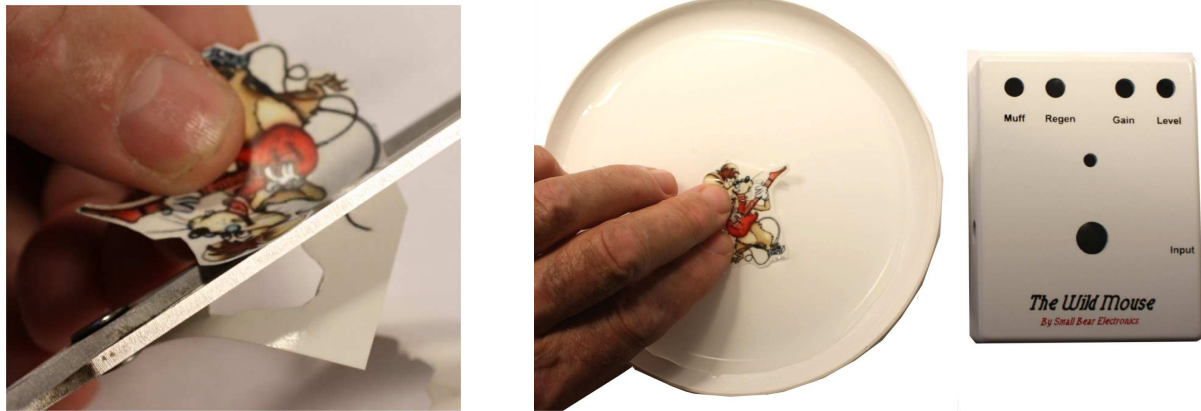
Transformer

T1 – 1.5K CT Primary, 8 Ohm Secondary

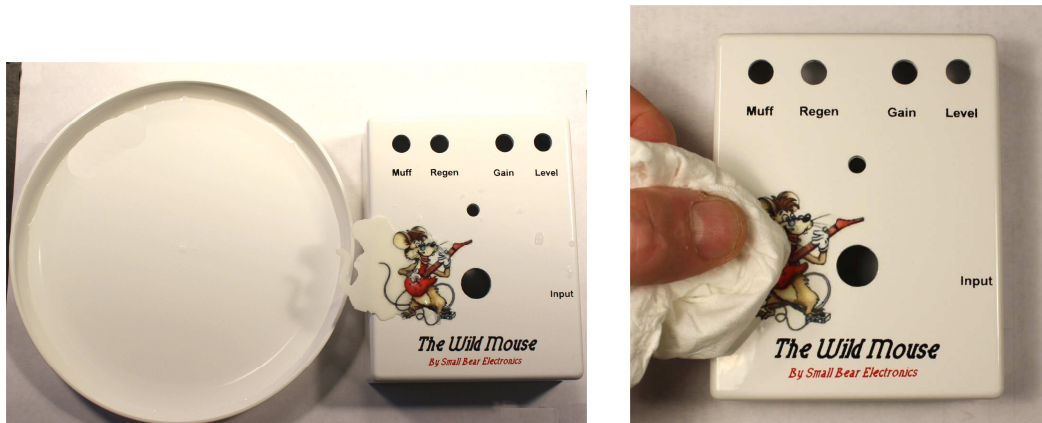
Prepare The Case

Most kits would start you off with assembling the circuit board. As you'll see later, the Wild Mouse goes together more easily if the enclosure is already finished and ready to accept the assembled board. To begin, make sure that the surface of the enclosure is free of dust by wiping gently with a damp, soft cloth.

Your kit includes a copy of the Wild Mouse cartoon figure on "water-slide-release" decal stock. With a sharp scissor, cut it carefully to size. As shown below, set up a small dish with some room-temperature water. Place the decal in the water and hold it down gently with your fingers. Within a minute, you'll feel the plastic decal start to peel away from its paper backing.



Remove the decal from the water, then slide the plastic decal off the stock and into place on the surface of the enclosure. When you have positioned the decal where you want it, blot the surface firmly and thoroughly with a paper towel. You want to squeeze out all of the water:



Give the result a couple of hours to set when you are done. Now spray on a coat of Krylon or similar clear lacquer. The first coat of this should be very light; I actually "shpritzed" it on. Give it a few minutes to get tacky, and then put down a slightly heavier coat with the usual sweeping motion. Finish with a fairly heavy "wet" coat.

Stuff The Board

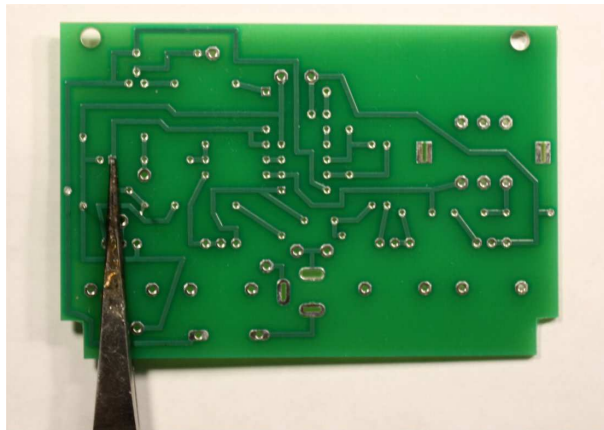
The next step is to solder the components on to the PC board. As I mentioned earlier, I don't cover in this manual the details of how to solder. If you have never soldered, you should study one of the many print or on-line references on this subject before you work on your board, and possibly practice a little on some scraps of wire.

“Stuffing” is the process of mounting components on the board and soldering them in place. Typically, we mount small parts first and finish with the larger ones, like pots. Heat up and tin your soldering iron, wet your cleaning sponge and let's begin, starting with the resistors. Find resistor **R1 (100K = Brown, Black, Yellow, Gold)**

Using a chain-nose plier, grab one lead of the resistor about 1/16” from the body. Bend the resistor lead sharply downward at right angles to the body of the component. Then do the same with the other lead:



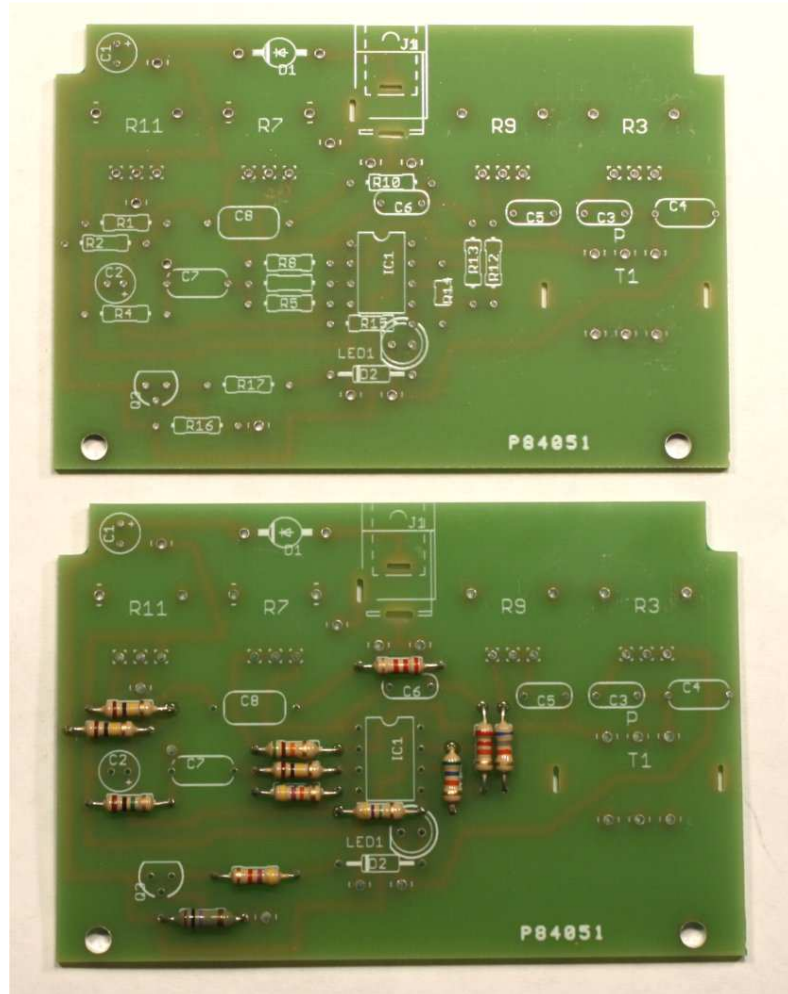
Look for the silkscreened legend “R1” on the PC Board, and insert the resistor into the appropriate holes. (Resistors have no polarity and can go in either way.) I use a pair of locking tweezers as a "third hand" to make sure that a component is held flush to the surface while I solder:



Solder R1 in place, and continue with the rest of the resistors in the same way.

The lower pic shows what things should look like when you are done.

R1, R2, R6 – 100K
R4 – 1 Meg
R5 – 47K
R8 – 51K
R10 – 2.2K
R12 – 68K
R13 – 22K
R14 – 56K
R15 – 4.7 Meg
R16 – 100 Meg
R17 – 4.7K



Now install the capacitors, working left to right:

C1 – 100 mf.

C2 – 10 mf.

C1 and C2 are polarized! The black band is the negative side.

C7 - .01 mf.

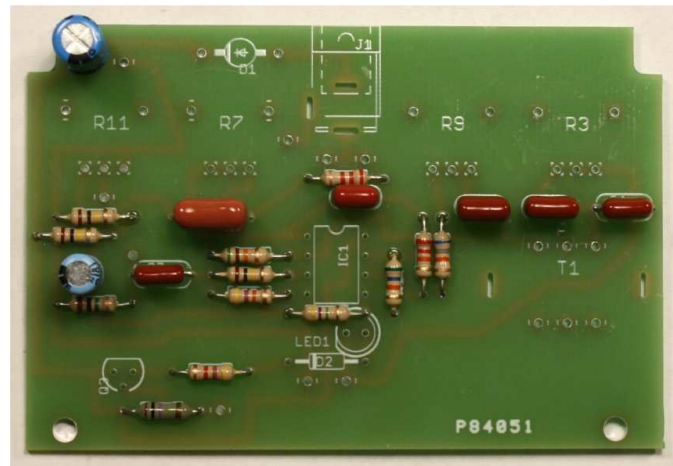
C8 - .22 mf.

C6 - .1 mf.

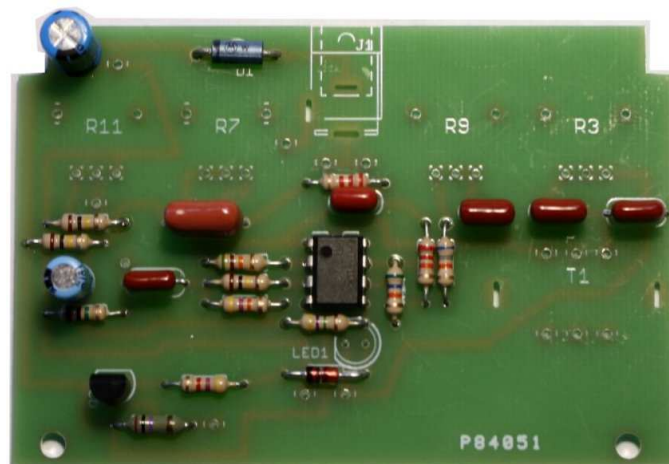
C5 - .047 mf.

C3 - .033 mf.

C4 - .0047 mf.

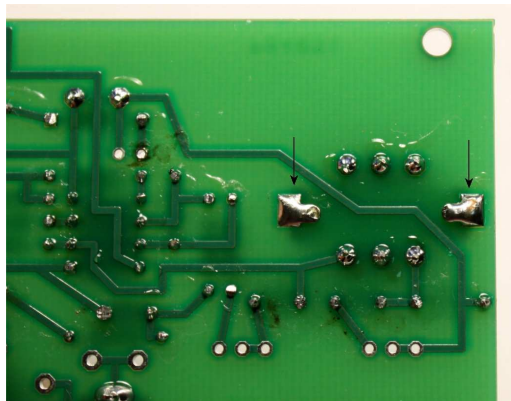
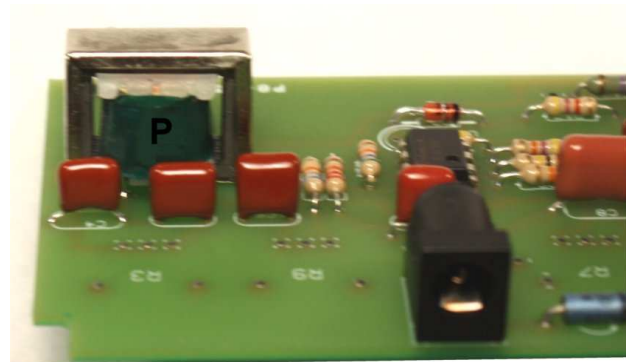


Next, the two diodes, the transistor and the IC. Pay attention to the bar markings on the diodes and the package outlines of the other parts. Some versions of the TL072 will have a notch at one end corresponding to the silkscreened legend, others a dot. Use the pics to guide you.

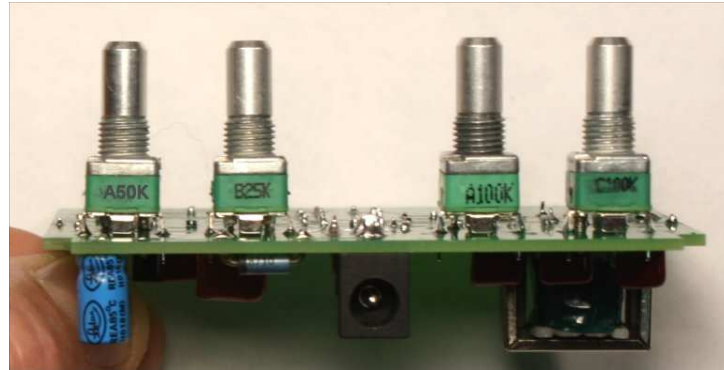
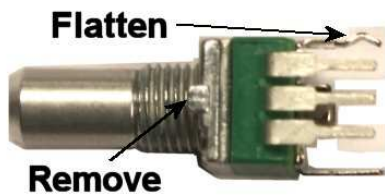


Now add the DC power jack and the transformer. With a flat file, shine the mounting tabs of the transformer so that solder will adhere to them easily. When mounting the transformer, make sure that the side of the transformer with the “P” faces the capacitors, bend the tabs flush to the bottom of the board and solder them to secure the component.

Before working on the pots, solder a bare wire jumper to connect the pads below diode D2.



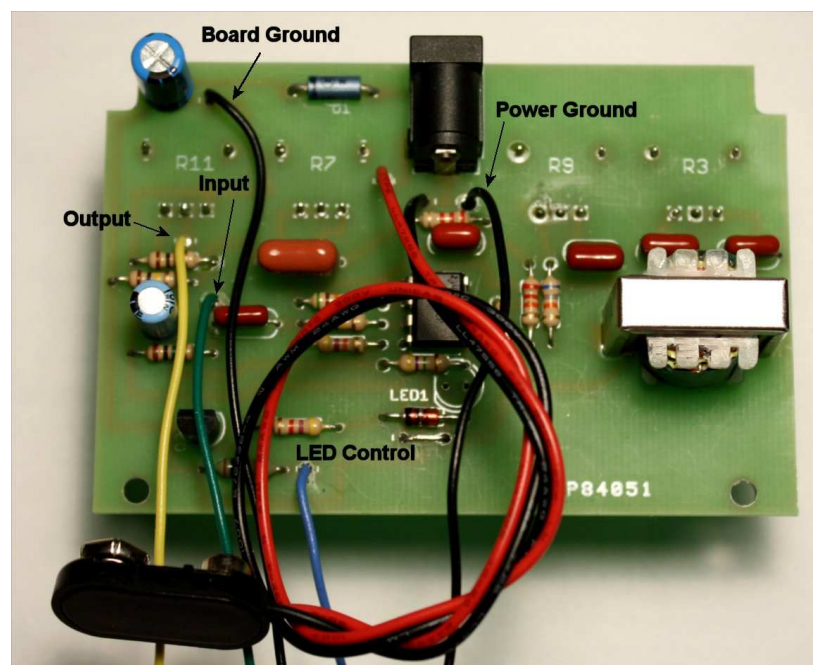
The 9mm pots have mounting flanges that position them precisely vertical on a board. I have found that the flanges go into their mounting holes more easily if I straighten them with a chain-nose plier. File or cut away the anti-rotation tabs on top of the case, as this build won't use them. Solder the pots in place, being especially careful to mount them such that the cases are precisely parallel with the surface of the board. Also, **be sure to get the correct value in the correct position!**



Add The Off-Board Wires

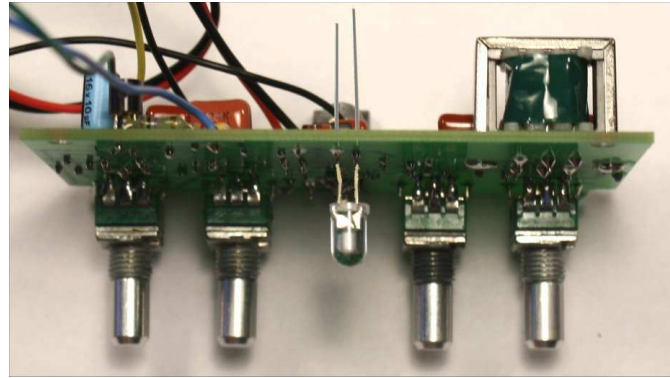
These are the wires that will go to the stomp switch and to the ground connections of the jacks. Cut to length, strip $\frac{1}{4}$ " at the ends, and consult the pic for the points where they are soldered. Solder the battery snap in place.

Suggested lengths: Board Ground 6", Power Ground 4", Input 4 $\frac{1}{2}$ ", Output 4 $\frac{1}{2}$ ", LED Control 3 $\frac{1}{2}$ ".

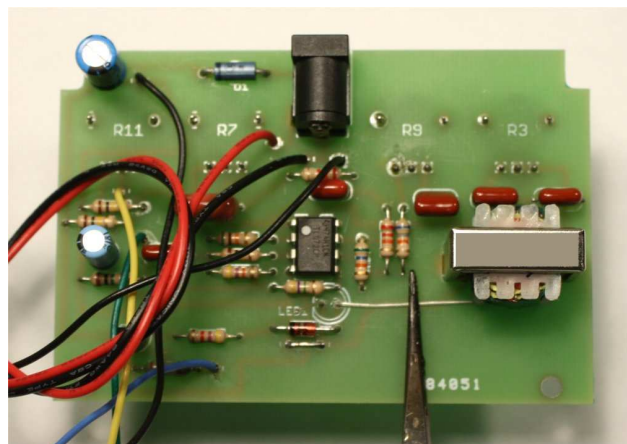


Install The LED

This component has a long and a short lead. Insert it **from the bottom of the PCB**, with the shorter lead to the left.



Use a ruler to position the LED so that the top of its dome is $\frac{1}{2}$ " above the bottom surface of the board. Bend one lead flush to the board on top, hold in place with soldering tweezers, and solder in place on the bottom. Clip the excess from the leads on top.



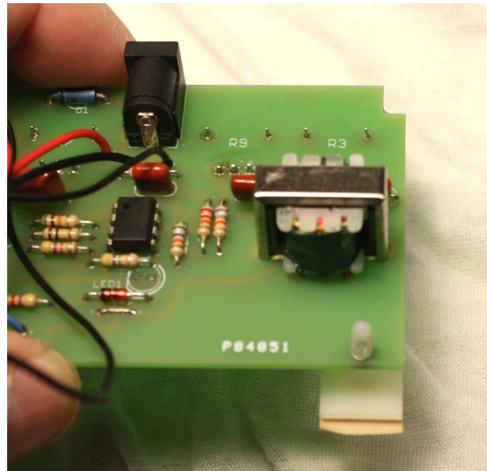
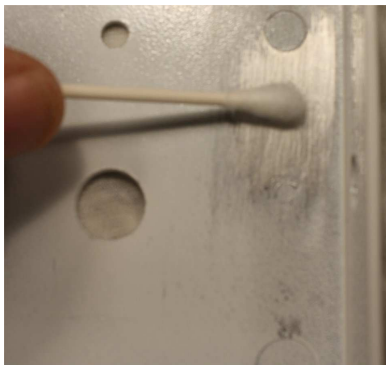
Prepare The Enclosure To Receive The Board

Any time that you are working with a finished enclosure, protect its finish by laying down a clean, soft cloth on your work area.

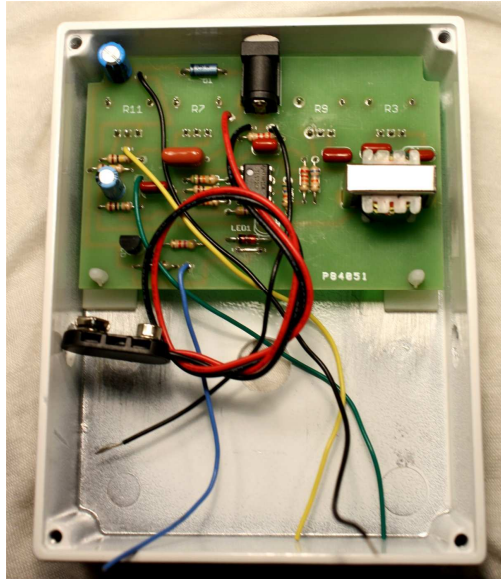
The PC board will be supported in the enclosure by the pots in front and by two adhesive standoffs in the rear. Before positioning the standoffs, we need to clean the area of the inside of the enclosure where they will attach.

Using 220-grit sandpaper, sand away all of the white powder-coat residue from the area forward of the jack mounting holes. Wet a Q-tip with acetone, and Very Carefully mop up the sanding residue. **Don't** let any of the solvent get on the painted finish.

These standoffs have a flange that will snap into place to securely hold the board. Insert one standoff into a mounting hole, and press it in gently until you feel the flange click. Do the same with the other standoff, and orient both so that their edges are parallel with the board.



Remove the protective backing from the adhesive surfaces of the standoffs. Making sure that the standoffs are still oriented correctly, carefully lower the whole assembly into place. Press gently on the standoffs to make sure that they get a good grip. Install the hardware on the pots and turn finger-tight.

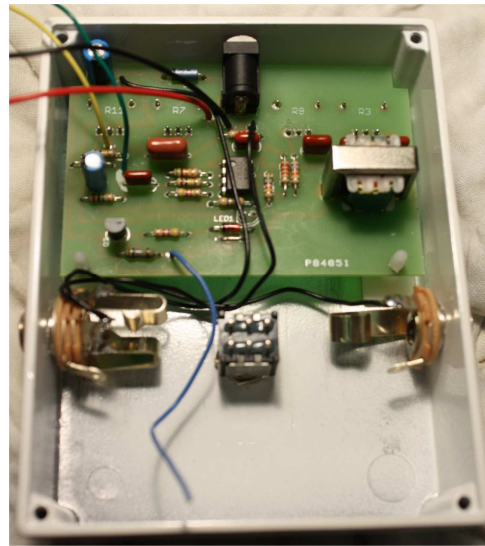
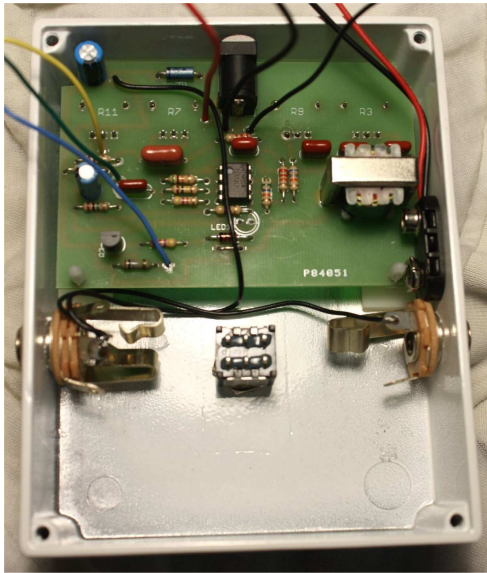


Installing And Wiring The Stomp Switch And Jacks

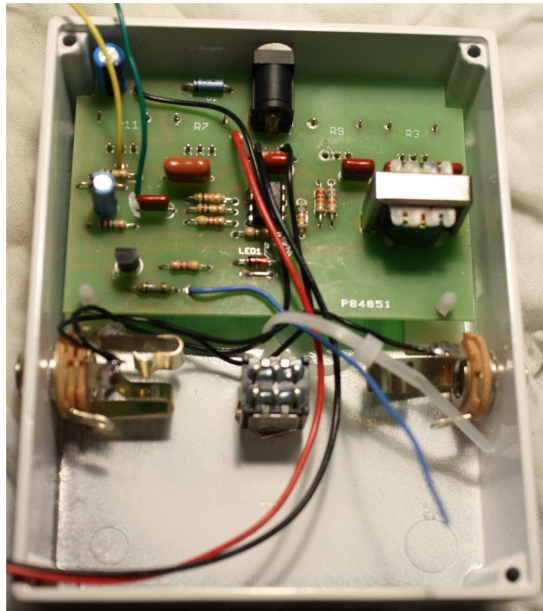
Hardware finger-tight on these to start. Note that the stereo (three-contact) jack goes on your left as you are looking at the pic, and observe how the contacts are oriented on both jacks. Also, don't forget the white nylon washer on the stomp switch.

Route the Board Ground lead as shown to the sleeve contact of the stereo jack. Run a wire from that same point to the sleeve contact of the other jack. Solder both connections.

Run the Power Ground lead to the ring contact of the stereo jack and solder.



Route the LED control lead to the right as shown in the next pic. Route the battery snap past the right side of the stomp switch. Loop the cable tie under and around all of the wiring to form a harness, and tighten the tie. Dress the wiring neatly. Strip the end of the LED control lead and solder to the top right switch contact.



Wiring the switch contacts invariably confuses a lot of people, so let's do the rest of it "by the numbers":



- #1 - PC board input (Green)
- #2 - Tip contact of input jack
- #3 - Connects to #4 and output jack tip
- #4
- #5 - To PC board output (Yellow)
- #6 - To LED control (Blue)

When wiring contact #3, run a short lead from there to #4. Solder #3, and then run the lead from #4 to the output jack before soldering at #4. The pic shows the result, and suggested routing.



Testing

Start with all of the controls except level at minimum and level about one-third clockwise. Connect your gear and a battery. With the effect engaged, you should hear a sharp treble boost. Turning the muff clockwise should give progressively more “honk,” and the gain and regen will vary the sharpness. Try playing a little at various settings of the controls. Got the effect? CONGRATULATIONS!

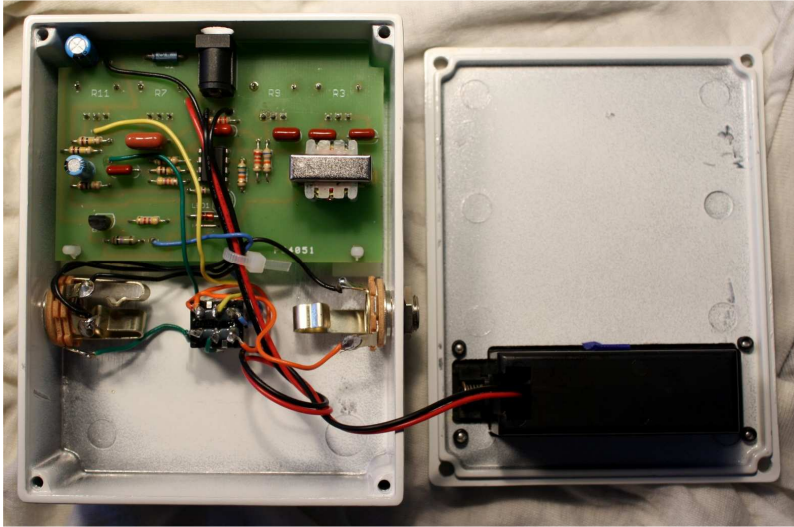
If you don't hear the effect at any setting, or if the controls don't work correctly, it's time to do some troubleshooting:

- Referring to the parts list, go over the board and make sure that every component is in its proper place, and the electrolytic caps, diodes, transistors and the IC are oriented correctly. Do you have the right pot values in the right places? If all of that is copacetic...
- There's probably a mistake in wiring to the outboard components. Re-check all of the wiring to the battery, jacks and switch. If all of that is OK and you are still having problems, drop me an e-message. TRIPLE-CHECK!

Final Assembly

Tighten the hardware. If you are using pliers to do this, take special care not to let the tool slip and ruin the finish. Knot the battery snap to shorten it up a little bit and slip the business end in the drawer.

Set the bottom plate in place and attach rubber feet. Before attaching the feet at the bottom, I used an X-acto knife to slice off part of each one so that they would fit without overlapping the enclosure. Secure the screws and add knobs to the pots.



How Does It *Really* Work?

I purposely did not go into technical detail in this manual. But if you go to my web site, www.smallbearelec.com, and look in the Projects section, you will find an article that describes building the Wild Mouse from scratch on perfboard. You'll find there a schematic, a detailed explanation of the circuit and notes on mods, tweaks and troubleshooting.

I know you will enjoy using your new pedal. Questions and comments are always welcome at smallbearelec@ix.netcom.com.