

ZYGOTE

FX TYPE: FUZZ

PCB artwork ©2010 madbeanpedals

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The Zygote is an “all-in-one” fuzz. It allows you to build several types of Fuzz Face circuits on one board, with as little as two controls, and up to five controls and two switches. Additionally, you can build either positive ground PNP or negative ground NPN.

The design incorporates elements from both the Fulltone '69 and '70 pedal as well as some other mods. You can choose to build either one using the instructions below, or make a hybrid of the two. Additional controls will add to the overall flexibility of the circuit, although you may find the Tweak knob a little redundant in some settings (if using the B/M switch).

The controls are as follows

STRAIN: Turning this control up reduces the amount of overall fuzz (similar to the Bias control on the '69). This is done by adding a 50k pot in series with the input of the circuit. This may also be useful in dialing down the input from a humbucker.

DRAIN: Turning this control up reduces the voltage to the circuit (voltage sag) from the nominal 9v by using a 5k pot in series with the voltage supply. At max, it will reduce the voltage to around 5.5v.

FUZZ: The overall fuzz amount.

TWEAK: Works in conjunction with the **B/M** switch. In **Boost** mode, this control adds output similar to the “Contour” knob on a '69. In **Mids** mode it reduces output similar to the “Mids” control on the '70.

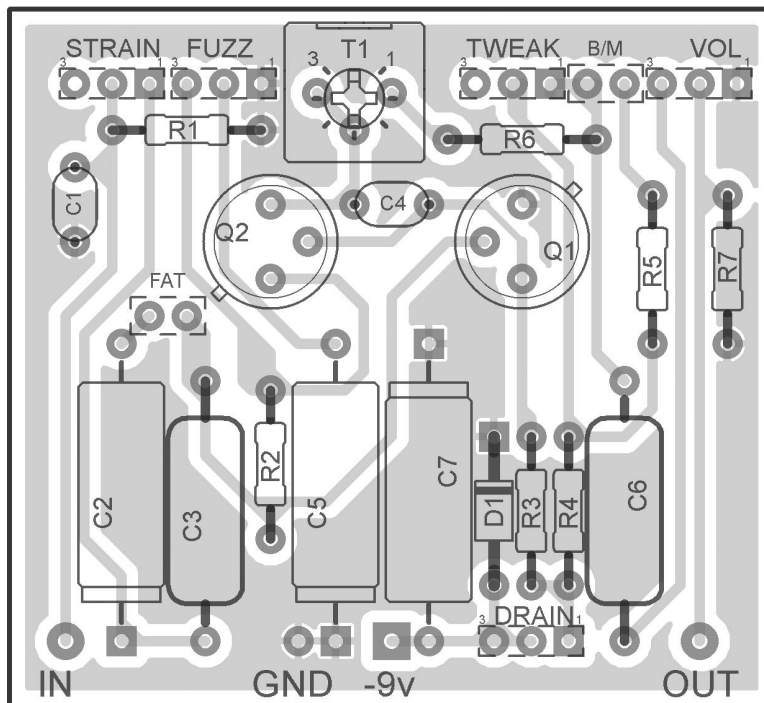
VOL: Overall output.

B/M (Boost/Mids): This either puts a 1k pot in series with a 220R resistor for **Boost**, or a 1k pot in series with a 220R and in parallel with an additional 1k resistor for **Mids**.

FAT: This switch allows you to select two different input caps to control the bass feeding into the circuit. The second cap (2u2 or other) is added in parallel with the first to increase the overall value.

Parts

- Xicon or Sprague axial electrolytic caps, 16v
- Mallory axial film caps, or similar
- Xicon carbon film or carbon comp resistors, ¼ W
- 16mm Alpha pots
- Matched pair of PNP transistors (Hfe of ~70 on Q1 and ~120 on Q2)

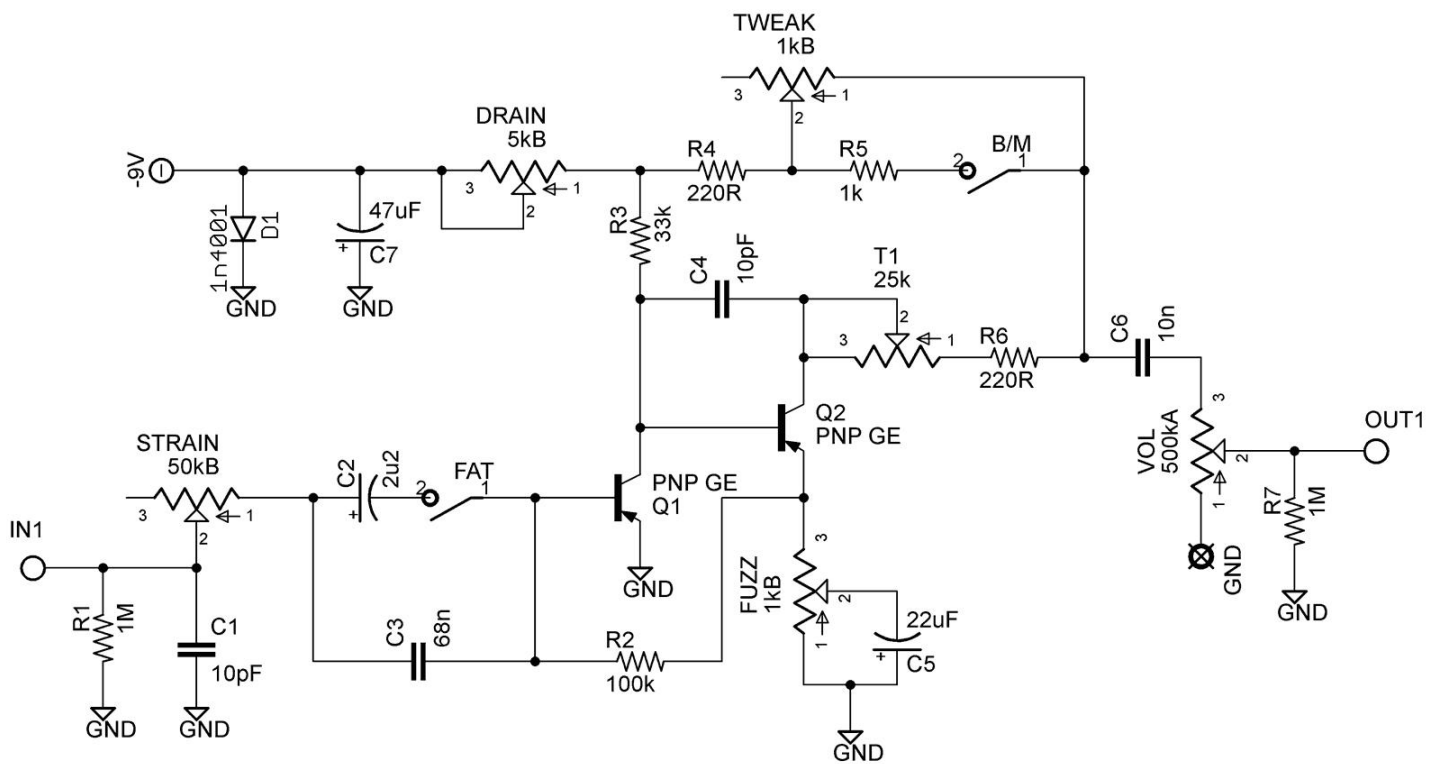


Resistors		Transistors	
R1	1M	Q1, Q2	PNP GE
R2	100k	Diodes	
R3	33k	D1	1n4001
R4	220R	Switch	
R5	1k	FAT	SPST
R6	220R	B/M	SPST
R7	1M	Trimmers	
		T1	25k
Caps		Pots	
C1	10pF	TWEAK	1kB
C2	2u2	VOL	500kA
C3	68n*	STRAIN	50kB
C4	10pF	FUZZ	1kB
C5	22uF	DRAIN	5kB
C6	10n**		
C7	47uF		

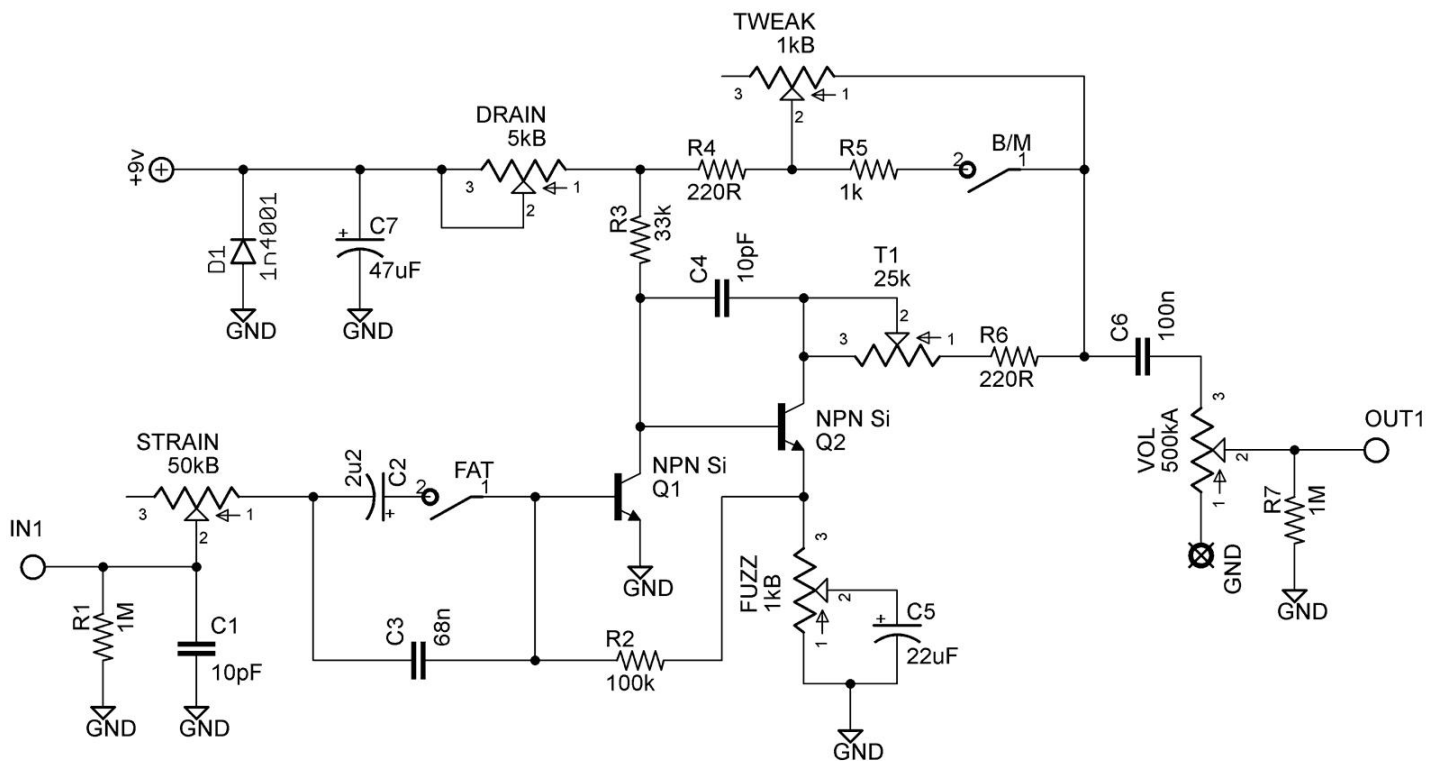
* 68n is suggested for C3, but lower values will produce more dramatic differences with the "Fat" switch. You could easily go down to 22n.

** C6 is 100n in the '70 version.

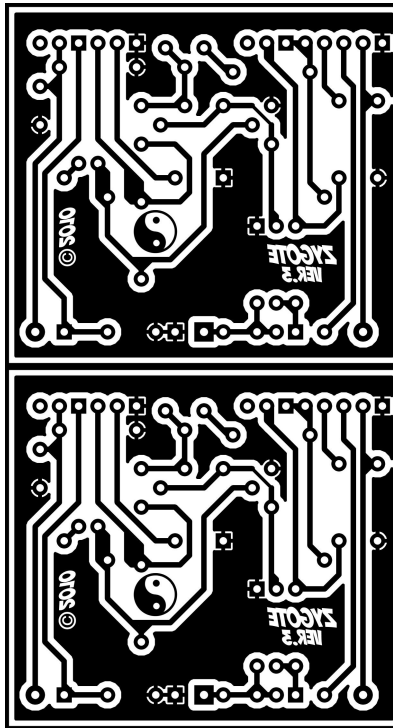
PNP – Positive Ground (“69”)



NPN – Negative Ground (“70”)



2.06" W x 1.89" H (including borders)



BIASING THE ZYGOTE

Using your DMM, adjust T1 until you get approximately +/-4.5v (depending on whether or not you are doing pos. or neg. ground) reading on the collector of Q2. The Zygote is set up to provide a very wide range for biasing. Note that if you order PNP transistors from Smallbear, Steve typically sends along the values to correctly bias that particular set. You can sub in the values he indicates, if you like. If you still want to use the trim pot, adjust it so that the resistance on the pot + the 220R in series with it adds up to the value he indicates for the collector of Q2

BUILDING THE ZYGOTE

There are a few key differences in building either the positive ground PNP and negative ground NPN. If building the PNP, you should follow the layout diagram on pg.2. You will need to connect your battery supply so that the black (negative) wire goes to the 9v pad on the board, and the red wire (positive) goes to ground (typically this is done by connecting it to the ring of a TRS input jack). Even though this setup uses only a battery to power the effect, the battery will only be in use when a jack is plugged into the input jack. Once the jack is unplugged the battery disconnects.

If you have never used PNP germanium transistors before, I HIGHLY recommend you by a matched set from Small Bear. These are already tested for leakage and have the appropriate gains for Q1 and Q2. Steve offers several sets to choose from.

If you want to use a power supply, you can do the following

- *Use a PS like the VoodooLabs Pedal Power which can supply negative and positive ground. It can do this because each 9v output is isolated. You can purchase a 2.1mm cable which has the neg/pos wires flipped or make your own. If you are using a different supply, make sure that the outputs are isolated or you will kill your board and possibly your power supply.*
- *By a dedicated wall wart that has a 2.1mm positive tip plug. You can get these off Mouser, although they are generally unregulated and put out closer to 13v.*
- *Use a Road Rage board. This is probably the best solution because you can set it up like a negative ground power supply, but the RR board flips the power to -9v internally. This means you can use the same PS/plugs as your regular negative ground effects, provided you wire everything properly, and it will cost about the same as buying a dedicated wall wart. I do not recommend using a battery in this situation. See the wiring diagram below which illustrates how to do this properly.*

To convert this layout to use NPN and negative ground, do the following

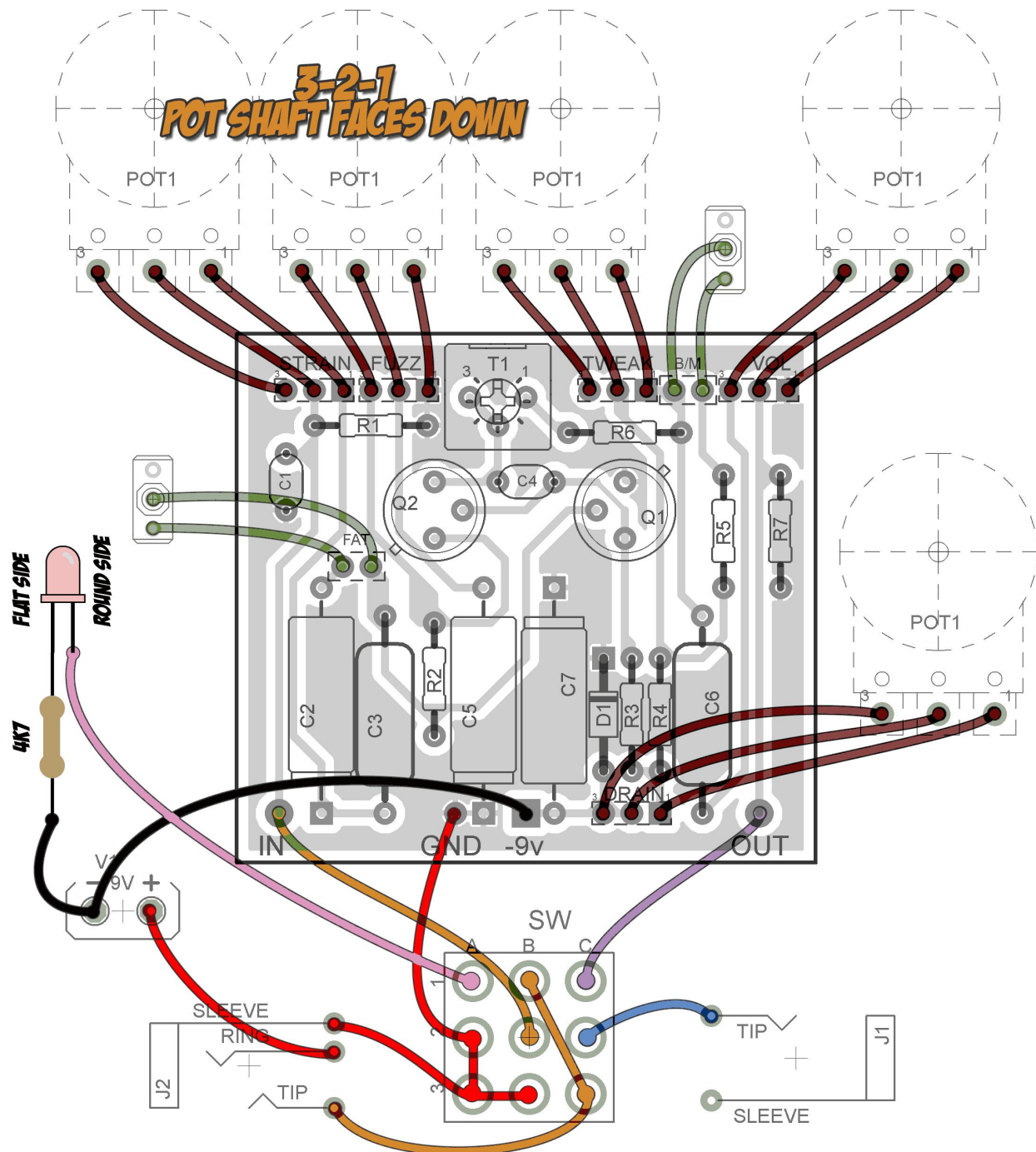
- *Reverse the direction of all electrolytic caps*
- *Reverse the direction of D1*
- *Hook +9v to the 9v pad on the board. The GND pad hooks to ground, as you would any other negative ground effect.*

For the NPN version, there are many types of transistors you can use. I suggest either the 2SC1815 or BC108. Both of these were used in the "70" pedal at different times. Again, check Small Bear to see what Steve has to offer. You can also use NPN germanium transistors, although these are a lot more expensive. Plain old silicon works really well here, so I wouldn't worry too much about that.

NOTE: *PNP transistors, the little metal tabs that stick out from the housing almost always indicate the Emitter of the transistor. Some transistors may have a red dot, and these can indicate Collector in a few cases. While you probably will not damage the transistor by putting it in backwards (I've never had this happen), try to figure out which is which before plugging it in.*

Also note that the pinout of 2SC1815 is most likely different than the typical E-B-C (typical is E-C-B). Consult a datasheet before using this type, as it may require you to twist the leads around to plug into the correct spots on your transistor sockets (yes...use sockets).

PNP POSITIVE GROUND W/LED



NPN NEGATIVE GROUND W/LED

REVERSE C2, C5, C7 AND D1

