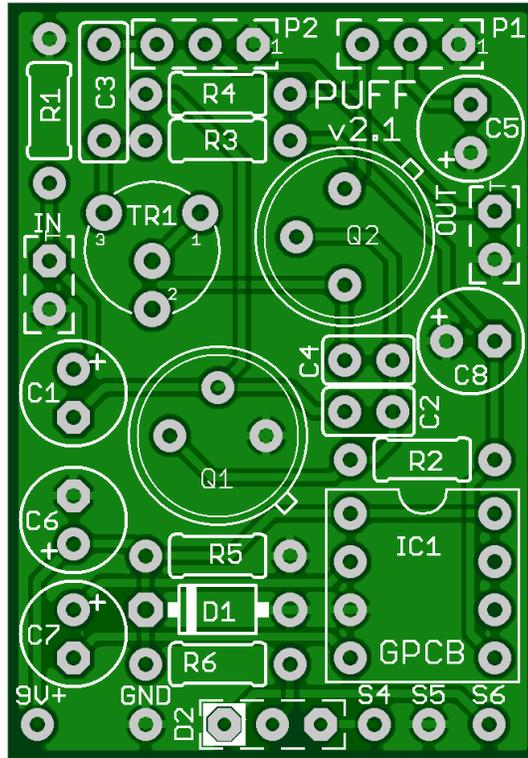


Pump'd Up Fuzz Face v2.1 (PNP Fuzz Face with Charge Pump)

This is an updated PCB from www.guitarpcb.com which includes a few modifications from the original circuit on which it is based. Version 2 of this board now is designed to fit into a 1590A enclosure for those that like to build tiny pedals. If you have a version 2 (not 2.1) circuit board, please be sure to download the version 2 instructions from the GuitarPCB.com website.

Board Dimensions (W x H) 1.14" x 1.49" i.e.: 29mm x 38mm

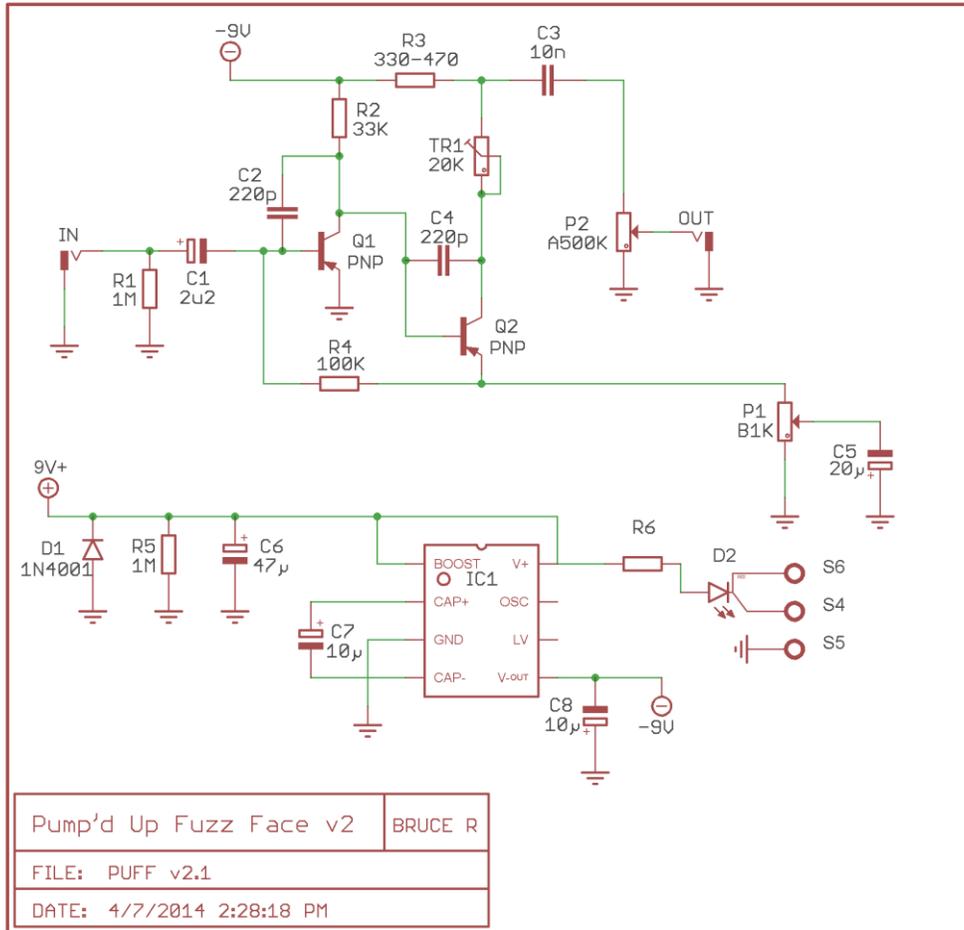


Part	Value
R1	1M
R2	33K
R3	330-470
R4	100K
R5	1M
R6 (CLR)	1k8*
D1	1N4001
D2	Bi-Color CA LED*
TR1	20K
C1	2u2
C2	220p

Part	Value
C3	10n
C4	220p
C5	22μ
C6	47μ
C7	10μ
C8	10μ
IC1	7660S
P1=FUZZ	B1K
P2=VOL	A500K
Q1	PNP—See Text
Q2	PNP—See Text

Get NOS Hand Matched [PNP Fuzz Face Transistors](#) at GuitarPCB.

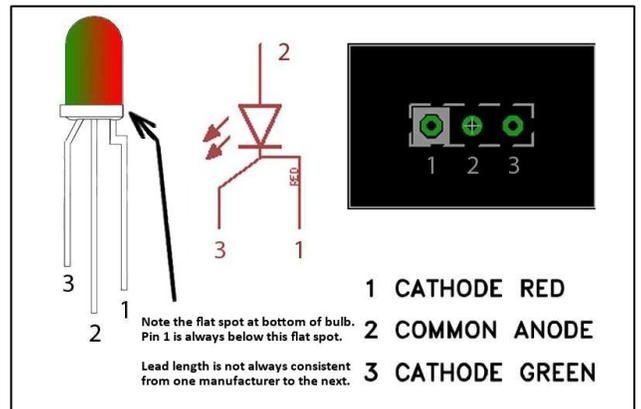
Get your [Charge Pump](#) at GuitarPCB



STATUS LED

D2 is a common anode bi-color LED. The diagram at right shows the pin-out, schematic symbol and pad connection for a common anode LED. The pin-out for the bi-color LED is typically (but not always) as follows:

1st Color Cathode	Is on the "flat" side of the LED (see graphic); 90 degree bend in the lead
Common Anode	Middle lead
2nd Color Cathode	45 degree bend in the lead



The lead 1 pad on the circuit board is marked with a white box.

When connected correctly, the LED will light red when power is applied and the circuit is in bypass mode. The LED will light green when in effects mode. If you wish to use a standard LED, connect the anode to the middle pad and the cathode to the right pad to show the circuit in effects mode. If you use a 3PDT wiring board that includes an LED, you can omit this LED and R6. R6 is the LED's Current Limiting Resistor (CLR). If you use a different LED, you may want to change this value to adjust LED brightness (3k3 typically works well with most single-color LEDs).

Notes about this build

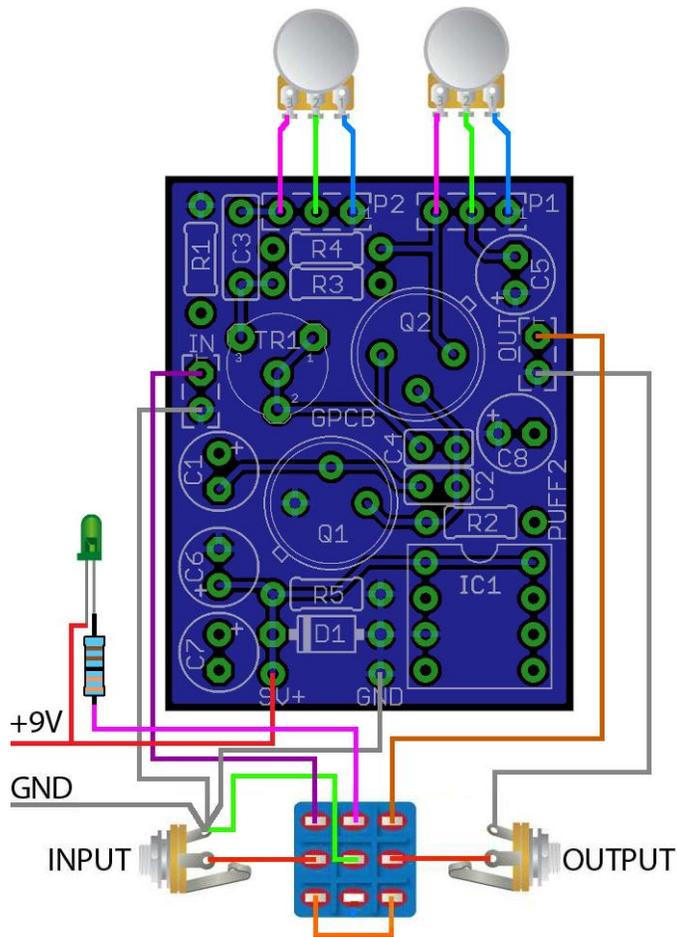
- Positive-Ground circuits typically cannot share a power adapter with negative ground pedals. A charge pump has been added to overcome this limitation. This is ideal for pedal boards that use daisy-chained power and projects which contain multiple effects within a single enclosure.

- Use a charge pump with the 7660/1044 pin layout and a frequency-boost feature which increases the oscillator from the default 10kHz up to 35-45kHz to avoid any audible whine. We have seen a high failure rate with some manufacturers' MAX1044 chips, so we prefer the 7660S (e.g.: TC7660SCPA). While all 1044 chips seem to have the boost feature, on the 7660 chips, the "S" designation after the number indicates that it has the frequency boost feature, whereas the original 7660 (without an "S") chips did not.
- The original Arbiter Fuzz Face pedals were equipped with NKT275, AC128, or SFT363E transistors, depending on what date the unit was manufactured. None of these are readily available today, and those that do exist are quite expensive. Many of the most commonly available and affordable Germanium transistors available today come in a TO-5 metal canister, which this board was intended to accommodate. Examples of these include 2n404, 2n404A, 2n1305, 2n1307, 2n1309, CV7355, etc. There are a number of Germanium transistors that come in smaller packages as well, which also fit on this board easily.
- Germanium transistors can be damaged by heat. We recommend that you socket the transistor holes, and then insert the transistors into the sockets after the heat has dissipated. If you don't socket, it is recommended that you use a small alligator clip on the component side of the lead from the solder joint to act as a heat sink while soldering.
- Vintage germanium transistors vary greatly from one piece to the next, including gain values, leakage, etc. Some of these transistors may generate some high-end hiss, which is not desirable. To account for this, this board layout includes 2 small capacitors which were not in the original circuit, C2 and C4. These act as a filter for the hiss, but do not reduce the level of any of the high-pitch guitar notes. We recommend that you initially build this project without these, and determine if they are needed after performing a sound check. If used, recommended values are 100-220pf.
- This circuit also contains modern features such as a reverse-polarity protection diode, and 2 pull-down resistors that discharge capacitors when the circuit is not in use. There is also a biasing trimmer resistor that is described in more detail in the next section.
- The wiring diagram in the previous section shows how to wire the board, but we recommend using the bi-color LED 3PDT boards, available in the GuitarPCB.com PCB Shop for a reasonable price. These make wiring a snap, and the PUFF and 3PDT will both fit nicely together into a 1590A if you wish.

Biasing

In order to have this circuit sound like a Fuzz Face, you must use transistors in the recommended gain (hFE) ranges and correctly bias the circuit. There is a 20K trimmer potentiometer on this board designed to help you adjust the bias perfectly to adjust for variances in transistors. This is easiest if you have a digital multimeter with test clips that fit over the probe ends, so you can clip one DMM test lead onto the collector of Q2, and the other to ground, leaving your hands free to adjust the trimmer (Radio Shack sells these for about \$4, catalog number 270-334, link at the end of this document). To properly bias, adjust the trimmer until your DMM reads about negative 4.5-4.8 VDC, or half of the input voltage (most guitar effects wall adapters and new 9V batteries measure about 9.6 VDC).

WIRING DIAGRAM



For more information (hyperlinks embedded within):

- [Crash Course in Pedal Building](#) by Bruce R.
- [Technology of the Fuzz Face, by RG Keen.](#)
- [How and Why to Solder Correctly](#) YouTube video by Curious Inventor
- [Biasing Part One](#) by tonmann
- [Mini Test Clip Adapters](#) at Radio Shack (link is current as of 11/2012)

Special thanks to:

- RG Keen, for his analysis of this circuit on geofex.com (see link above)
- Tonepad, as I referenced their charge pump circuit on their bipolar power project
- BeeJive Pedals, as I referenced their Fuzz Face circuit and borrowed their biasing trimmer idea



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