

Project 2

Build the Bulk Fuzz
(based on Christian H's Bazz Fuss Circuit)

v02, 02.26.12

Here's the plan:

This is a very fun project!

When the smoke has cleared (and the smoke alarm has been reset), you'll not only have an absurdly fat-sounding fuzz pedal, but one that's custom-tuned to suit your gear and ear.

All the parts, theory, and build techniques used here were introduced in Tonefiend DIY Club Project #1, and I'm way too lazy to run through them again. So if you're a total beginner, please, check out Project #1 first. You may not have to actually *build* it, but you'll need the background info to proceed with this project. (All DIY Club Projects and Resources are located [on this page](#), including a video demo of the final build.)

If you've built stompboxes before, dive right in. This one's super-easy.

And did I mention it's fun? ;)



Credit where it's due:

Everything here is based on a simple but wonderful design by a clever guy named [Christian H](#). His circuit, known is called the Bazz Fuss because it was originally conceived as a bass effect. [Here](#) is a terrific article on the circuit from home-wrecker.com, a cool DIY site.

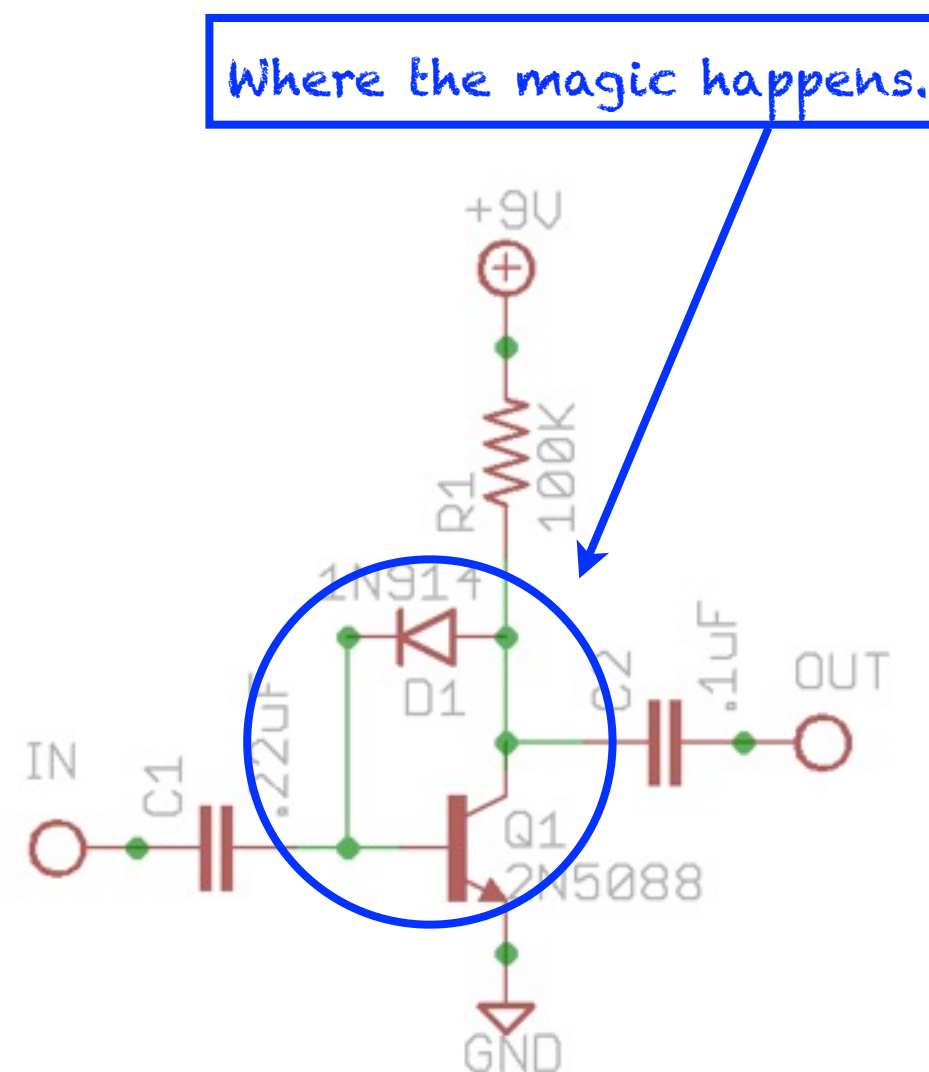
I wound up departing a bit from the original, and you should too. In fact, the main goal of this project (beside building a cool pedal) is learning how easy it is to mod circuits to taste.



The basic idea:

Here's a basic version of the circuit. (If you have no idea what these symbols mean, you should *definitely* review Project #1.)

All the action happens between the transistor and diode at the heart of the circuit. Sticking certain diodes between the collector and base of certain transistors instantly generates a thick and distinctive fuzz with an aggressive, almost synth-filter-style resonance.

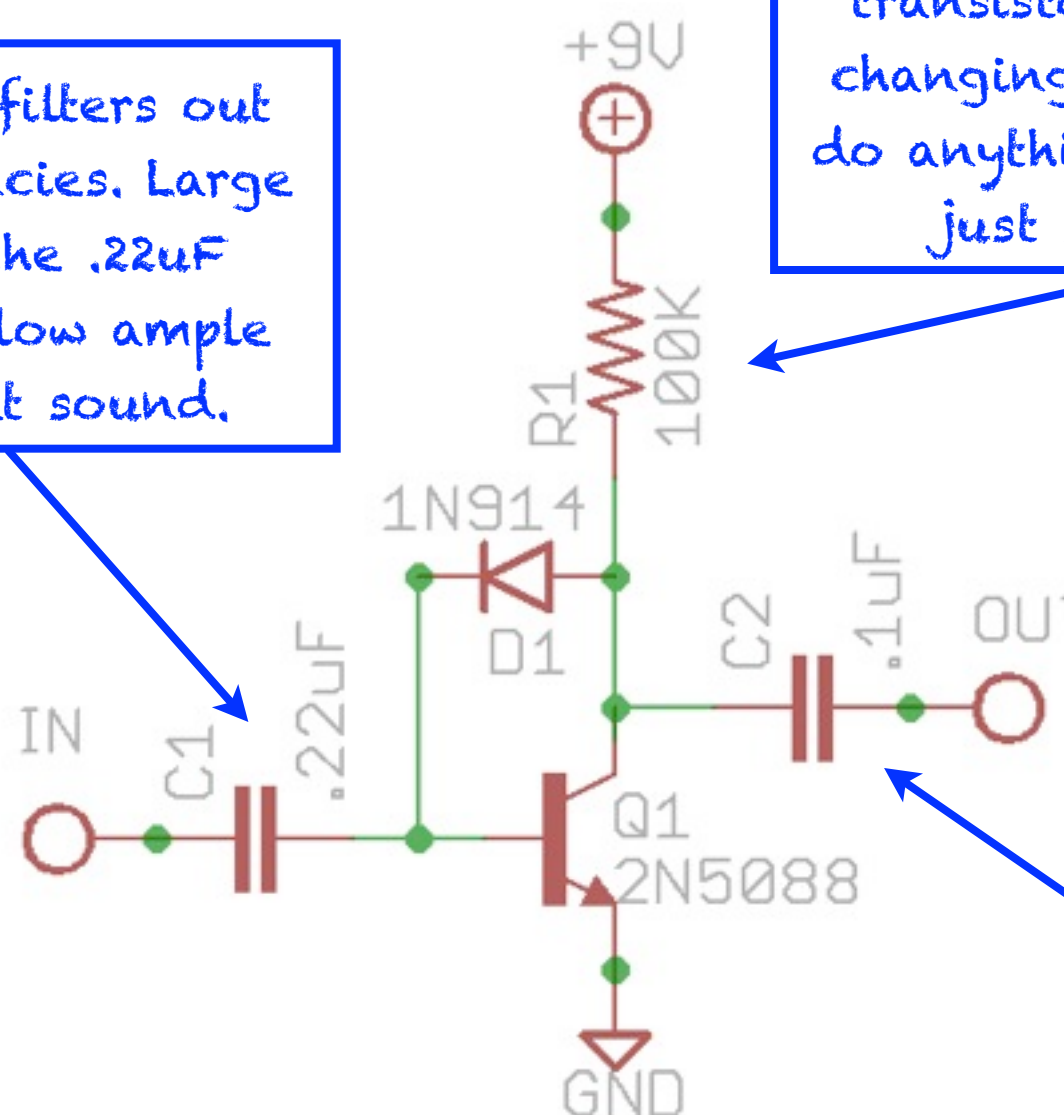


What the other parts do:

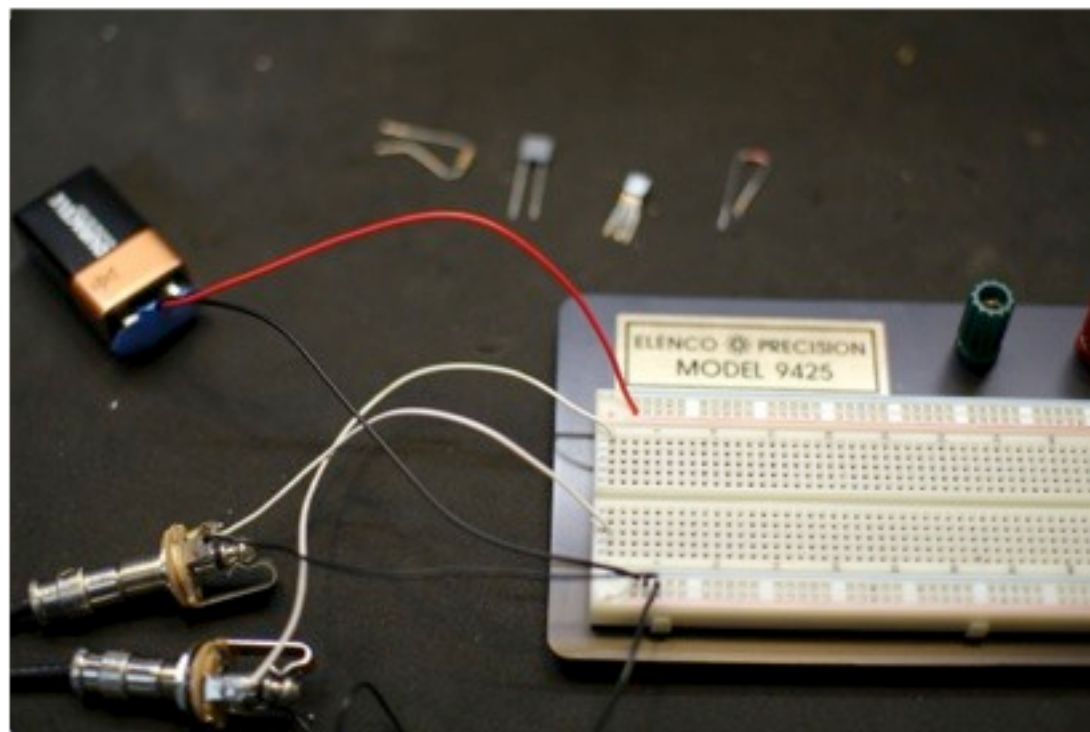
The input cap filters out certain frequencies. Large values, like the .22uF shown here, allow ample lows for a fat sound.

Controls current to transistor. In this circuit, changing the value doesn't do anything interesting – it just stops working.

Output cap removes the battery's DC current from the output signal. Also shapes the tone, though not as dramatically as the input cap.



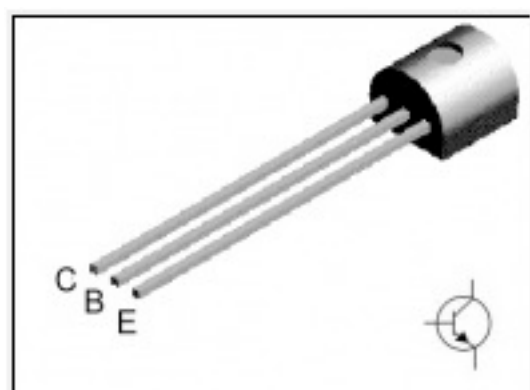
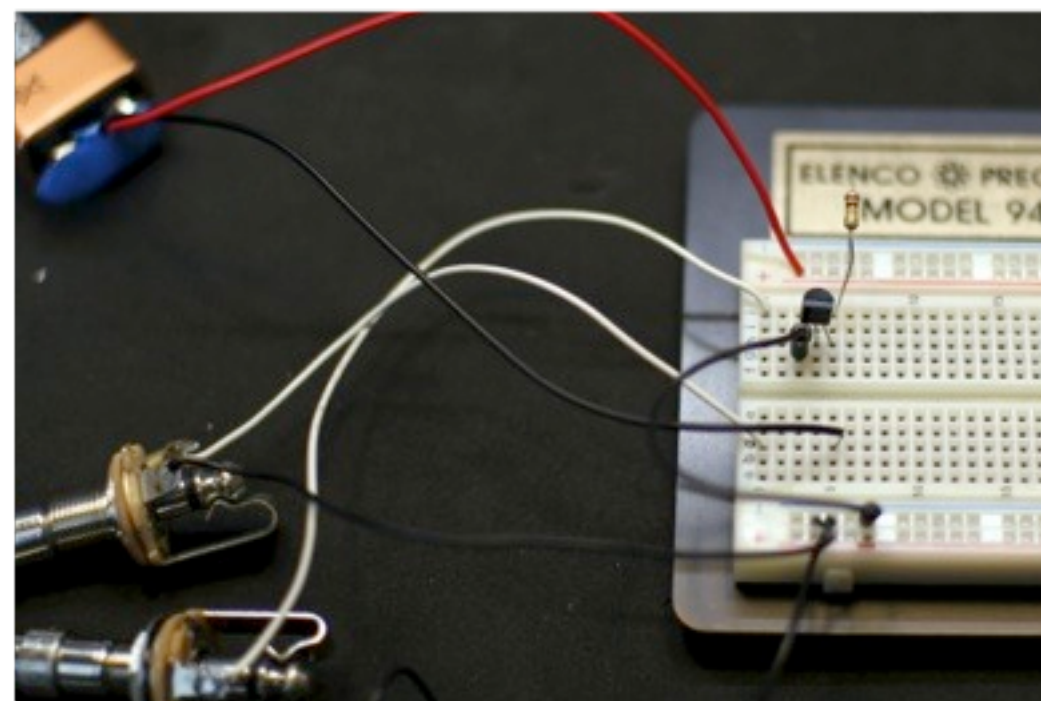
Let's Breadboard It!



Connect jacks and a battery to your breadboard, as detailed in Project #1.

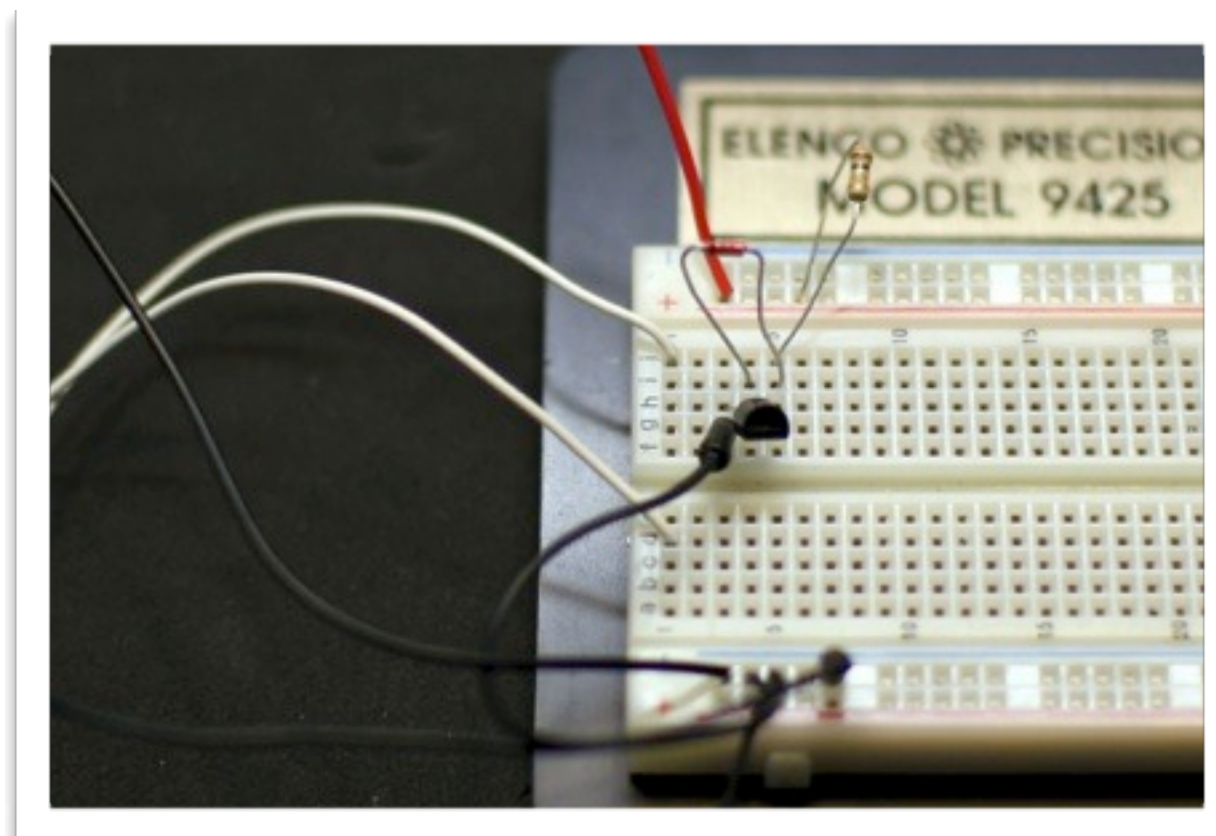
Connect the Transistor

Install your 2N5088 transistor. Use a 100K resistor to connect the transistor's collector to the positive 9V bus. Use a jumper cable to connect the transistor emitter directly to the ground bus.



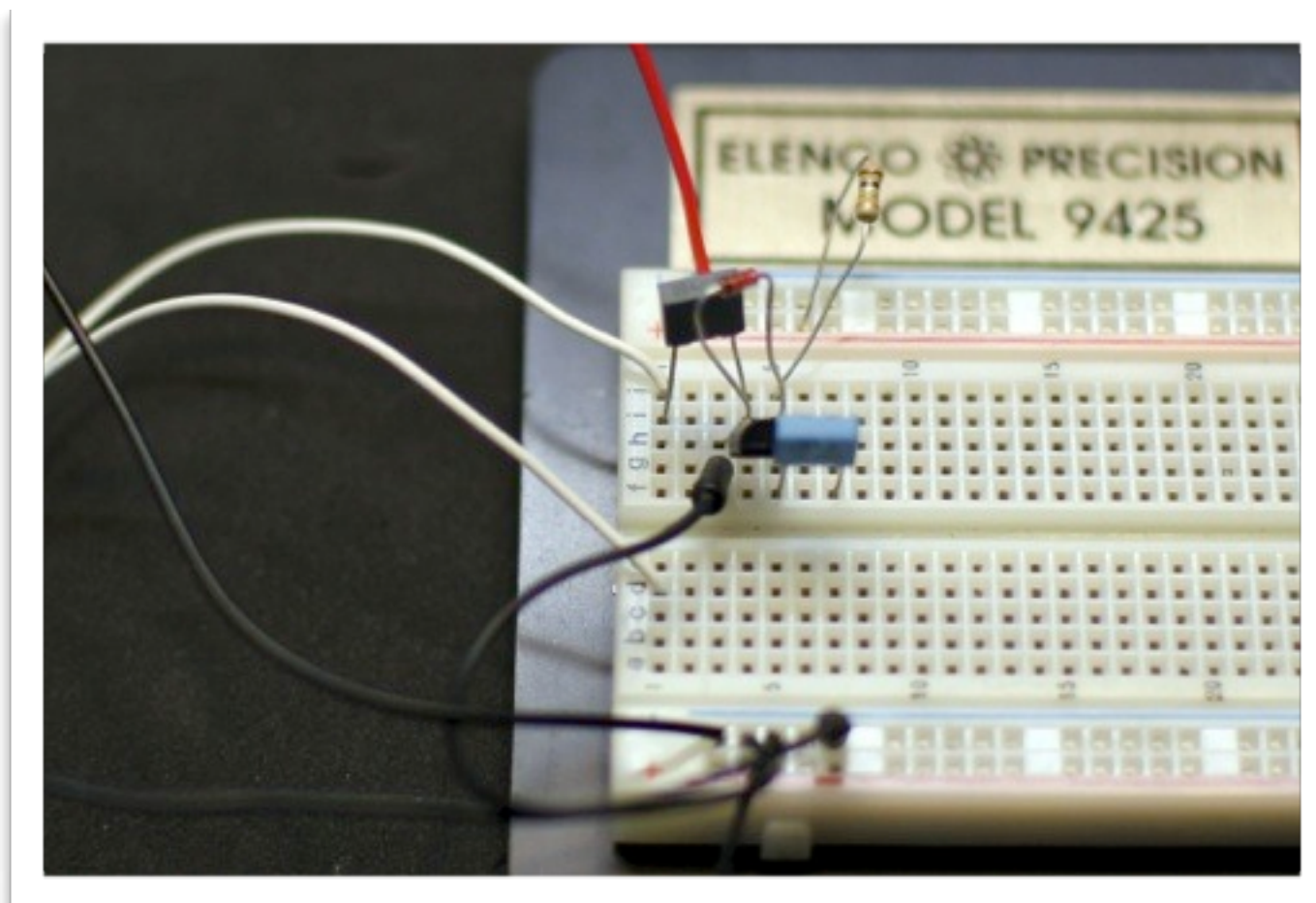
This is the "pinout" for the 2N5088 and many other popular stompbox transistors, including the 2N5089 and 2N3904.

Add the diode



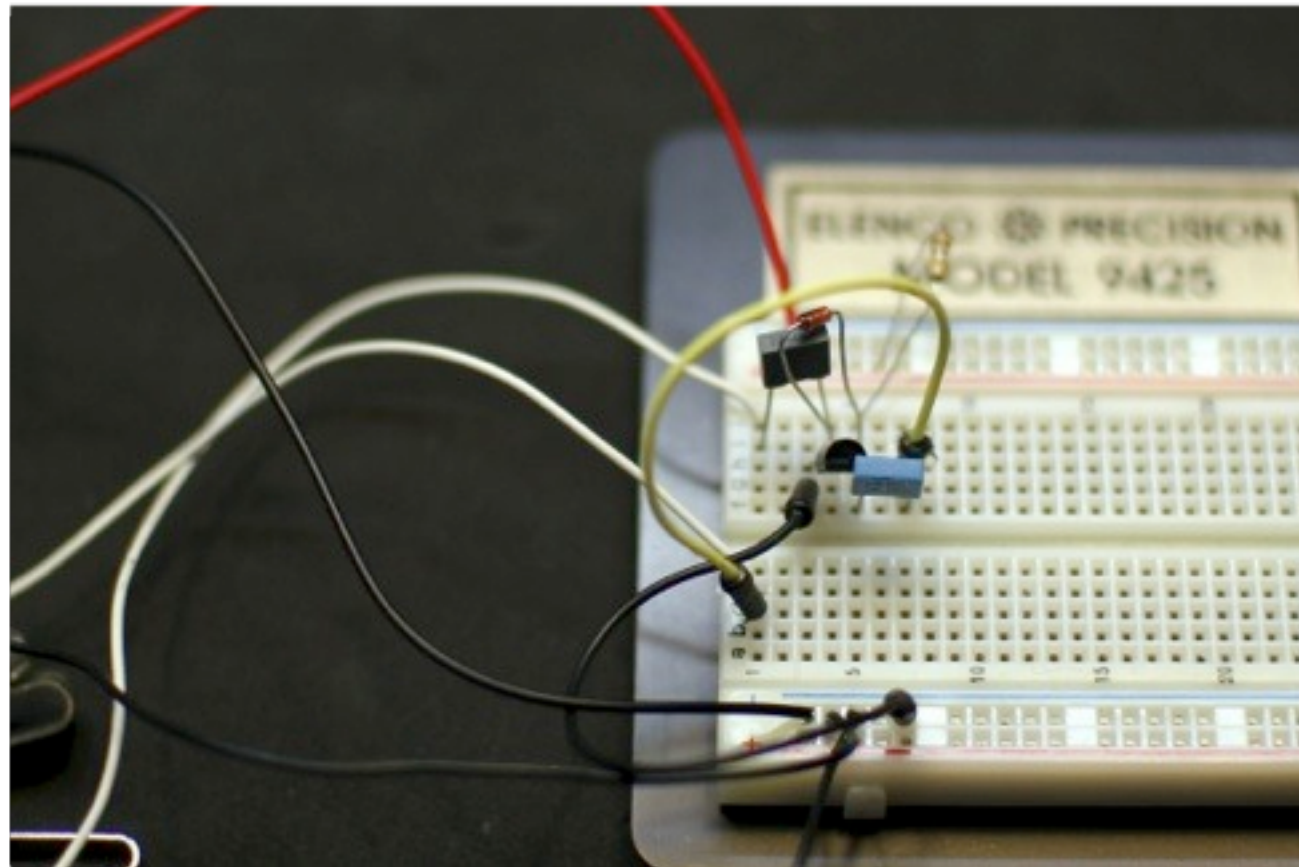
Use the 1N914 diode to link the transistor's collector and base. The cathode—the banded, negative terminal—connects to the base.

Install the Input and Output Caps



Place the .22uF cap between the input wire and the transistor's base.
Connect one leg of the .1uF cap to the transistor's collector.

Stand back.

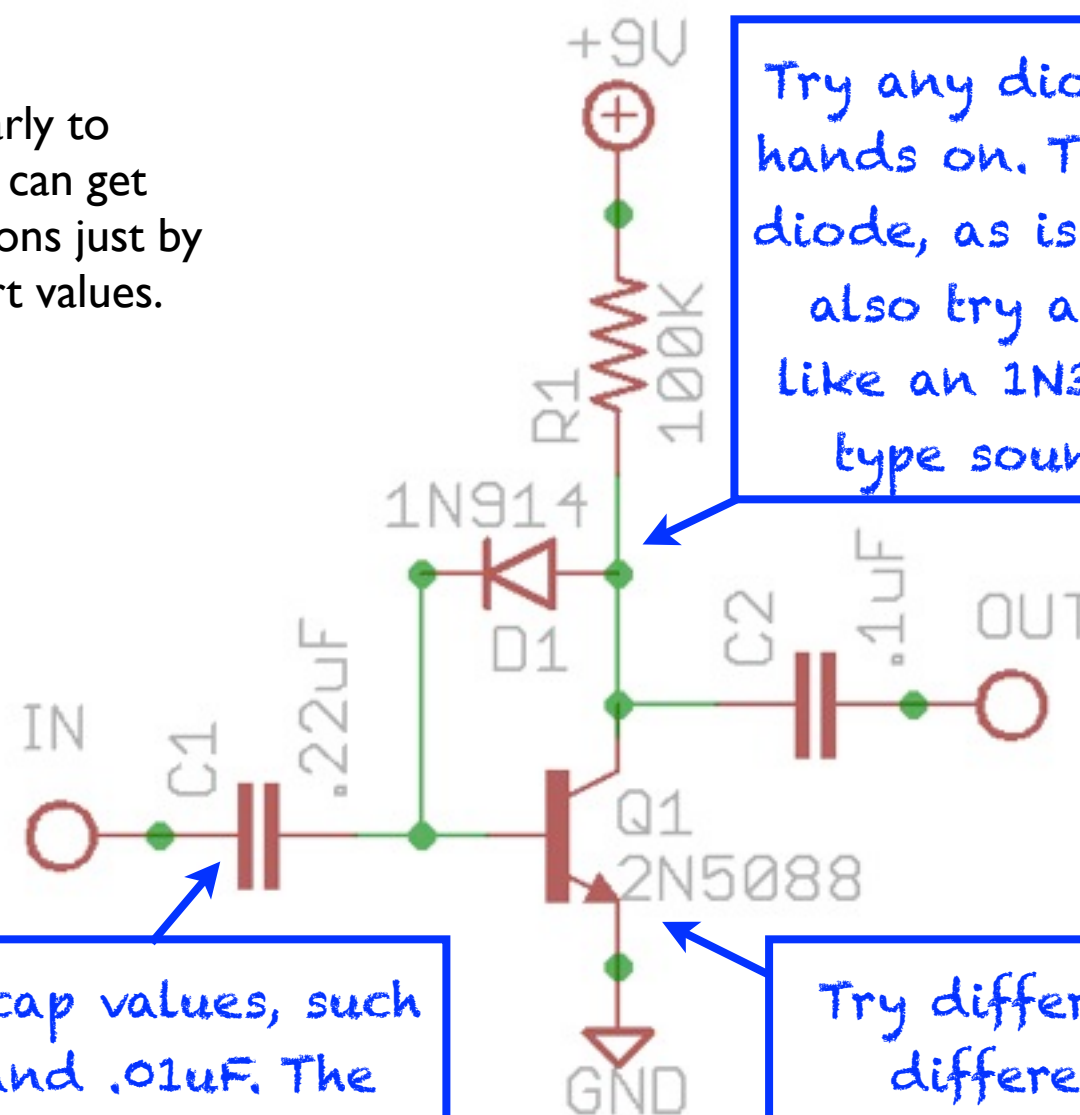


Use a jumper cable to connect the rightmost leg of the .1uF capacitor to the output wire.

You should now hear loud, violent fuzz.

Start modding!

It's never too early to experiment! You can get HUGE tonal variations just by trying various part values.

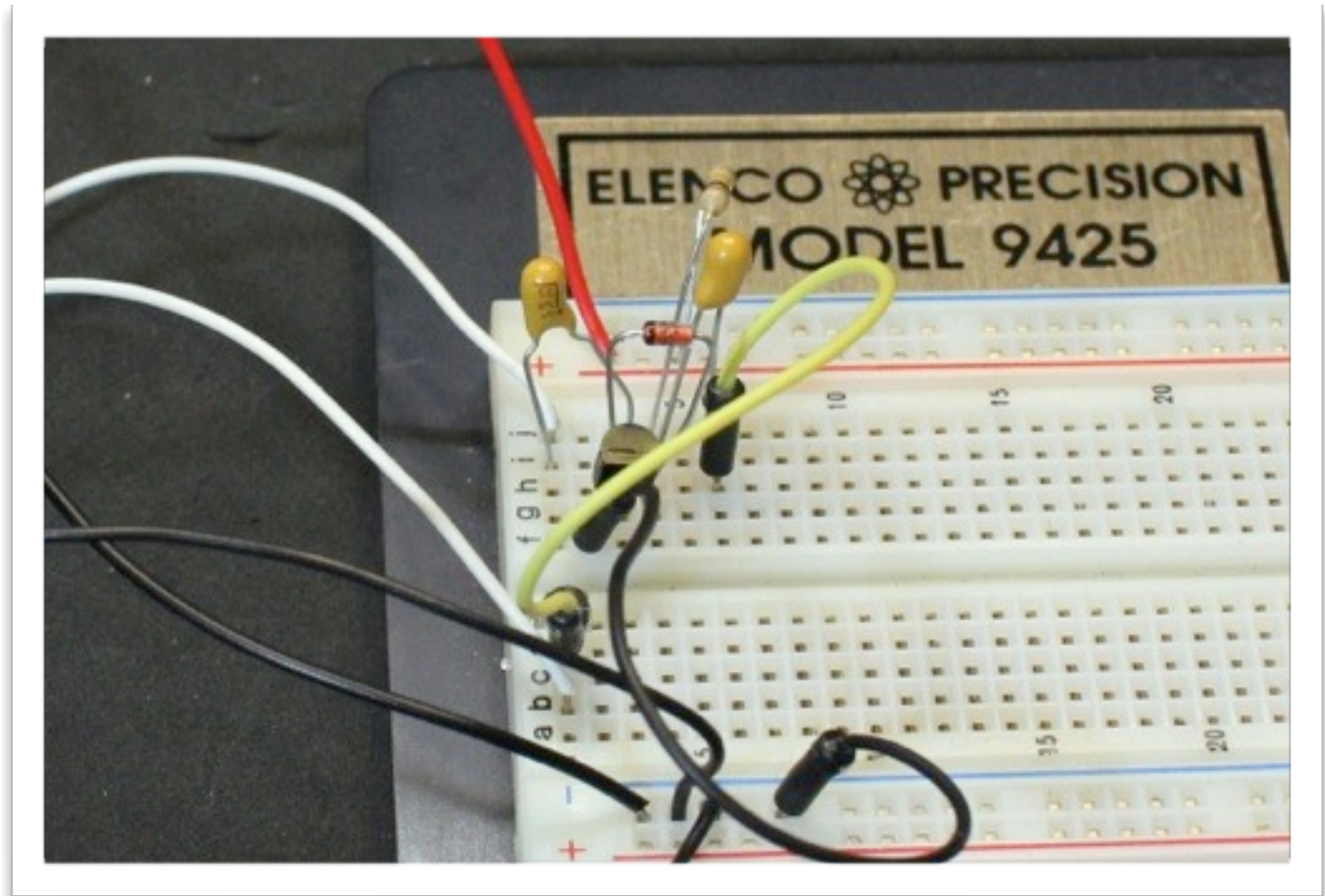


Try any diode you can get your hands on. The 1N914 is a silicon diode, as is the 1N4001. You can also try a germanium diode, like an 1N34A, or an LED. Each type sounds very different!

Try smaller input cap values, such as .1uF, .047uF, and .01uF. The smaller the value, the more lows get filtered out.

Try different transistors with different gain levels. A 2N5089 has more gain than a 2N5088. A 2N3904 has less.

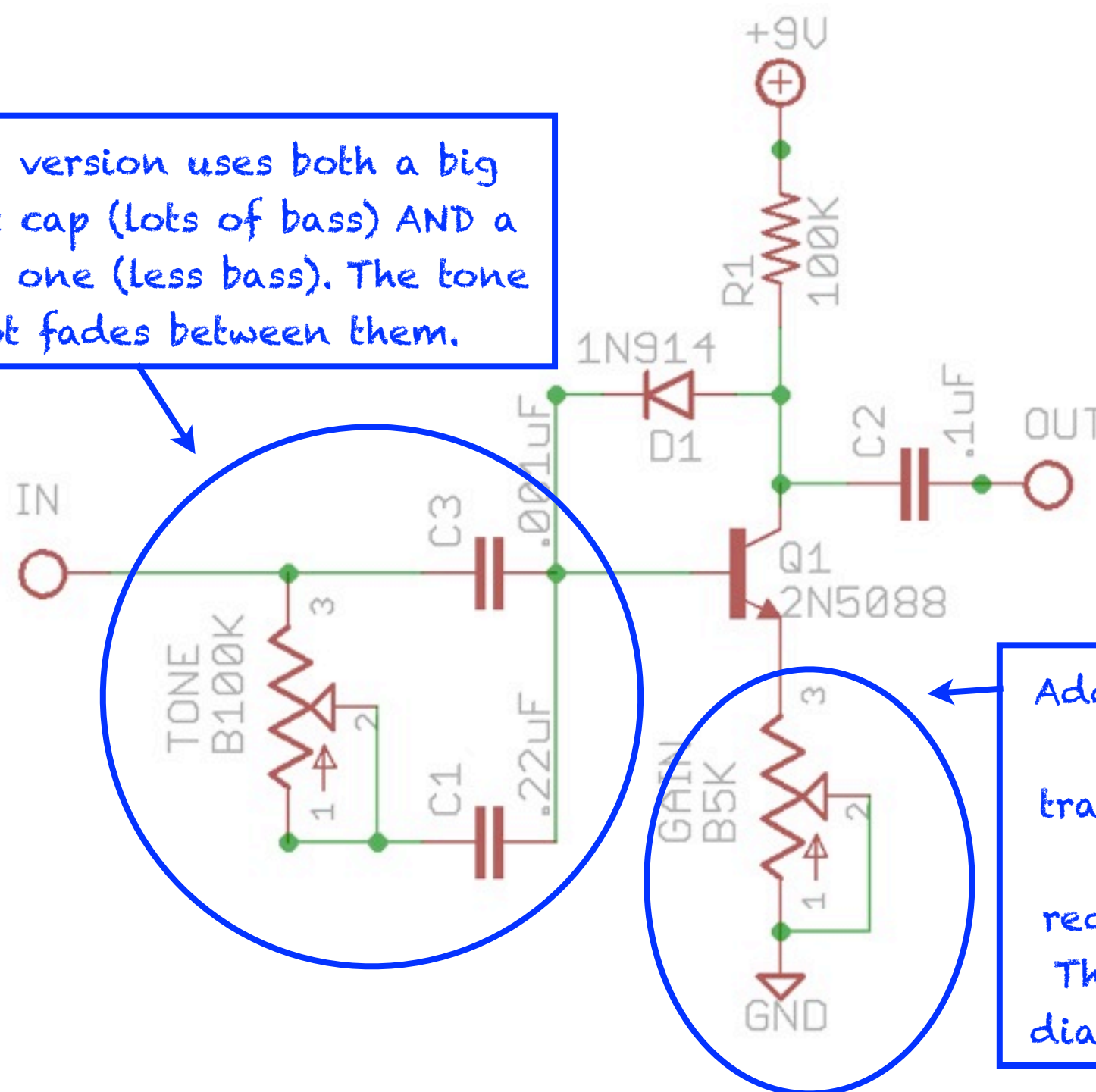
473
103



I wound up using .15uF capacitors for both the input output caps in the “stupid” version of the pedal seen in the demo video. The tone is less bassy than with the stock caps, but still has plenty of lows for my taste. These particular caps are tantalum, which *are* polarized (the negative legs connect to the input and output jacks). But the cap *type* really doesn’t matter much — just its value.

Version 2: A Little Trickier..

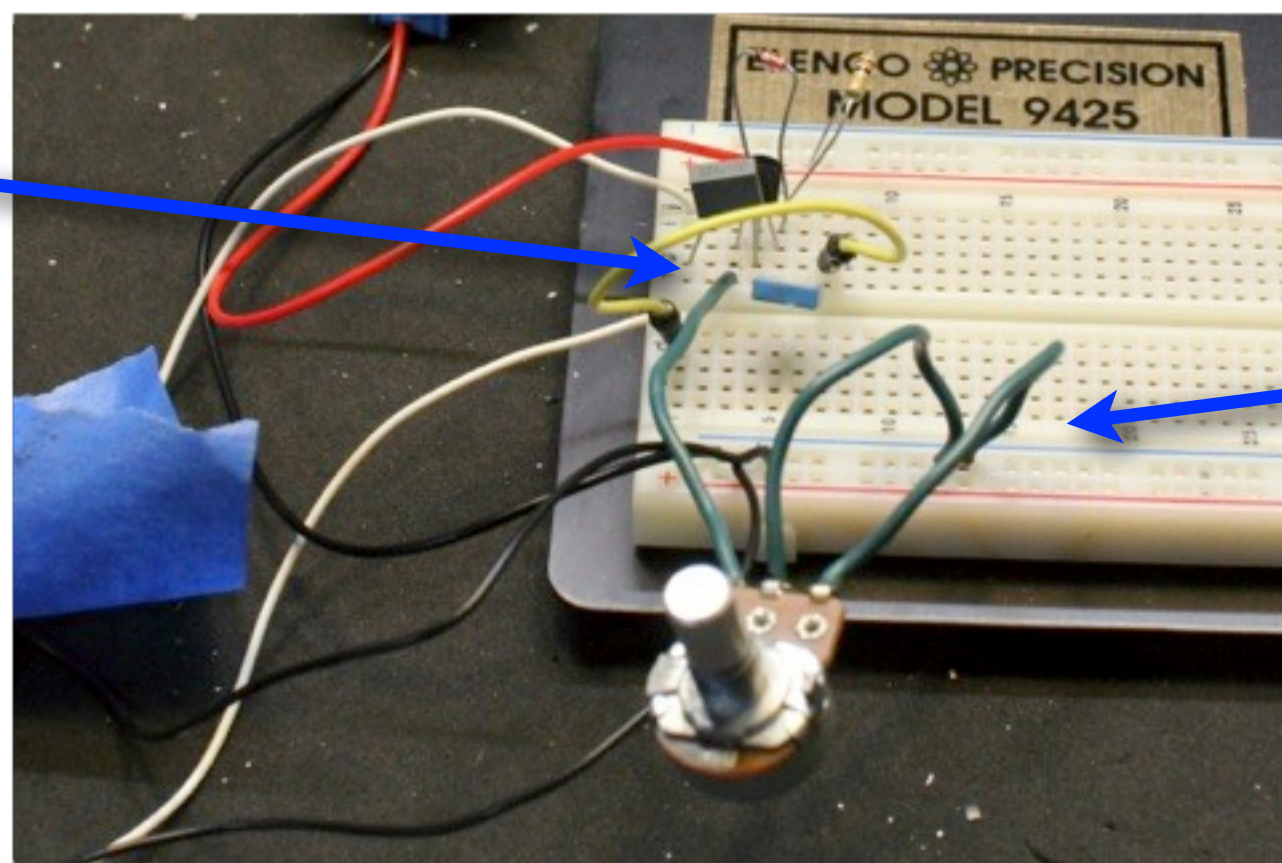
This version uses both a big input cap (lots of bass) AND a small one (less bass). The tone pot fades between them.



Adding resistance between the transistor emitter and ground reduces the gain. The pot lets you dial back the dirt.

Let's Breadboard Version 2: The Gain Control

Lug 3 of
B5K pot
connects to
transistor
emitter.

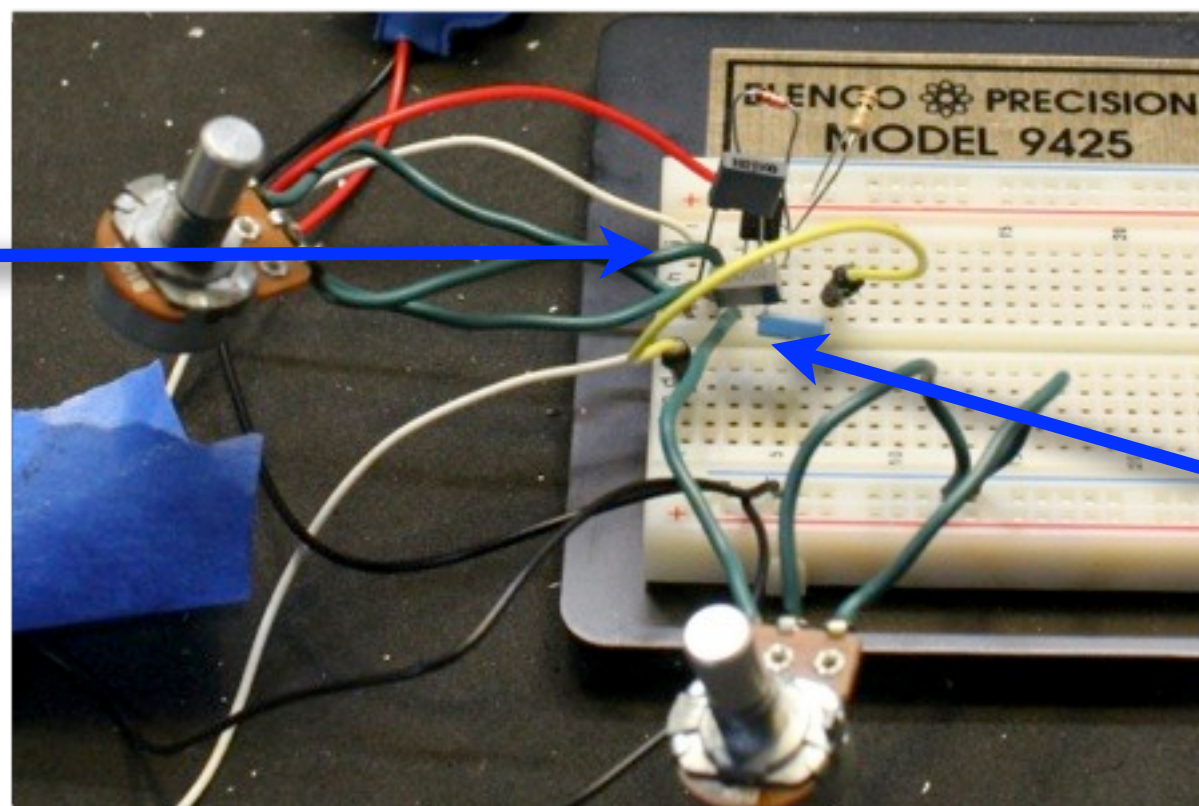


Lugs 1 and
2 connect to
ground.

Replace the jumper cable between the transistor's emitter and ground with a B5K pot. Lug 3 connects to the emitter. Lugs 1 and 2 both connect to the ground bus.

Add the Tone Control

Lug 3 of
B100K pot
connects to
input wire
and one leg
of .22uF cap.



Lugs 1 and 2 of
B100K pot
connect to one
leg of .01uF
cap.

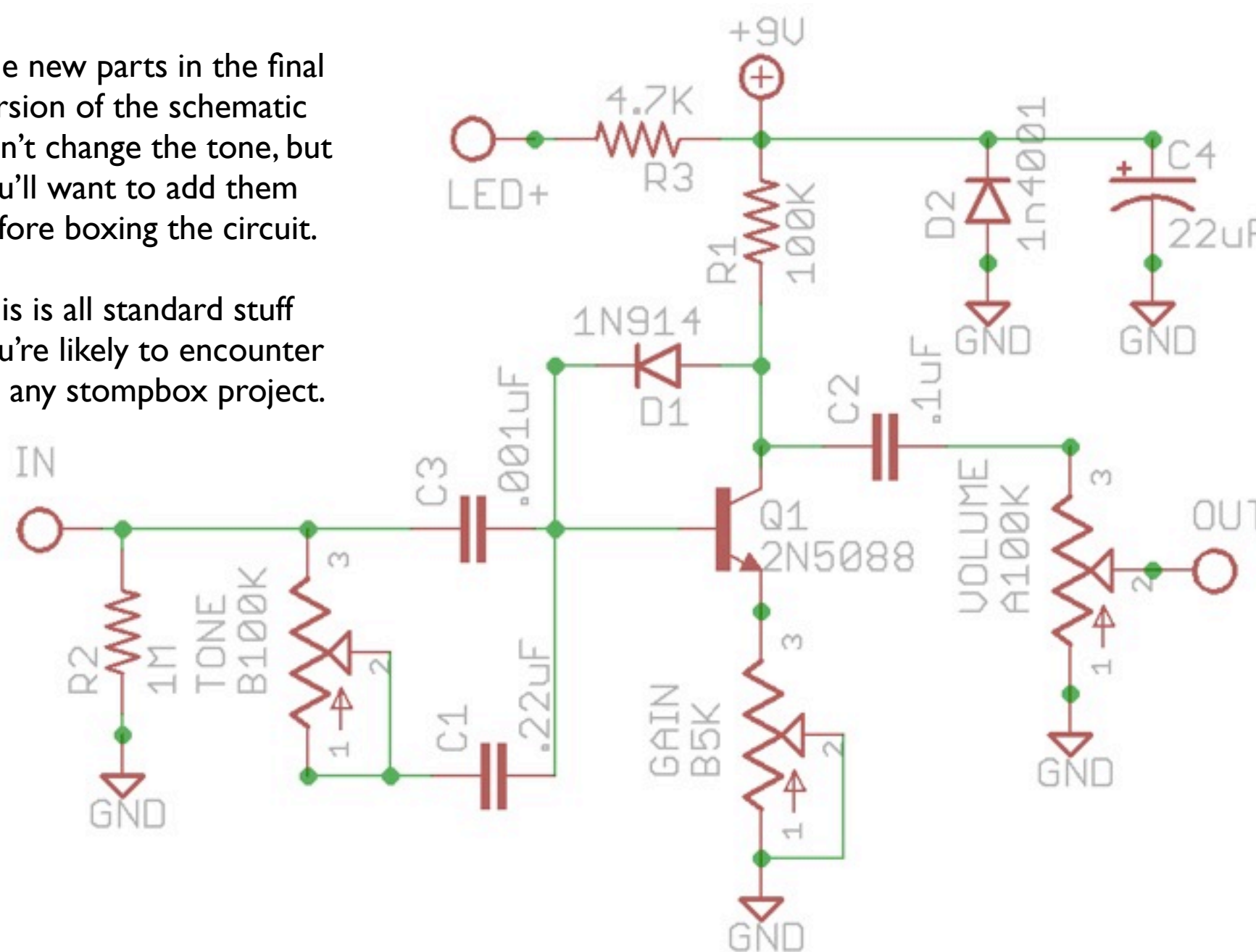
Replace the .22uF cap with a .01uF cap. Reinstall the .22uF cap, with one leg on the same bus as the transistor base and rightmost leg of the .001uF cap. Place the other leg in an empty bus. Connect lug 1 and 2 of a B100K pot to this new bus. Connect lug 3 to the same bus as the input wire and the .22uF cap.

Experiment with these controls. You might also repeat some of your part-swapping experiments, because these new controls may change your perspectives.

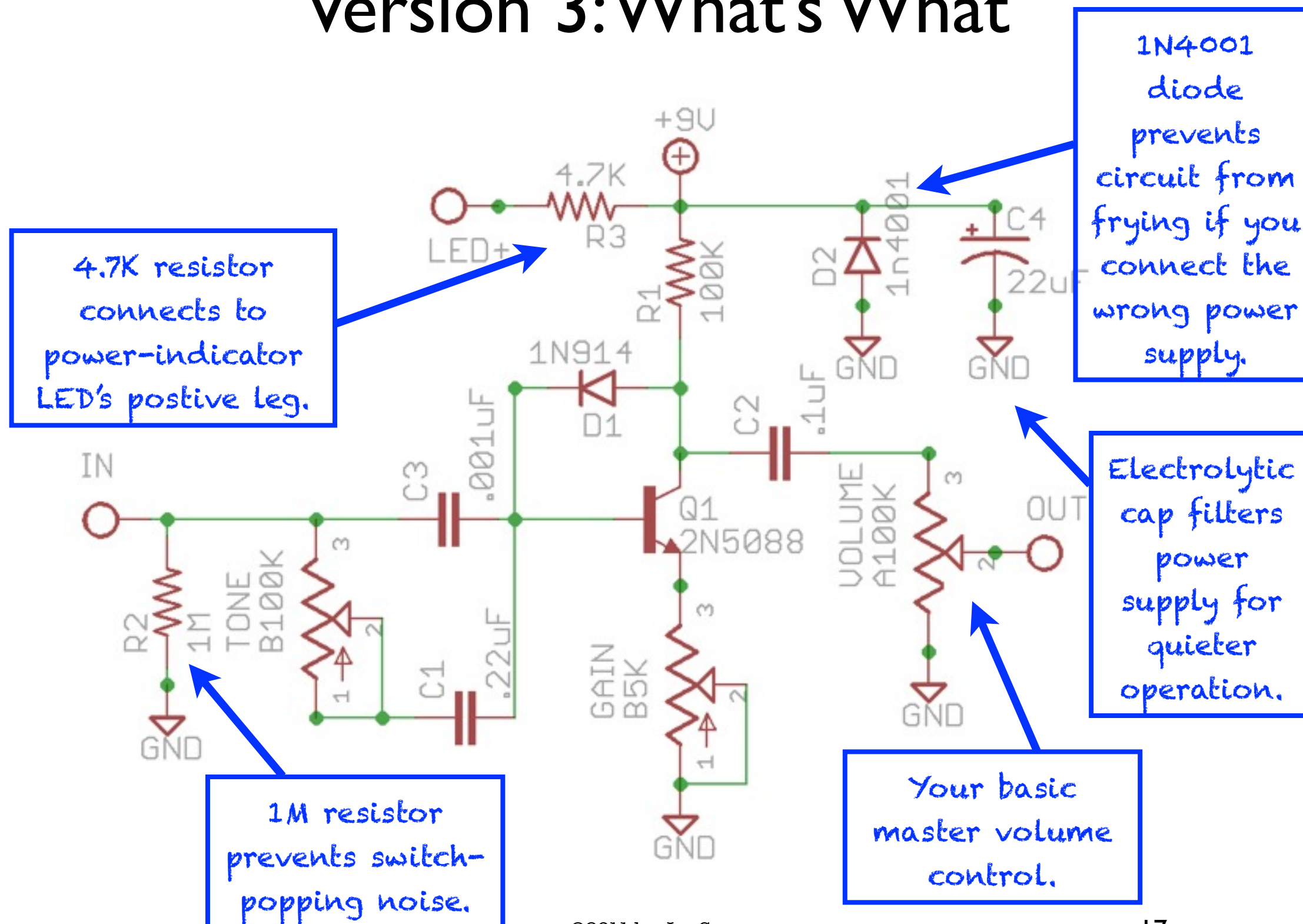
Version 3: Ready for Production!

The new parts in the final version of the schematic don't change the tone, but you'll want to add them before boxing the circuit.

This is all standard stuff you're likely to encounter on any stompbox project.



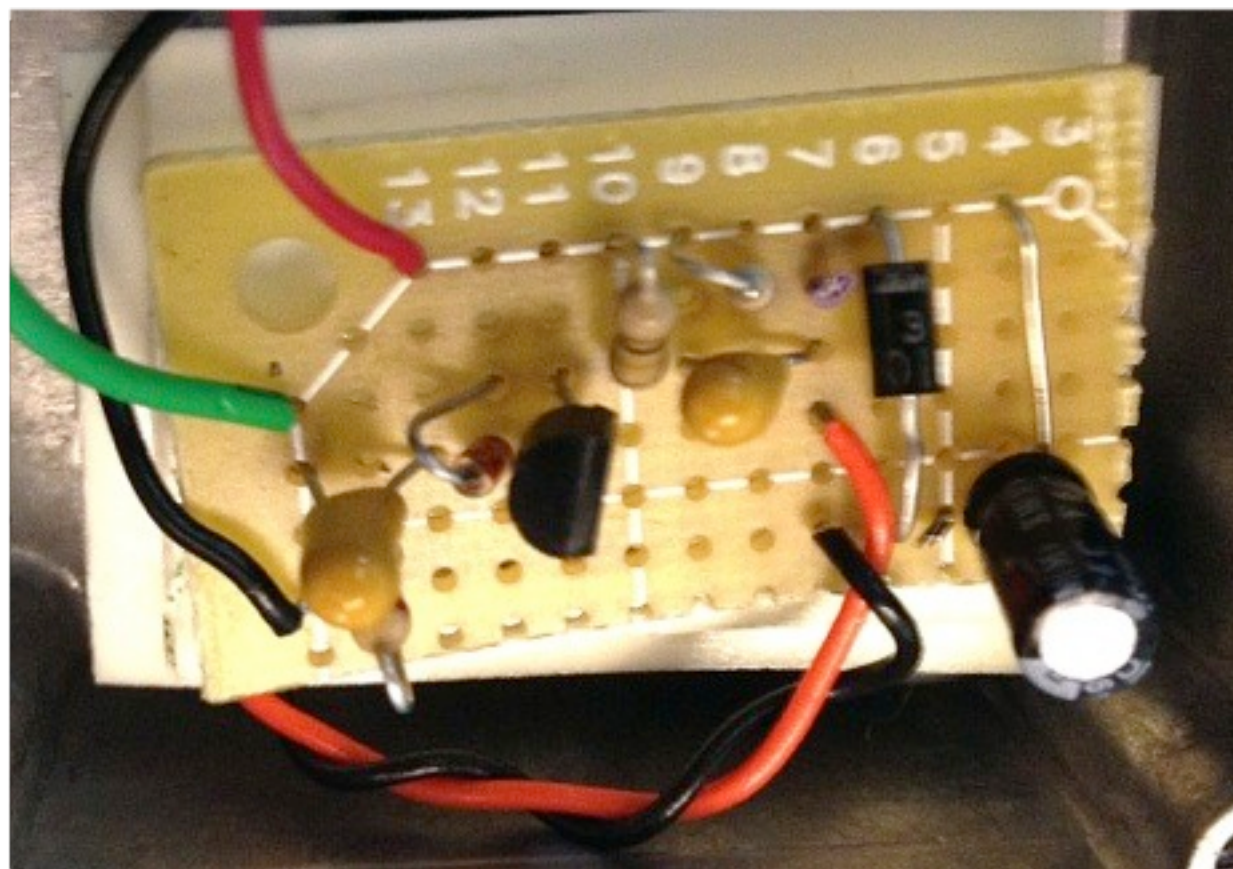
Version 3: What's What



Transfer the Circuit to Perfboard

My version of the
one-knob layout
looks like this.

With any luck, yours
will look nicer.



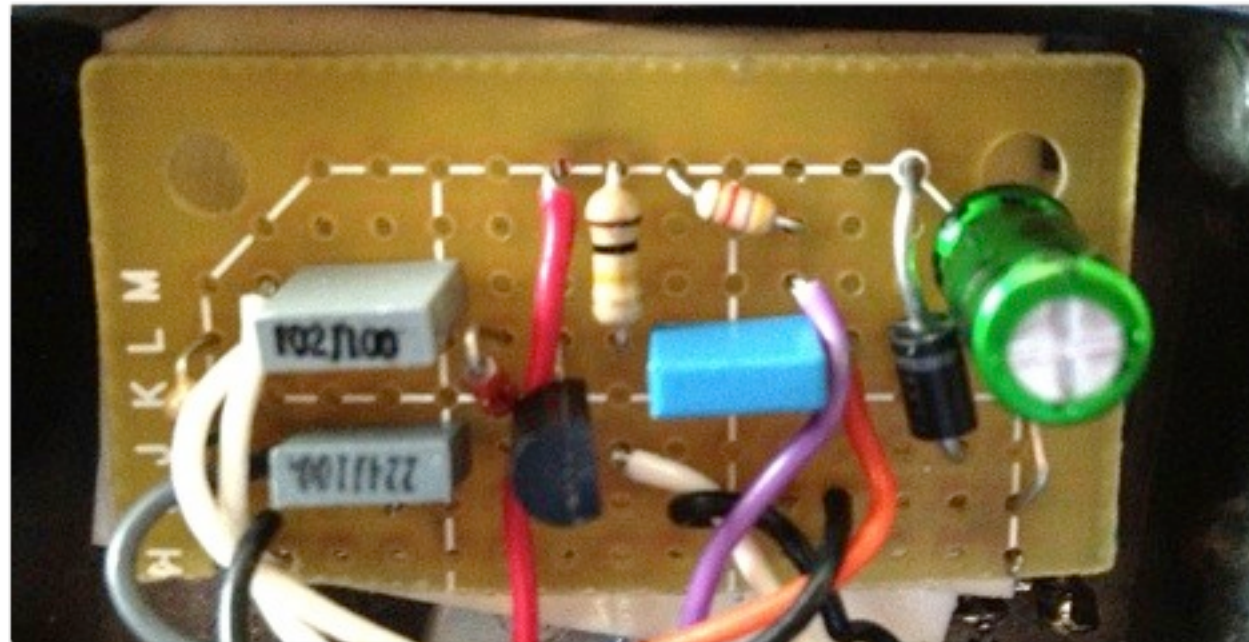
Transfer the circuit to perfboard using the techniques introduced in Project #1.

I always recommend starting with the “busiest” part of the layout. In this case, it’s the connections that converge at the transistor’s collector and base. Position the transistor and diode pair near the center of your perfboard, and then work outward from there.

Transfer the Circuit to Perfboard

My version of the
three-knob layout
looks like this.

Aim higher.



Box It Up!

The boxing process is exactly the same as in Project 1. If you add the A100K master volume pot, you have a choice of whether to connect lug 1 to ground on the perfboard, or run a wire from the pot to the negative lug of the input jack.



Extra Credit:

Do yourself a favor and read the article cited on page 3:

<http://home-wrecker.com/bazz.html>

Try breadboarding some of the variants in the article—especially the Buzz Box version, which is basically *two* Bazz Fusses in series. Funny thing about this circuit—as extreme as the fuzz is, you can still stack two of them back-to-back and get usable tones. One great recipe: Put two of these in a larger BB-sized box with two footswitches. Make one with a large input cap (fat bassy side), and one with a small one (bright, trebly side). Engage them both to unleash hell.