Rodent (ProCo™ Rat™ Distortion Replica) Instructions

This is the Rodent Distortion kit, a replica of the ProCo™ Rat™. There were/are several versions of the Rat™. This project and kit is based on an older version of the Rat™ circuit sometimes known as version "B". It does not include a JFET on the input of the circuit as version "A" had. Experimentation has shown the input JFET does not have much effect on the sound and is probably not worth the extra parts to include it in this project.

The Opamp

The original Rat™ used the LM308, which is now obsolete and expensive to buy, though still available from some sources. The datasheet for the LM308 states that the special characteristics of this opamp are very low input bias current, low supply current, and guaranteed drift characteristics, characteristics not normally important to audio. Further checking of the datasheet shows the slew rate of the LM308 (0.15 V/microsecond) is dismal compared to a typical audio opamp, like a TL071, which I think is the key to why it sounds great in the RAT circuit.

Comparing the LM308 to both the TL061 and the TL071, the TL opamps sound OK in the Rat™ circuit, they are brighter and more of a heavy metal type of tone, and there is some "plinking" to the attack. The LM308 gives a warmer tone, less treble, and

with a smoother, more tube-like attack, no "plinking". The dismal slew rate may be responsible for this - the opamp simply cannot reproduce the pick attack at high gain.

The LM108 or a LM208 should work the same as the LM308, the specs are the same except the 108 and 208 are guaranteed over a wider temperature range. There are also other opamps like the LM10 or the OP-08E with very similar specs.

This kit uses the OP07 opamp that is used in the current model Rat™ distortions. We compared the sound of this circuit with the LM308 IC and the OP07 IC and found little or no difference in the sound. Your results may vary, depending on your guitar and rig. For that reason, the kit does include a IC socket, so if you wish to find and purchase a LM308 or other IC on your own and try them out, it will be easy to do.

The project also includes a nice little add-on that allows you to set the bias on the JFET. The voltage divider of R12 and R13 sets the voltage on the 1 meg gate resistor, which in turn sets the source voltage. The original had that 1 meg resistor set to ground voltage and if you want your Rodent to be as original, leave R13 blank and use the included 0 ohm resistor (jumper) for R12. This will set the voltage into R9 at ground voltage as original. We recommend the values listed for R12 and R13 as we believe it sounds a little better.

Total current consumption of the entire effect is about 3 ma, which means long battery life.

Populating the PCB

Use the project documents provided, starting with the General Build Instructions. There are a couple of options for populating the small ceramic capacitors. Since they are usually available in two different lead spacings and it's sometimes difficult to source the caps with just the right lead spacing, there are optional lead spacing holes for C3 and C4. See the diagram below for placement.

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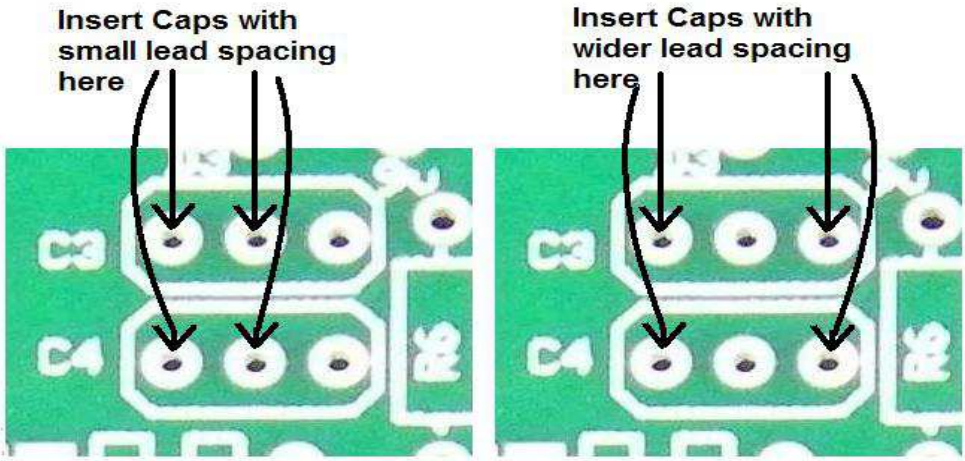
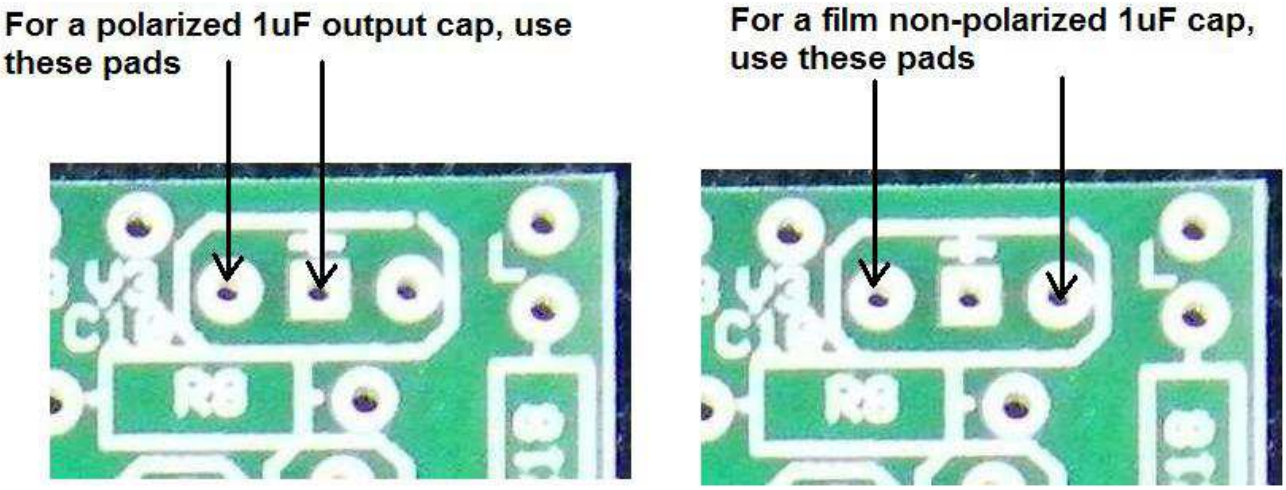


The output capacitor C10 placement is similar. The kit includes a great sounding aluminum electrolytic capacitor, but 1uF film cap can be used if you are sourcing your own parts.



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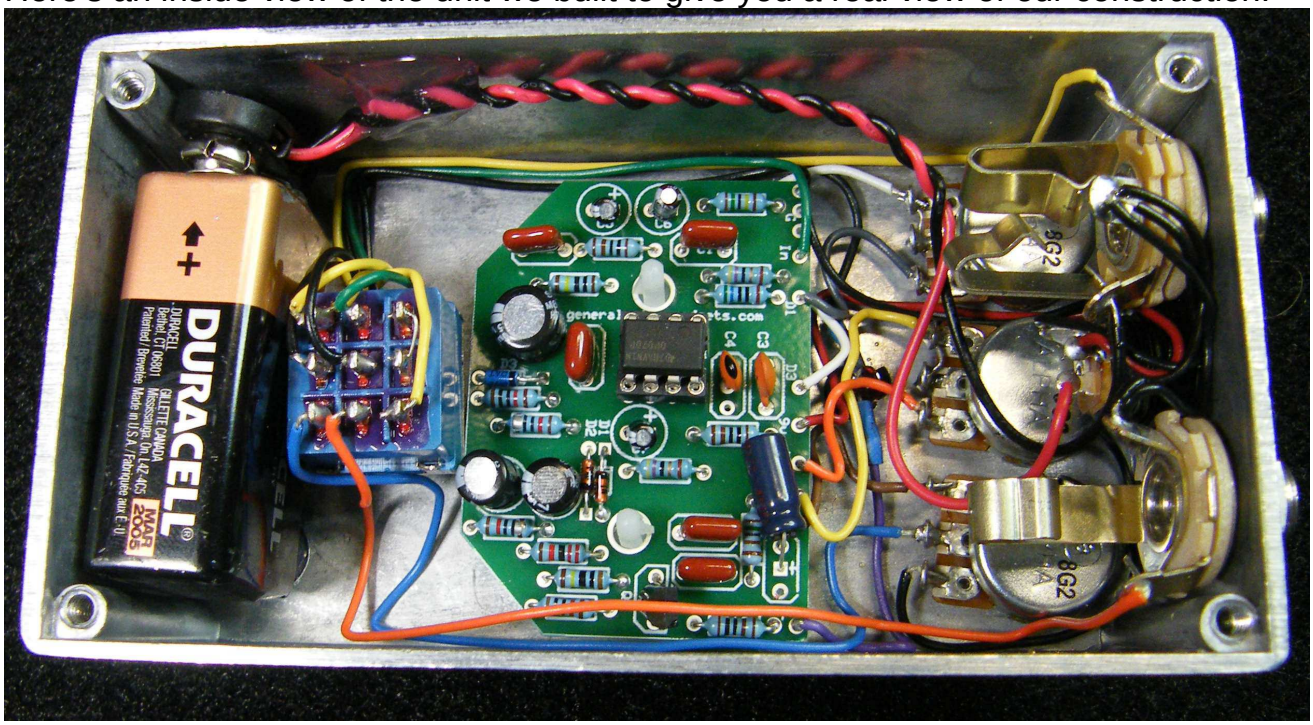
Here's an inside view of the unit we built to give you a real view of our construction.



Here is a chart of voltages taken at the IC pins. Use these voltages as a guideline. You may not get the exact readings listed, but should be somewhere in the area.

Component	Location	Voltage
9 volt power supply		9v
IC1	Pin 1	8.4v
	Pin 2	4.5v
	Pin 3	4.1v
	Pin 4	0v
	Pin 5	0v
	Pin 6	4.5v
	Pin 7	9v
	Pin 8	4.6v