Range Master

Sweet germanium treble boost with optional voltage inverter

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:

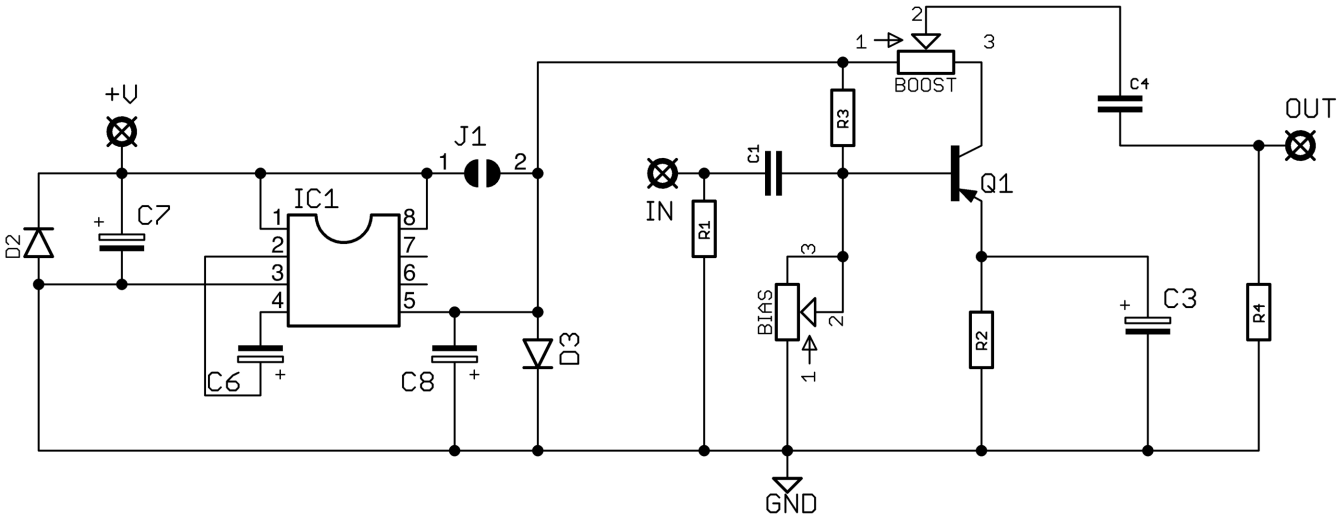
- Resistors should be 0.25W. You can use those with higher ratings but check the physical size of them.
- Electrolytics caps should be at least 25V for 9V circuits, 35V for 18V circuits. Again, check physical size if using higher ratings.

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 + Notes



This is the full schematic including the following optional parts:

Voltage Inverter (**D3, IC1, C6, C8**) to make a positive ground build (using PNP transistors) work with standard negative ground supplies.

To use the voltage inverter simply add those parts.

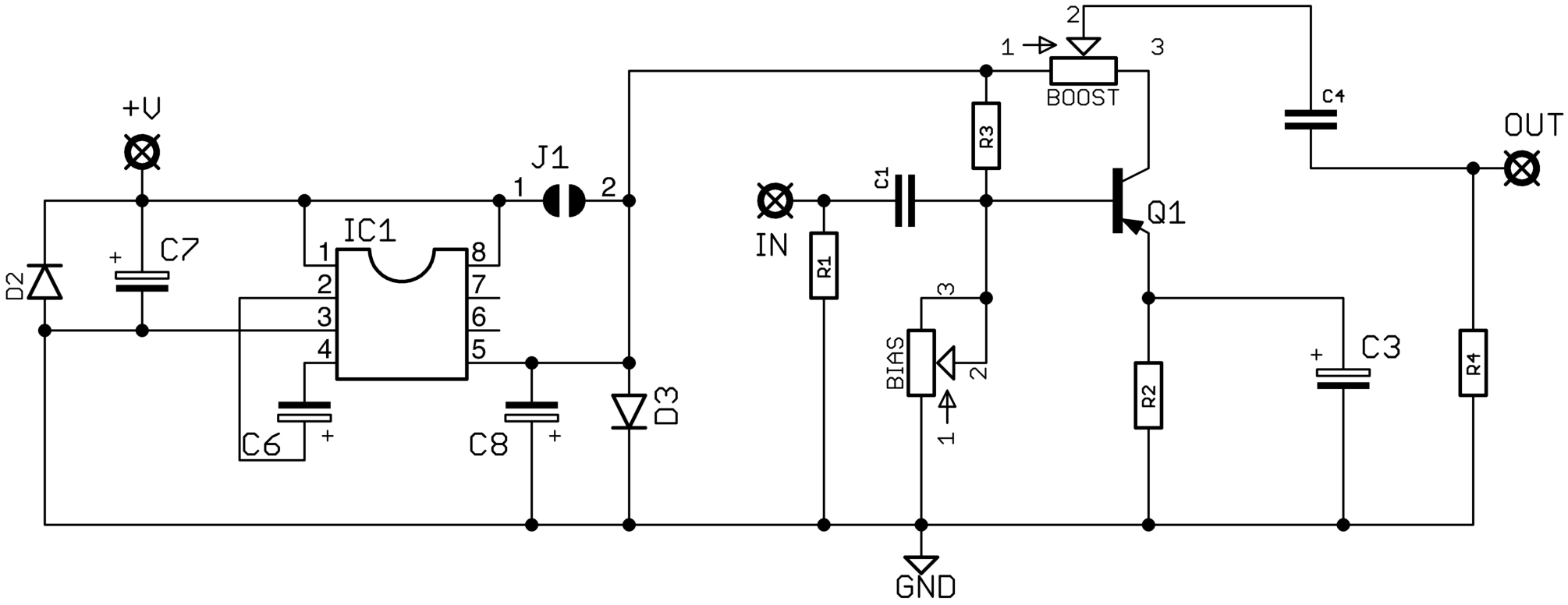
If you're building using an NPN transistor , so don't require the inverter, leave these parts out and jumper the pads for J1 (on the back of the PCB) with a blob of solder. This will supply the power to the circuit directly from the +V supply, rather than from pin 5 of the charge pump (-9V).

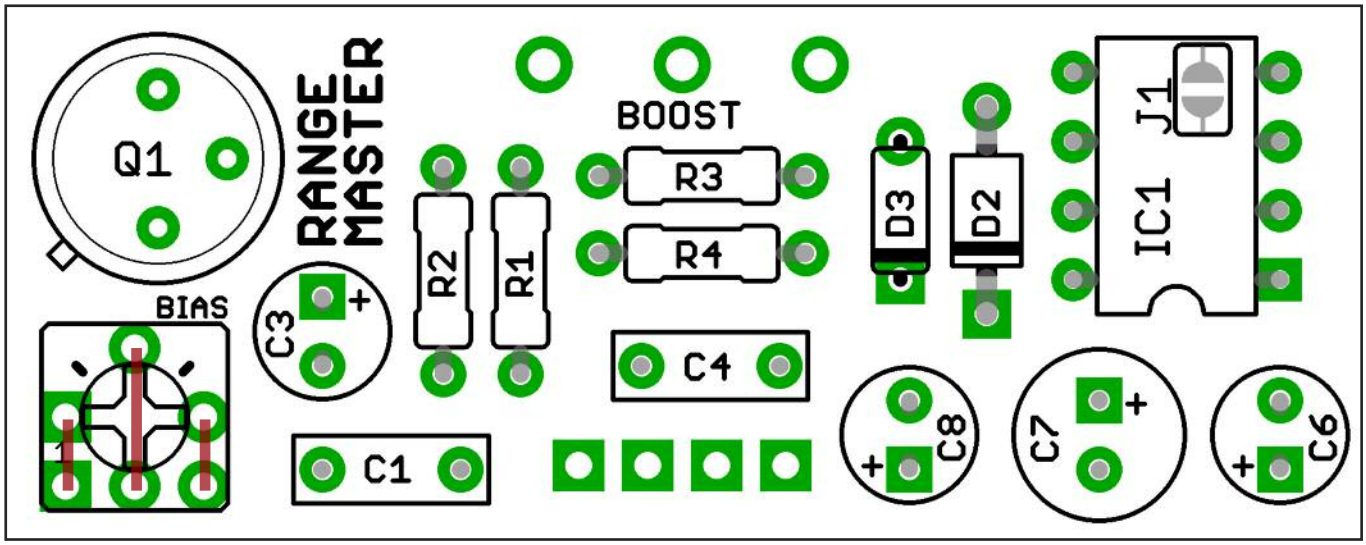
R1	1M
R2	3K9
R3	470K
R4	1M
BIAS	100K preset
BOOST	10KA
D2	1N4001
D3	1N4148
IC1	7660S (EPA recommended)

*C3 is the correct orientation for a build with NPN transistors. If you're using PNP, whether with the inverter circuitry or not, C3 needs to be reversed.

C1	4n7
C3	47u elec*
C4	10n
C6	10u elec
C7	47u elec
C8	10u elec
Q1	Your choice... Germanium transistors with hFE 80-100 are ideal.

Use PNP in conjunction with the voltage inverter parts, or NPN without.


+V
D2
C7
IC1
1
2
3
4
8
7
6
5
J1
1
2
C6
C8
D3
IN
R1
C1
R3
2
1
3
BOOST
Q1
C4
OUT
3
BIAS
2
1
R2
C3
R4
GND



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 diodes and transistor. 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 pot so it can be mounted flush in the box.

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

There are extra pads for the Bias trimmer to allow different package formats to be used. Pads are connected via PCB traces as shown above, so just fit your trimmer into whichever holes it fits naturally into. As long as you have one pin each in the left, centre and right sections. No jumpers are required.

Use **BIAS** to set the voltage on the collector of Q1 (shown above) to between 6-7V. You can measure this on pin 3 of the pot if you find it easier to get at.

POSI GROUND, NO INVERTER?

Of course, if you really want to. If you're going to do this you'll need to reverse the orientation of **D2** and **C7** and connect the pads of J1. Follow the PNP instructions in the daughterboard document for wiring.

Test the board!

Check the relevant daughterboard document for more info before you undertake this stage.

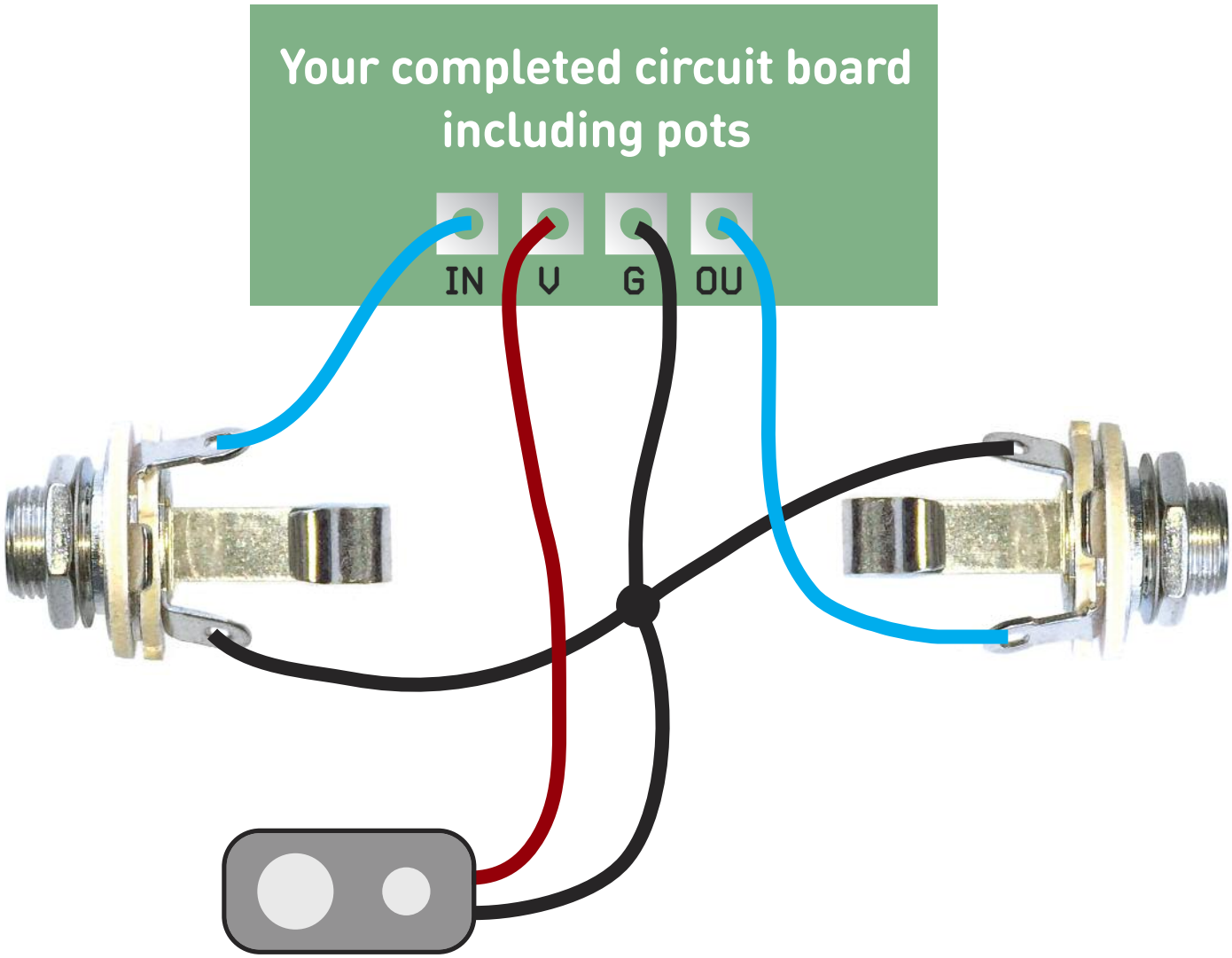
UNDER NO CIRCUMSTANCES will troubleshooting help be offered if you have skipped this stage. No exceptions.

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.

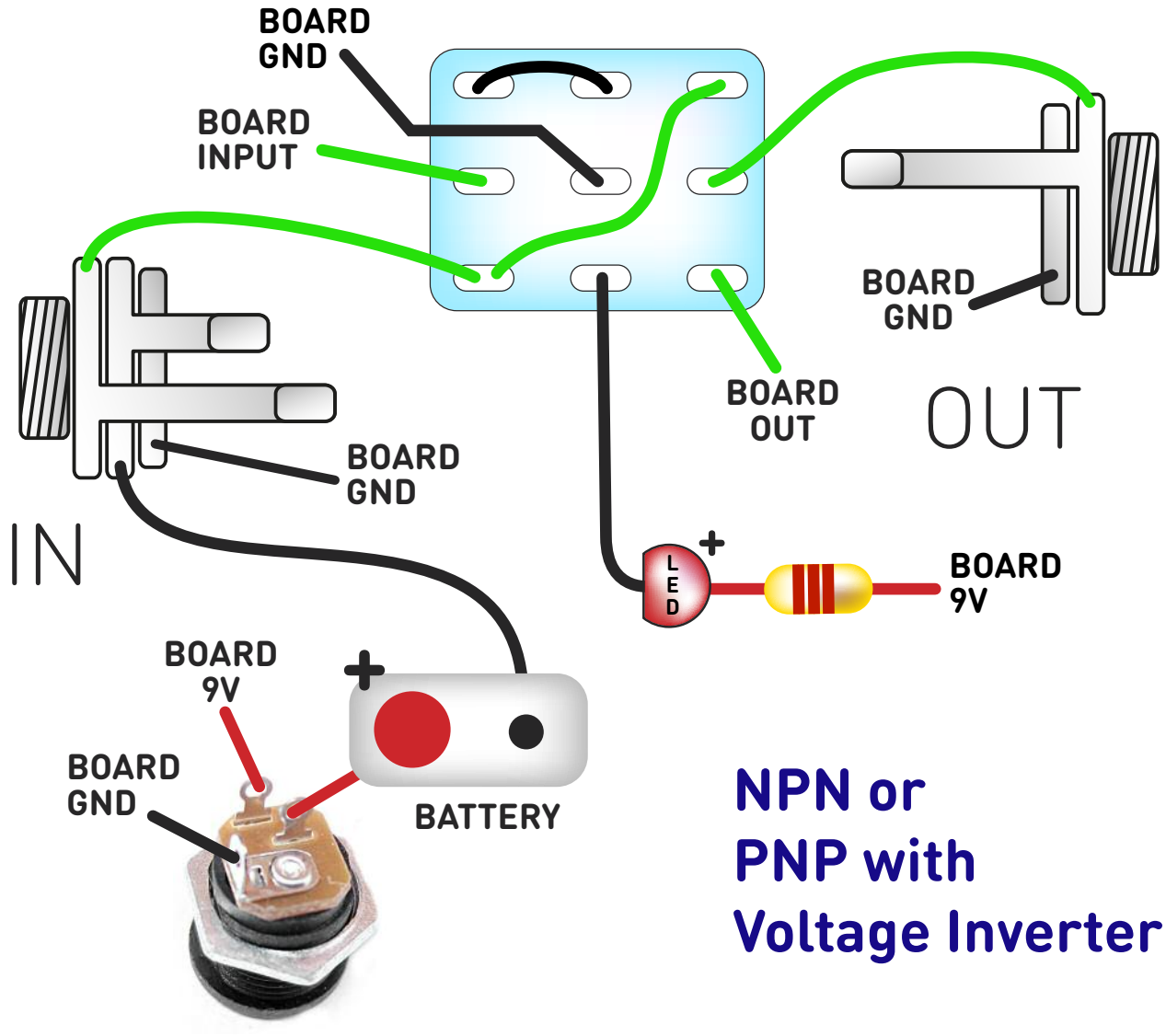
Solder some nice, long lengths of wire to the board connections for 9V, GND, IN and OUT. Connect IN and OUT to the jacks as shown. Connect all the GNDs together (twist them up and add a small amount of solder to tack it). Connect the battery + lead to the 9V wire, same method. Plug in. Go!

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.

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



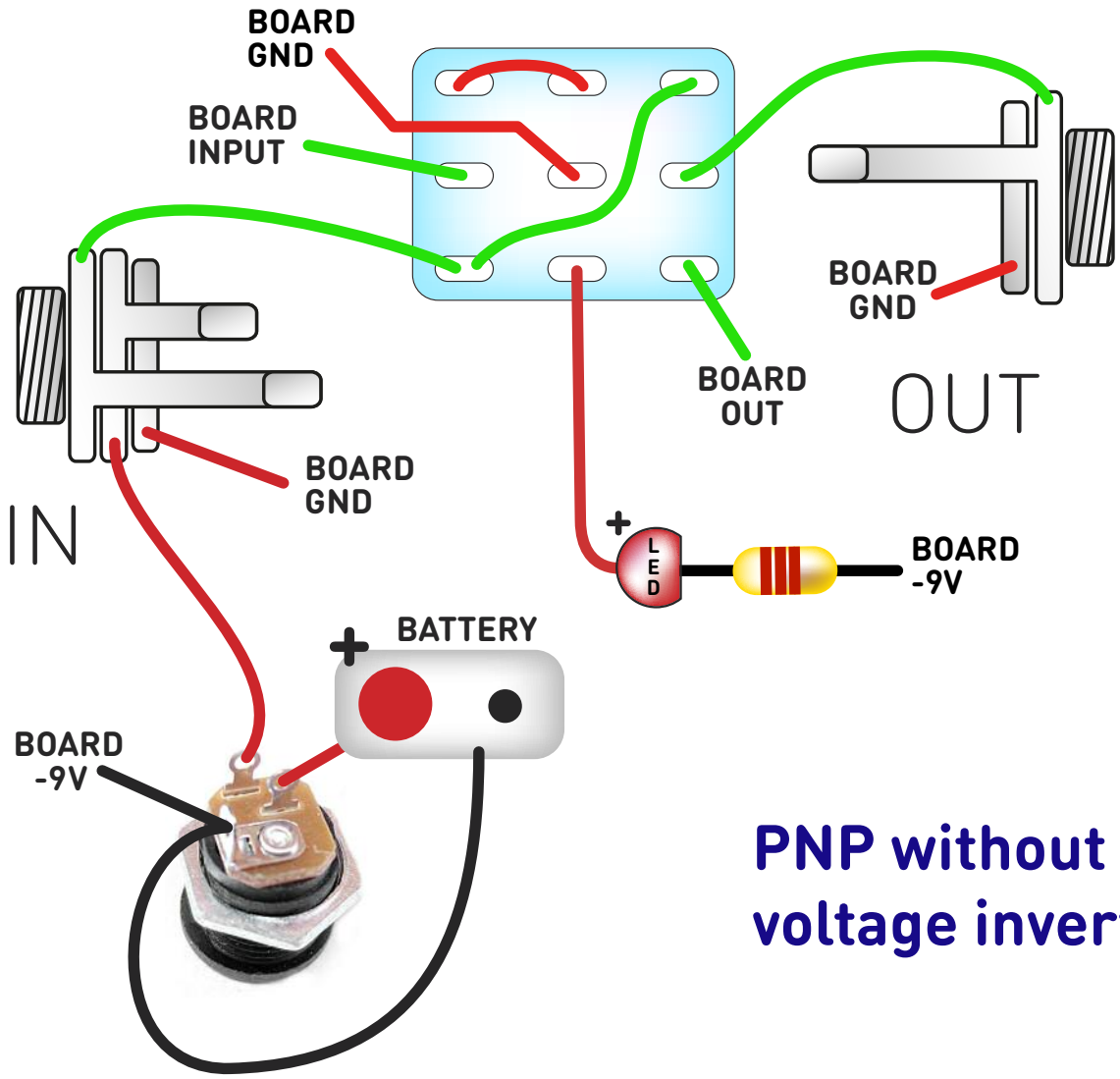
Wiring shown above will disconnect the battery when you remove the jack plug from the input, and also when a DC plug is inserted.

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 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.

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



PNP without voltage inverter

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

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

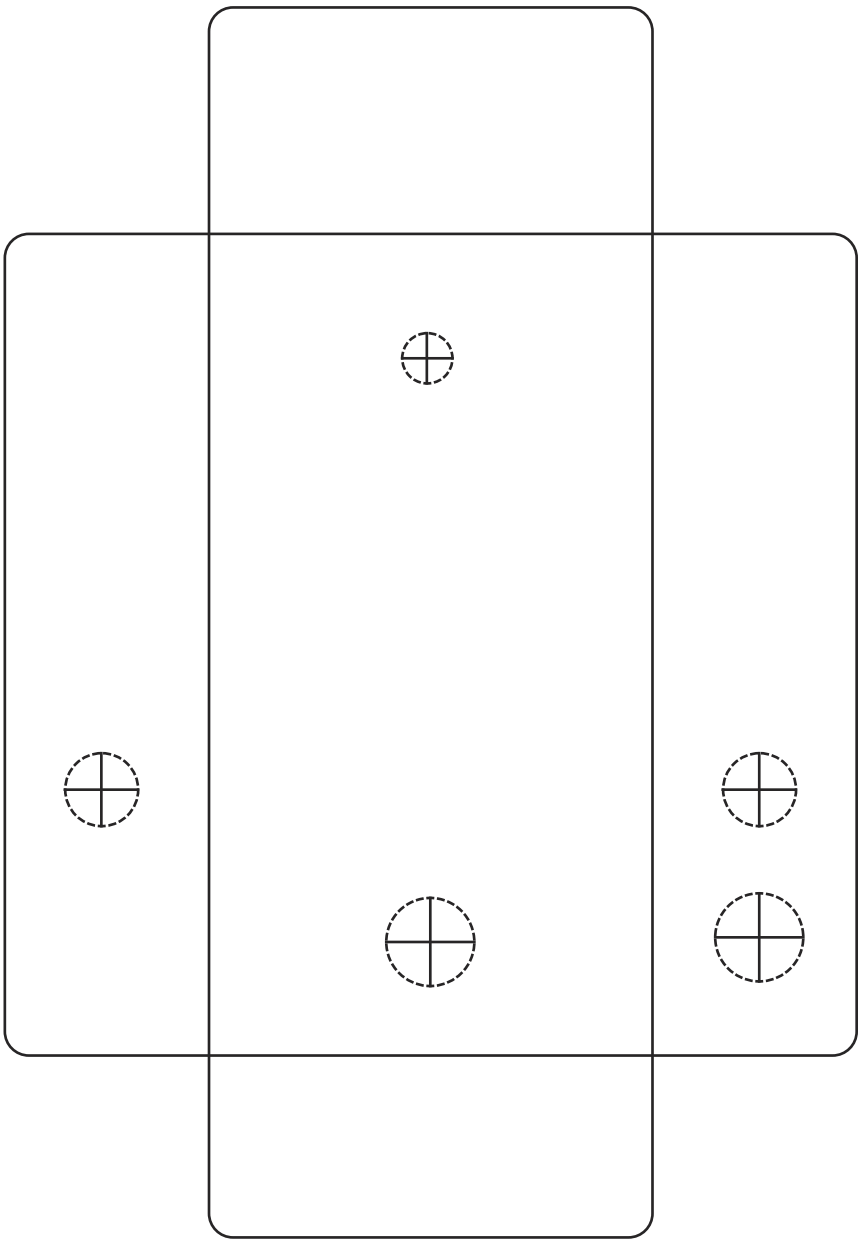
This circuit is positive GND. Your power supply should be Tip Negative / Sleeve Positive, but it cannot be daisy-chained with standard negative GND pedals.

Drilling template without battery

Hammond 1590B - 60 x 111 x 31mm

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.

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Drilling template with battery

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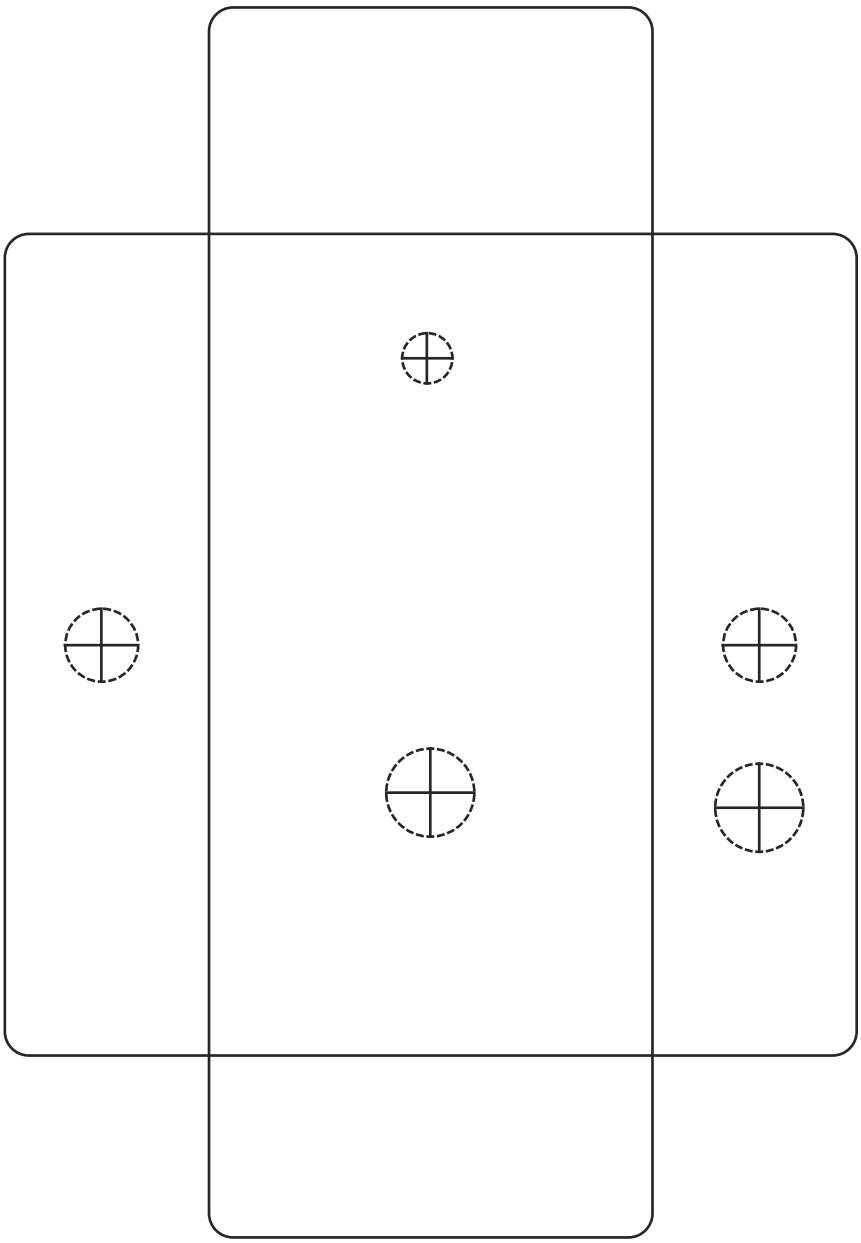

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