Tone Bender Mk II

Sweet, smooth fuzz

Important notes

If you're using any of our footswitch daughterboards, DOWNLOAD THE DAUGHTERBOARD DOCUMENT

- Download and read the appropriate build document for the daughterboard as well as this one BEFORE you start.
- DO NOT solder the supplied Current Limiting Resistor (CLR) to the main circuit board even if there is a place for it. This should be soldered to the footswitch daughterboard.

POWER SUPPLY

Unless otherwise stated in this document this circuit is designed to be powered with 9V DC.

COMPONENT SPECS

Unless otherwise stated in this document:

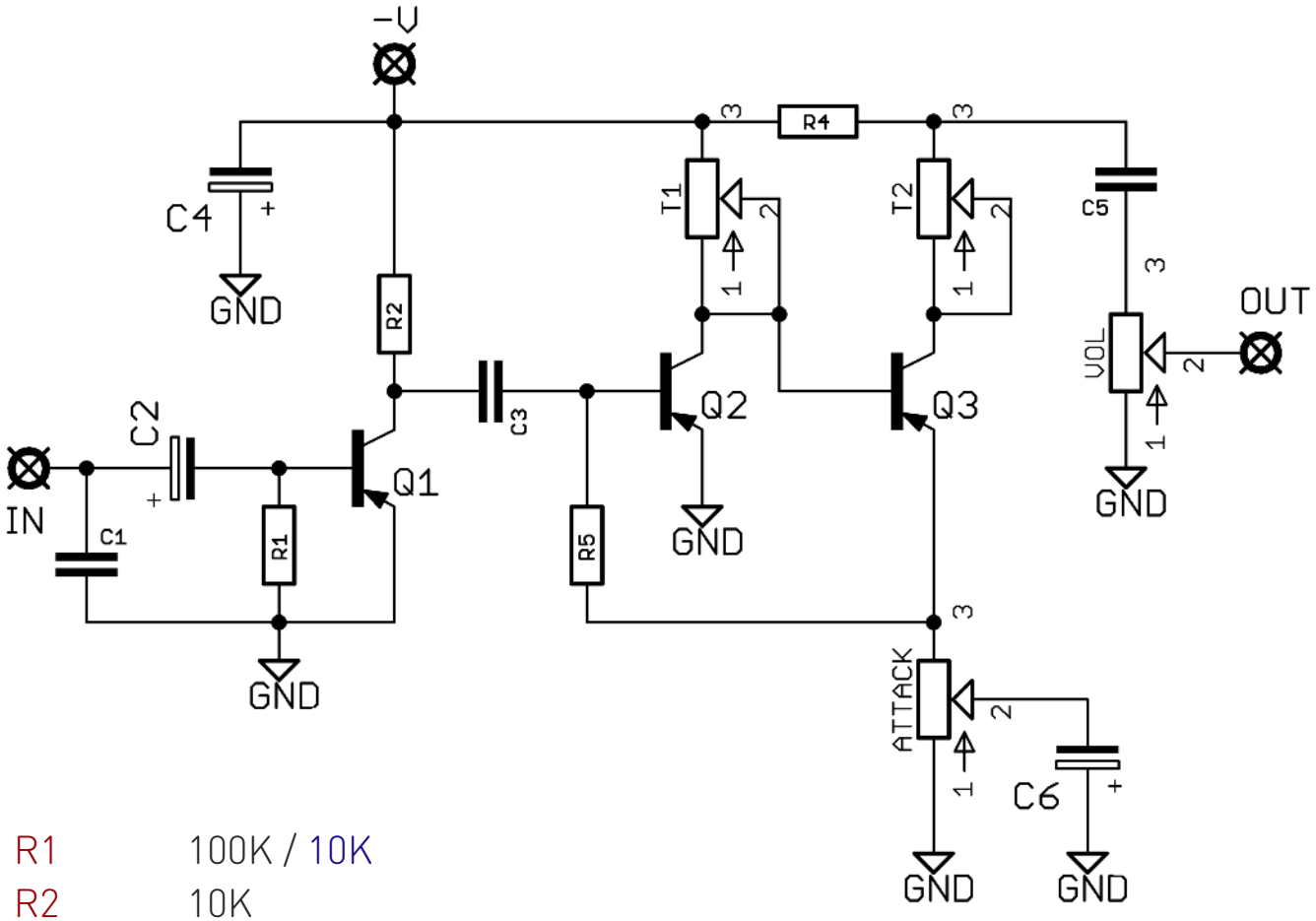
- Resistors should be 0.25W. You can use those with higher ratings but check the physical size of them.
- Electrolytics caps should be at least 25V for 9V circuits, 35V for 18V circuits. Again, check physical size if using higher ratings.

LAYOUT CONVENTIONS

Unless otherwise stated in this document, the following are used:

- **Electrolytic capacitors:**
  Long leg (anode) to square pad.
- **Diodes/LEDs:**
  Striped leg (cathode) to square pad. Short leg to square pad for LEDs.
- **ICs:**
  Square pad indicates pin 1.

Schematic - PNP (posi ground)



R1	100K / 10K
R2	10K
R4	470R
R5	100K
C1	10n / 15n
C2	4.7u / 10u
C3	100n
C4	47u
C5	10n / 15n
C6	4.7u / 10u
Q1,2,3	PNP Germaniums
ATTACK	1KB
VOL	100KA
T1	100K preset
T2	10K preset

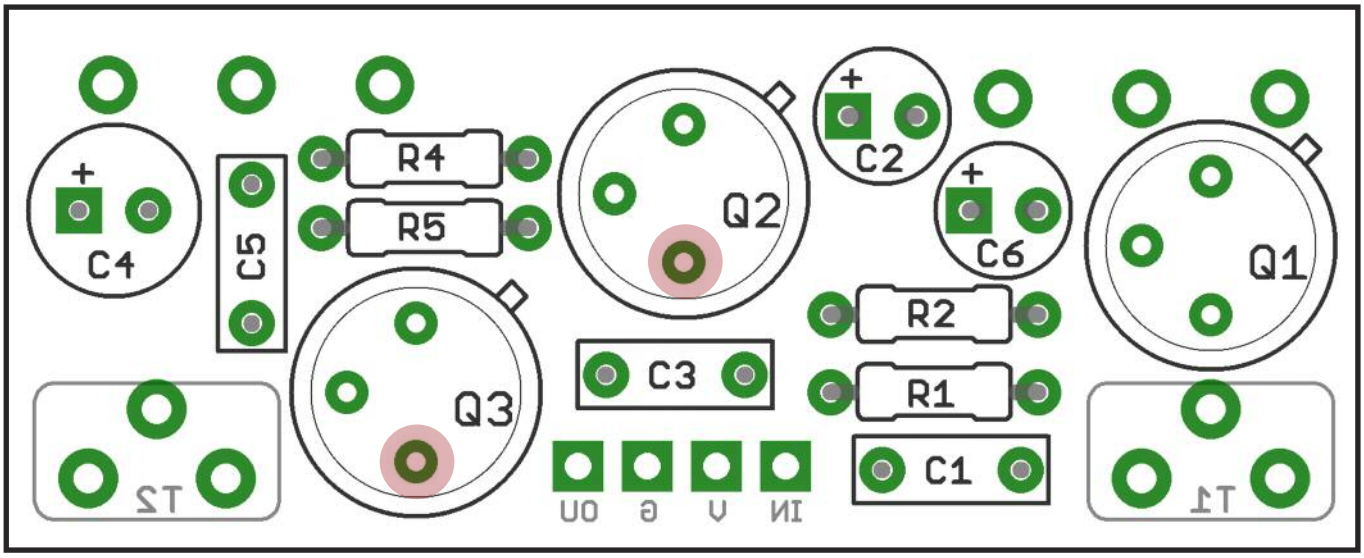
Values in black are for the Tonebender Pro MkII. Substitute values in blue for Marshall SuperFuzz or red for Vox Tone Bender MkII.

The schematic above shows the original PNP - Positive-Ground layout, which is also how the PCB is designed. What does that mean? Well, basically it means it won't play nicely with 'normal' pedals if you try to daisy chain them on the same power supply. Don't do it.

It's perfectly simple to make a NPN - Negative-Ground version. Use NPN transistors, flip the orientation/polarity of C2, C4 and C6, then follow the appropriate wiring diagram later in these instructions. The -V connection becomes +V.

Typical hFE ranges for the transistors are:

Q1 - 55-60 Q2 - 70-80 Q3 - 100-140



The power and signal pads on the PCB conform to the FuzzDog Direct Connection format, so can be paired with the appropriate daughterboard for quick and easy offboard wiring. Check the separate daughterboard document for details.

Be very careful when soldering the transistors if you aren't using sockets (why not?). They're very sensitive to heat. You should use some kind of heat sink (crocodile clip or reverse action tweezers) on each leg as you solder them. Keep exposure to heat to a minimum (under 2 seconds).

Snap the small metal tag off the pots so they can be mounted flush in the box.

You should solder all other board-mounted components before you solder the pots. Once they're in place you'll have no access to much of the board.

Trimmers should mount on the same side of the PCB as the pots, as shown.

Once everything is soldered in place you need to adjust the trimmers to bias the transistors. Q1 is fixed bias, but you adjust T1 and T2 to change the voltages on the collectors of Q2 and Q3 respectively (marked above).

There are no definitive 'correct' voltages, but you should be in the ballpark of:

Q2 - 1.0 - 1.75V

Q3 - 8.0 - 8.5V

Set Q2's bias first before tweaking Q3, as the T1 trimmer will affect both.

It's a case of tweaking by ear within those ranges until you get the sound you want. Sweet, sustained fuzz without gating.

Test the board - PNP version

UNDER NO CIRCUMSTANCES will troubleshooting help be offered if you have skipped this stage. No exceptions.

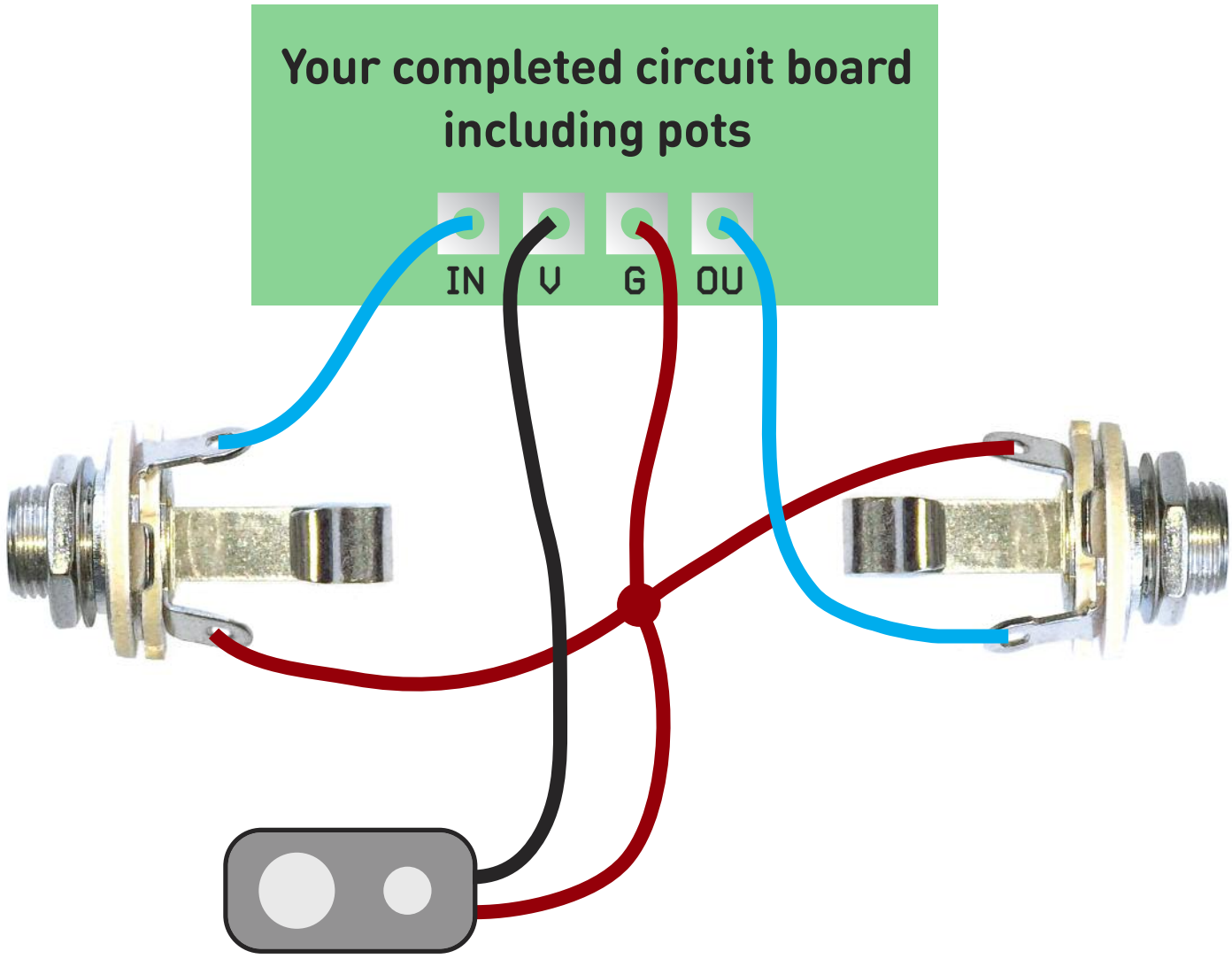
Once you've finished the circuit it makes sense to test is before starting on the switch and LED wiring. It'll cut down troubleshooting time in the long run. If the circuit works at this stage, but it doesn't once you wire up the switch - guess what? You've probably made a mistake with the switch.

Solder some nice, long lengths of wire to the board connections for -V, GND, IN and OUT. Connect IN and OUT to the jacks as shown. Connect all the GNDs together (twist them up and add a small amount of solder to tack it). Connect the battery - lead to the -V wire, same method. Plug in. Go!

It may look strange, but as this is a positive ground circuit the +9V power goes to the GND of the circuit and the jacks.

If you're using a ribbon cable you can tack the wires to the ends of that. It's a lot easier to take them off there than it is do desolder wires from the PCB pads. Check the daughterboard doc for details.

If it works, carry on and do your switch wiring. If not... aw man. At least you know the problem is with the circuit. Find out why, get it working, THEN worry about the switch etc.



Test the board - NPN version

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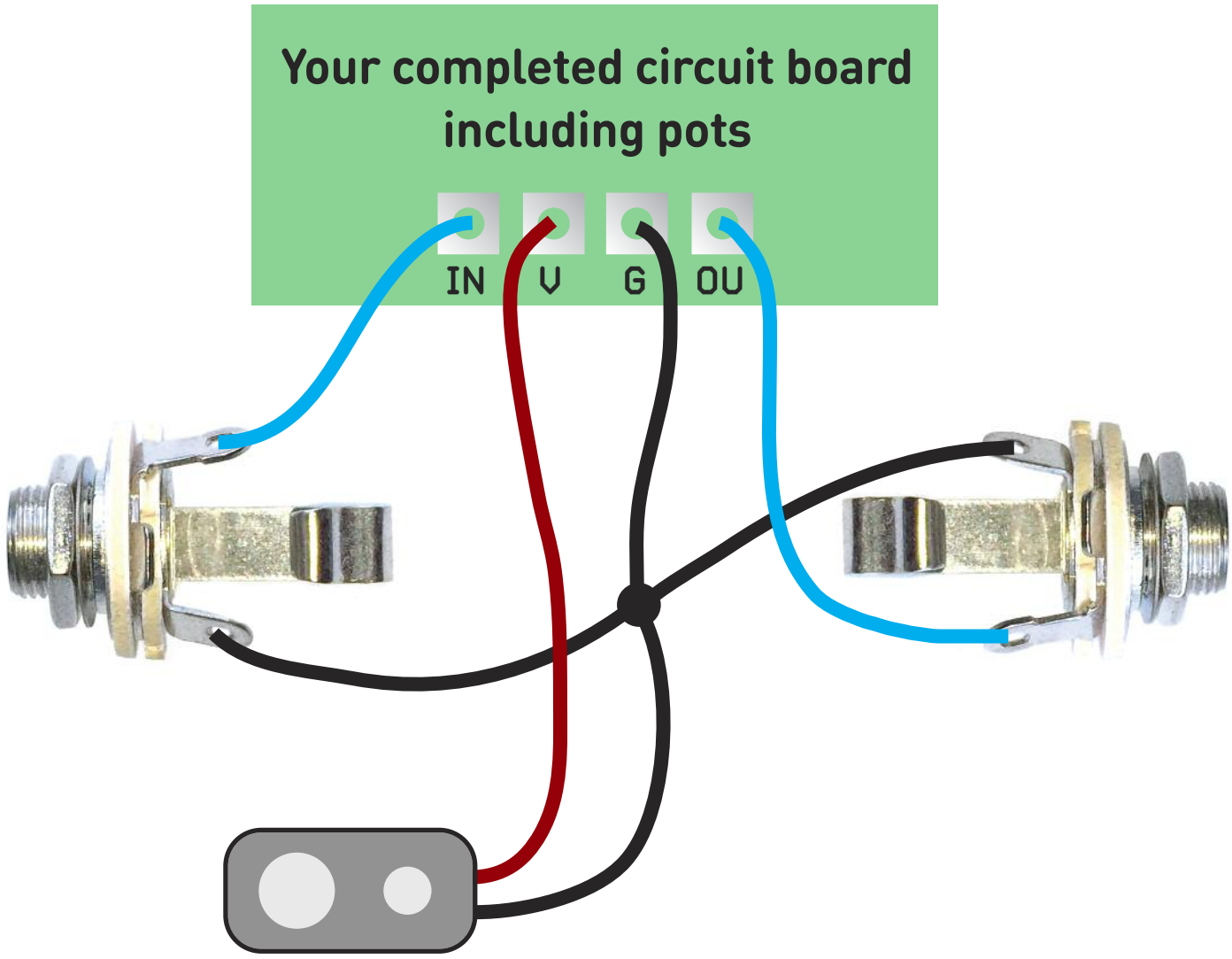
Solder some nice, long lengths of wire to the board connections for -V, GND, IN and OUT. Connect IN and OUT to the jacks as shown. Connect all the GNDs together (twist them up and add a small amount of solder to tack it). Connect the battery + lead to the -V wire, same method. Plug in. Go!

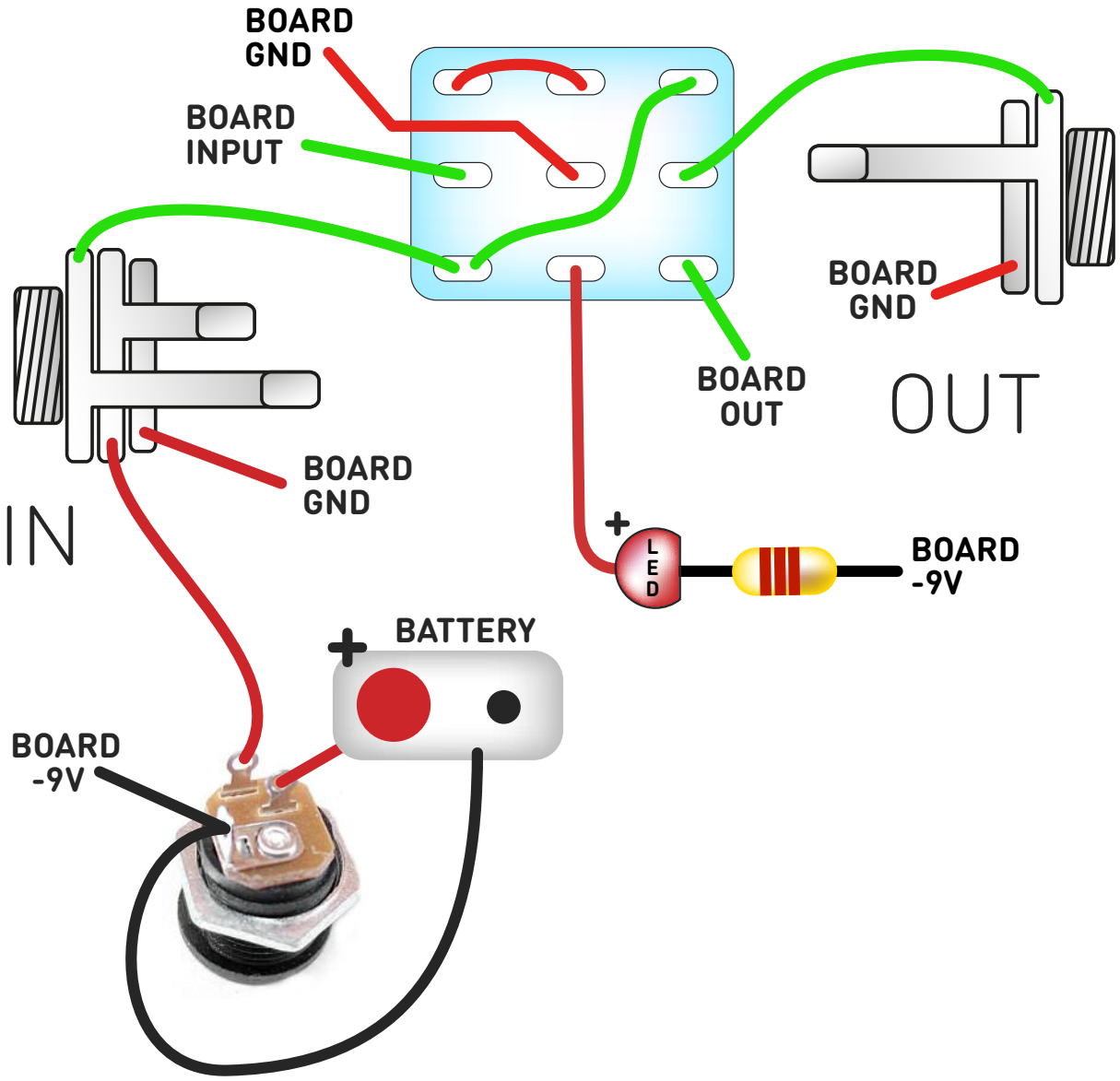
If you're using a ribbon cable you can tack the wires to the ends of that. It's a lot easier to take them off there than it is do desolder wires from the PCB pads. Check the daughterboard doc for details.

If it works, carry on and do your switch wiring. If not... aw man. At least you know the problem is with the circuit. Find out why, get it working, THEN worry about the switch etc.



Wire it up - PNP

(if using a daughterboard please refer to the relevant document)



Wiring shown above will disconnect the battery when you remove the jack plug from the input, and also when a DC plug is inserted.

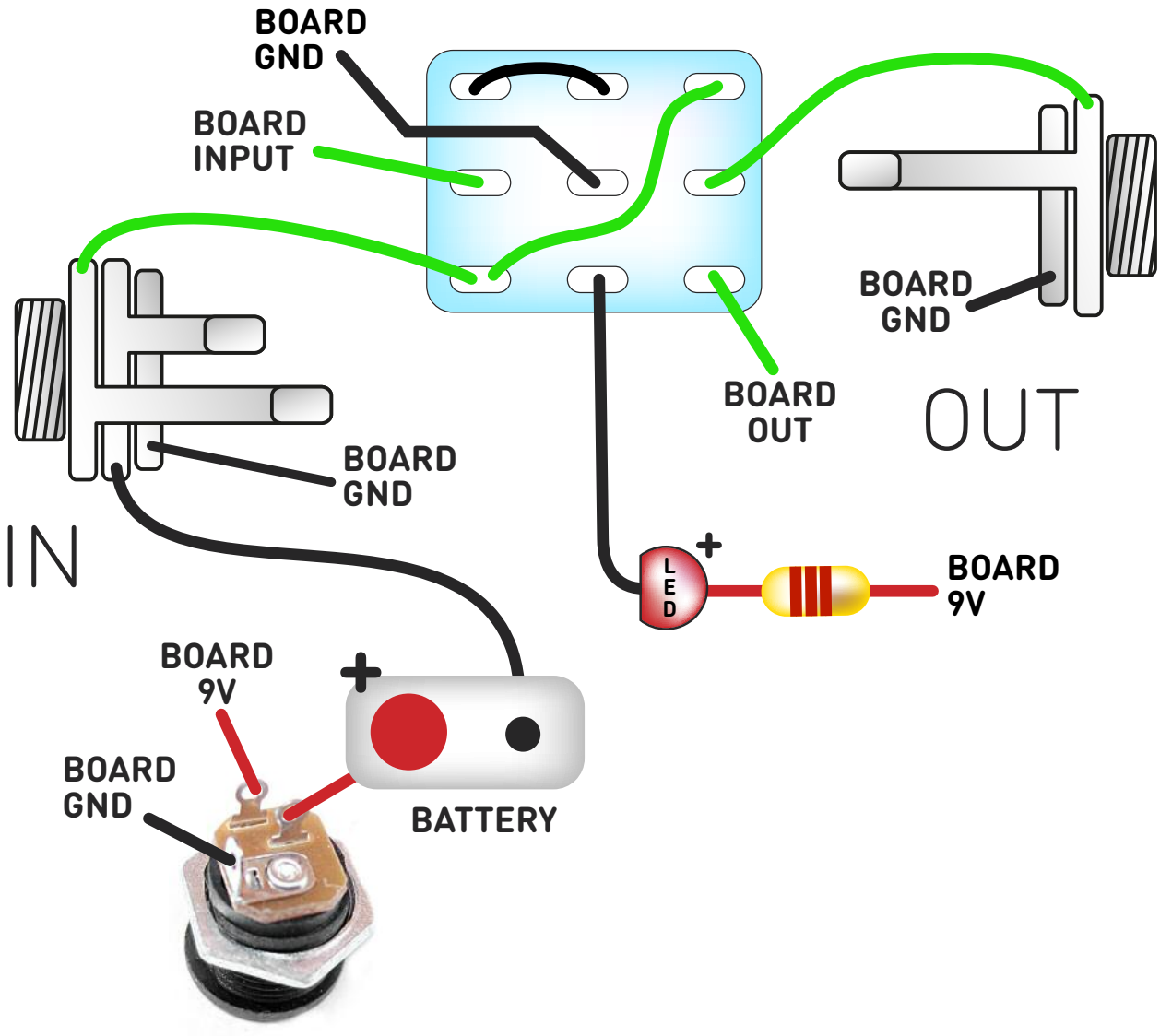
The Board GND connections don't all have to directly attach to the board. You can run a couple of wires from the DC connector, one to the board, another to the IN jack, then daisy chain that over to the OUT jack.

It doesn't matter how they all connect, as long as they do.

This circuit is positive ground and cannot be daisy chained along with standard negative ground pedals.

Wire it up - NPN

(if using a daughterboard please refer to the relevant document)



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It doesn't matter how they all connect, as long as they do.

This circuit is standard, Negative GND. Your power supply should be Tip Negative / Sleeve Positive. That's the same as your standard pedals (Boss etc), and you can safely daisy-chain your supply to this pedal.

Drilling template

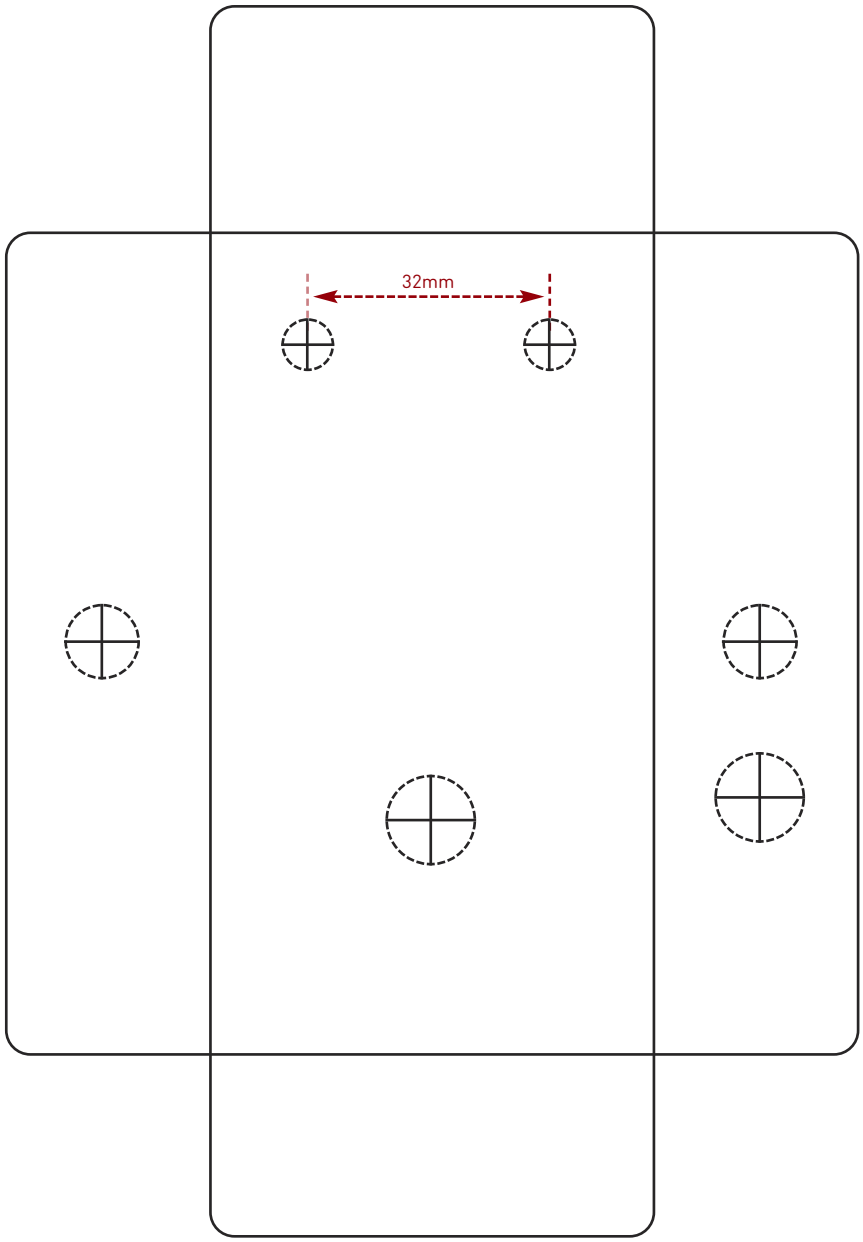
Hammond 1590B

60 x 111 x 31mm

It's a good idea to drill the pot and toggle switch holes 1mm bigger if you're board-mounting them.
Wiggle room = good!

Recommended drill sizes:

Pots	7mm
Jacks	10mm
Footswitch	12mm
DC Socket	12mm
Toggle switches	6mm



This template is a rough guide only. You should ensure correct marking of your enclosure before drilling. You use this template at your own risk.
Pedal Parts Ltd can accept no responsibility for incorrect drilling of enclosures.

FuzzDog.co.uk