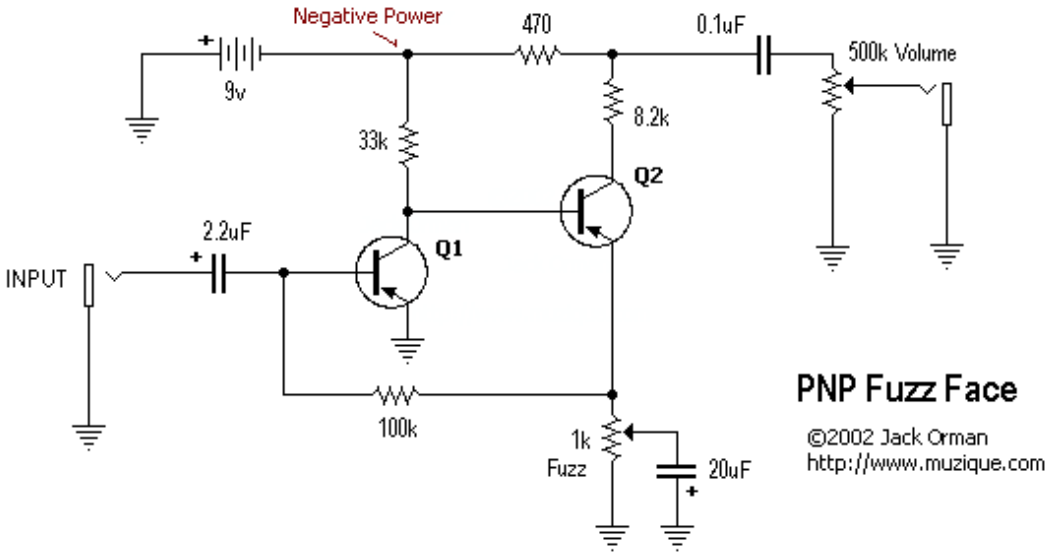
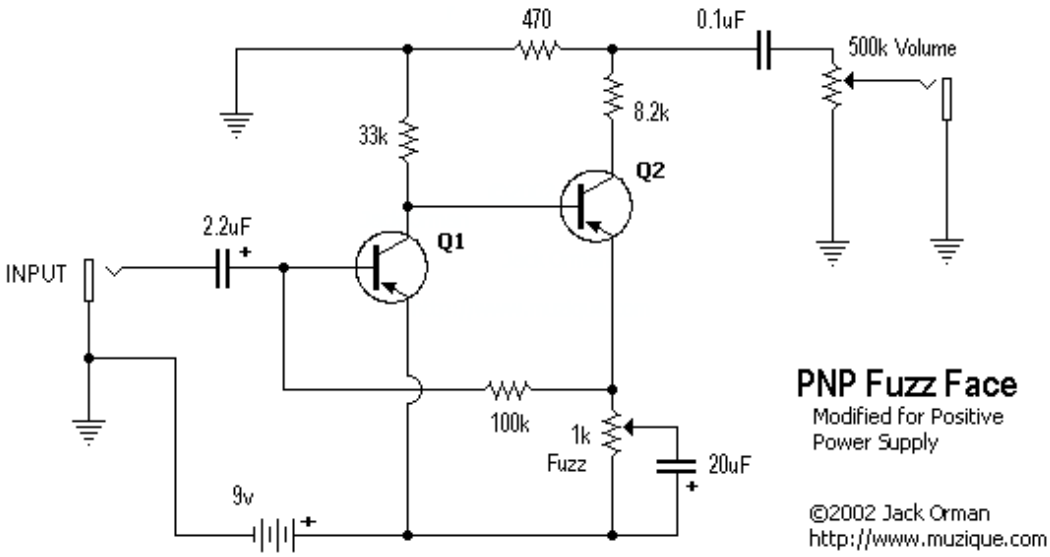
Positive Power for the PNP Fuzzface

The early Fuzzface units utilized germanium pnp transistors simply because they were the semiconductors most available and reliable at the time. The schematic below shows the circuit of this classic unit.



You will note that the positive battery connection is grounded and the circuit uses a negative supply voltage. This is the typical way that simple pnp transistor circuits are used. It also makes the circuit incompatible with the usual pedalboard power supply that has a negative ground and a positive supply voltage.

There is a simple solution though... turn the circuit "upside-down" and use a positive power supply! The ground connection of the pcb will become the V+ and the previous ground pad connected to the positive voltage. This is demonstrated in the schematic below.



If you look at the drawing you will quickly discover there is not much difference between the two circuits. Imagine the ground of battery on the bottom drawing connected to the ground point of the upper end of the 33k resistor and you'll see that it is the same as in the original. The Fuzzface circuit is effectively "isolated" between the input and output capacitors and cannot tell if it is being run from a positive or negative ground power supply... certain points of the circuit are more or less positive than others and that *relative voltage* is what determines the bias and not the polarity of the power supply.

How does it sound? The same as before - the transistors cannot tell the difference!

You'll note that I have changed the polarity of the input capacitor. I think that it is more properly oriented this way since the base of the input transistor Q1 will be about 0.7v below its emitter in voltage, which is about 8.3v as shown. You cannot get much more positive than that in this circuit and the capacitor is more properly placed with the plus side connected to the transistor base. Either orientation with the capacitor and the circuit will still work.

I have altered the pc board labels to reflect the new designations of the power and ground pads and provided it here for download. One thing to be careful about is the connection of the 1k Fuzz pot; the end not connected to the pc board points X and Y must be connected to +9v and not to ground as previously.

This trick works with both silicon and germanium transistors and may even be adapted for other designs that use pnp transistors (like the Rangemaster) though it is possible that the dc configuration of some circuits may not be suited to it. Try this wiring setup and eliminate the need for a separate negative voltage supply on your pedalboard.

How to apply the technique (basic steps):

- See if all the grounds are connected to a common point on the pcb. If so, you can switch the V- and ground connections to ground and V+ respectively.
- If there is any pot that has a dc path to ground, the grounded end should moved to the V+ supply. An example of this is the Fuzz control in the fuzzface examples above. Note that the output Volume pot is ac coupled through a capacitor and it is not changed.
- Make all connections short and direct.
- If for some reason you don't like the sound when using the positive supply voltage, it is easily changed back.

Update 12 MAR 2002

I received an email asking if this method of powering could cause oscillation in the circuit. There is always the possibility of oscillation in all high gain circuits if good construction practices are not followed; however, there are many examples in circuit history of PNP transistors operated off a positive supply. Most of the time when you see an NPN driving a PNP in a typical transistor circuit the PNP is operating from the positive supply. The Roger Mayer Axis Fuzz is but one commercial example of this technique; the Harmonic Percolator is another.

If for some reason oscillation does occur, a quality low esr capacitor from the positive supply to ground will solve the problem everytime since it effectively places the power rails at the same ac potential. Put the capacitor on the pc board if possible. Also keep the positive and negative power wires as short as practical. I've used this method with two different fuzzface derivatives for years with no problems and one of them has a quite long positive power supply wire.

The circuit can easily be converted back to positive ground if you get oscillations that are not cured by the power supply filter.

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