

Rob Mods

Powering an 18v Pedal From A 9v Supply (October, 2019)

Here's two ways to get 18v from a 9v pedal supply. The first is with the max 1044 charge pump IC. Here's the voltage doubling circuit from the datasheet:

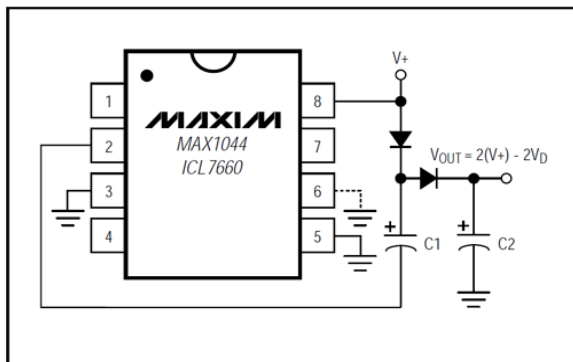
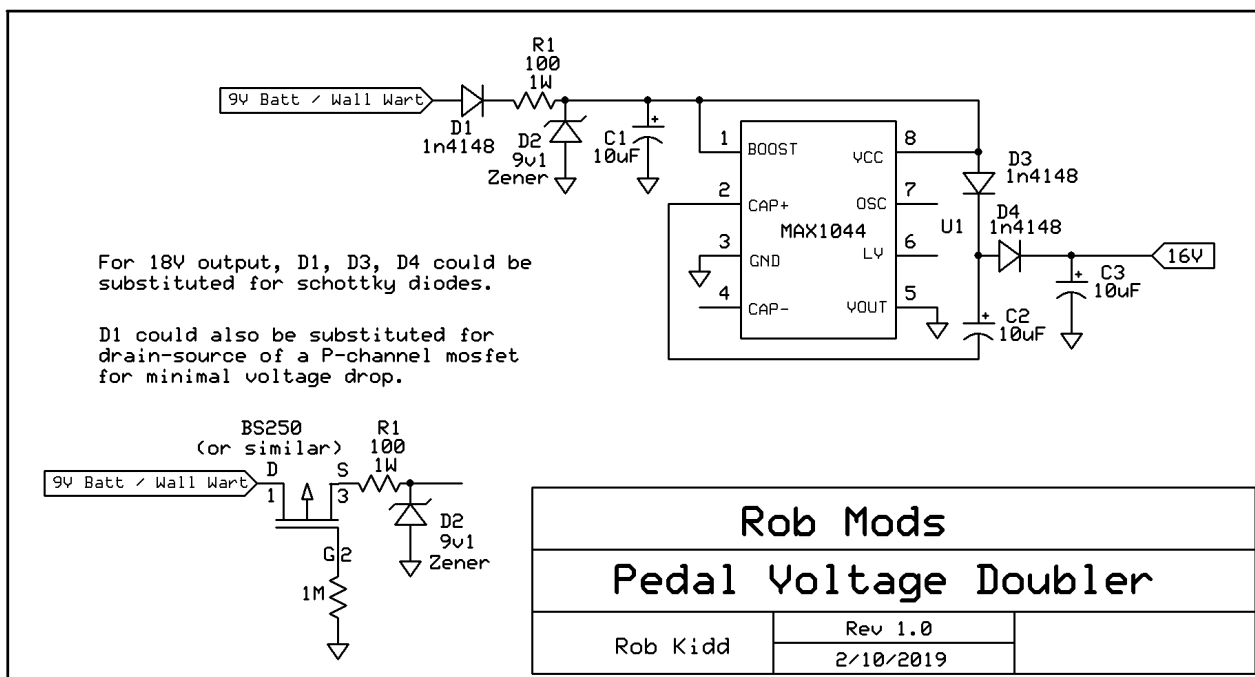


Figure 9. Voltage Doubler

With my circuit, you can see I've more or less copied this, but with a couple of tweaks.



Connecting pin 1, the boost pin, to the 9v rail increases the switching speed of the IC up above 20khz so it's out of the audio range. Without this there's a good chance the standard 3.5khz oscillation will find its way into the audio path. This will cause a constant high pitched whine through your amp.

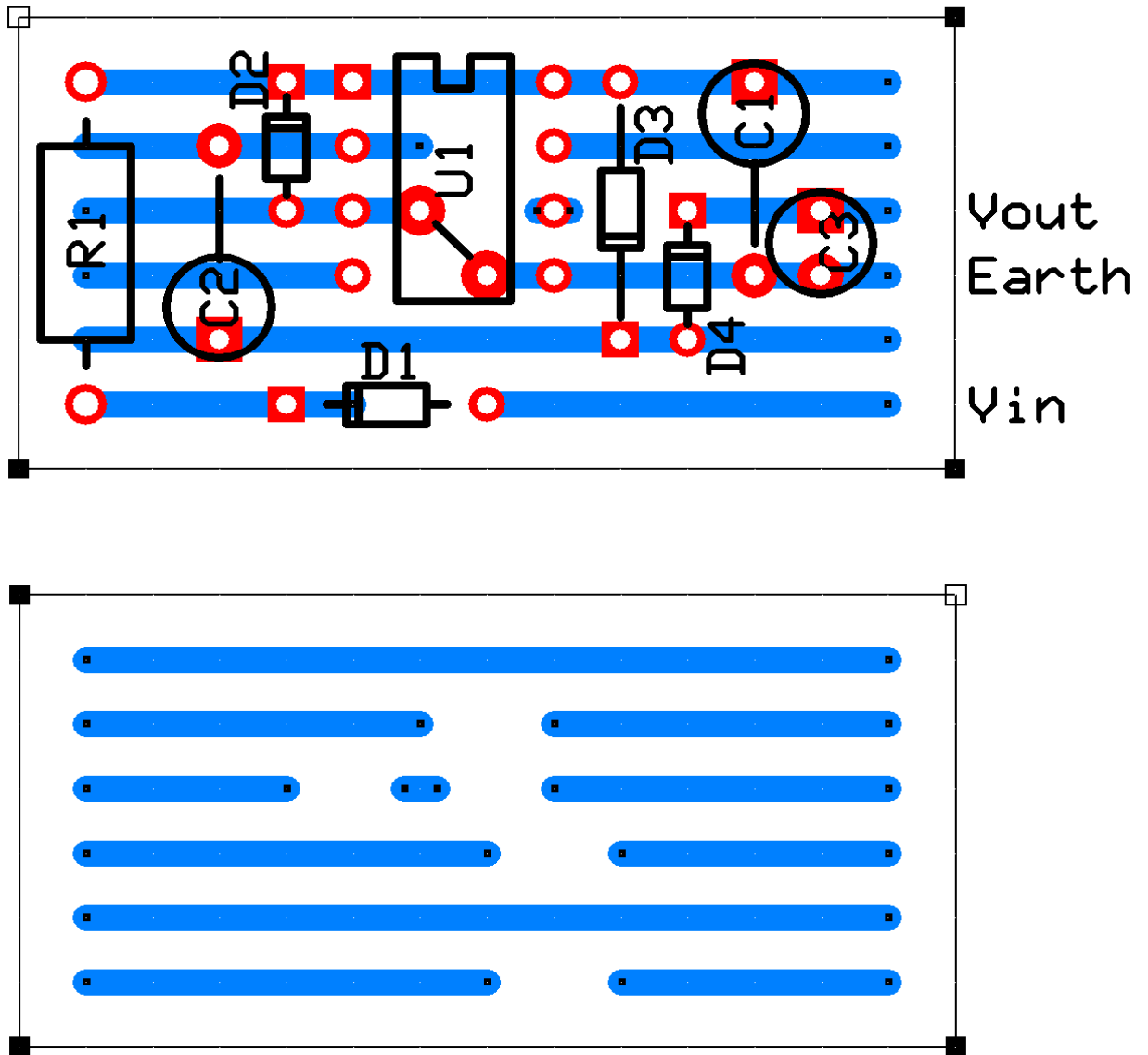
I've also put a 9.1v zener diode and a 100 ohm resistor at the front of the circuit. This is to keep the input voltage below 10v. With guitar pedals, it's not uncommon that the wrong power supply is accidentally used, and this keeps the output of the circuit no higher than 18v. Also, the max1044 is designed to operate below 10.5v.

D1 is known as a protection diode. This will save the pedal from damage in the event of an accidental reverse polarity condition at the DC jack. It will also protect the pedal if a 9v

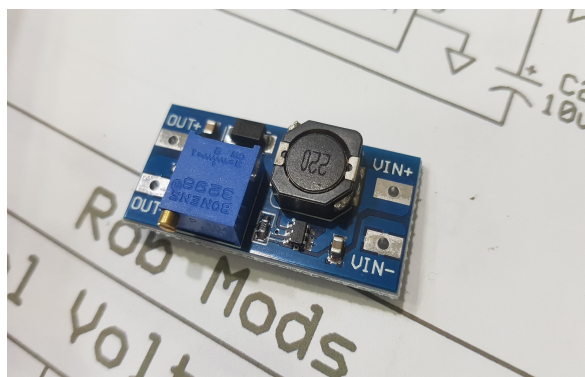
AC adaptor is used by mistake.

Because of the voltage drop across D1, D2 and D3, the output voltage is actually going to be around 16v. This is fine for typical 18v pedals, but if you really need 18v, then all three could be replaced with Schottky diodes. These have a very low forward voltage. Another old trick is to use the drain and source from a P-channel mosfet as the protection diode. This will have a negligible voltage drop.

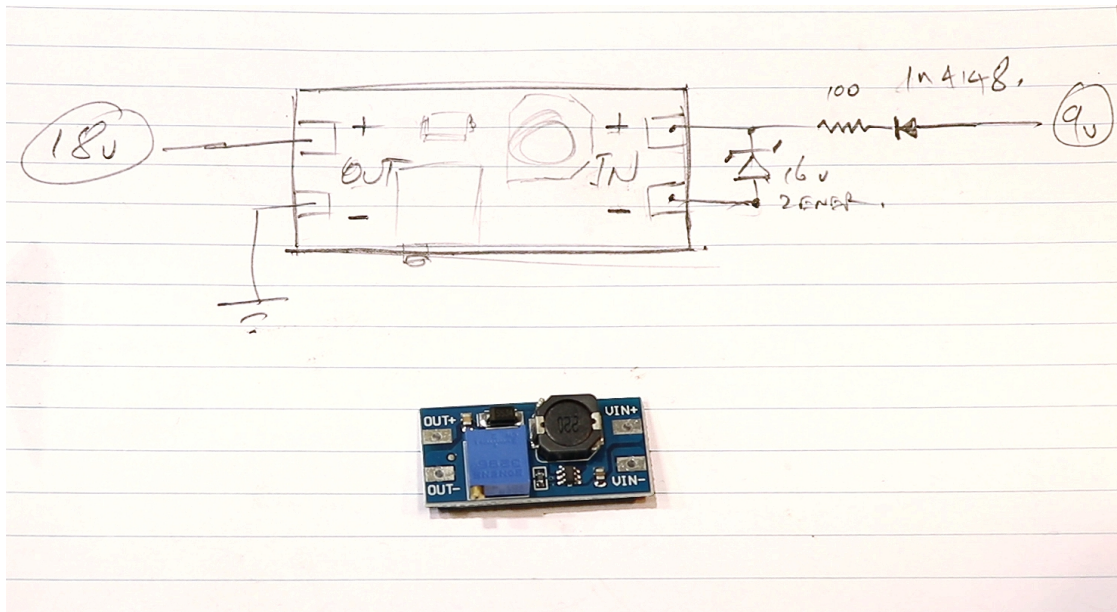
Here's a stripboard layout for the circuit. Below is the underside view.



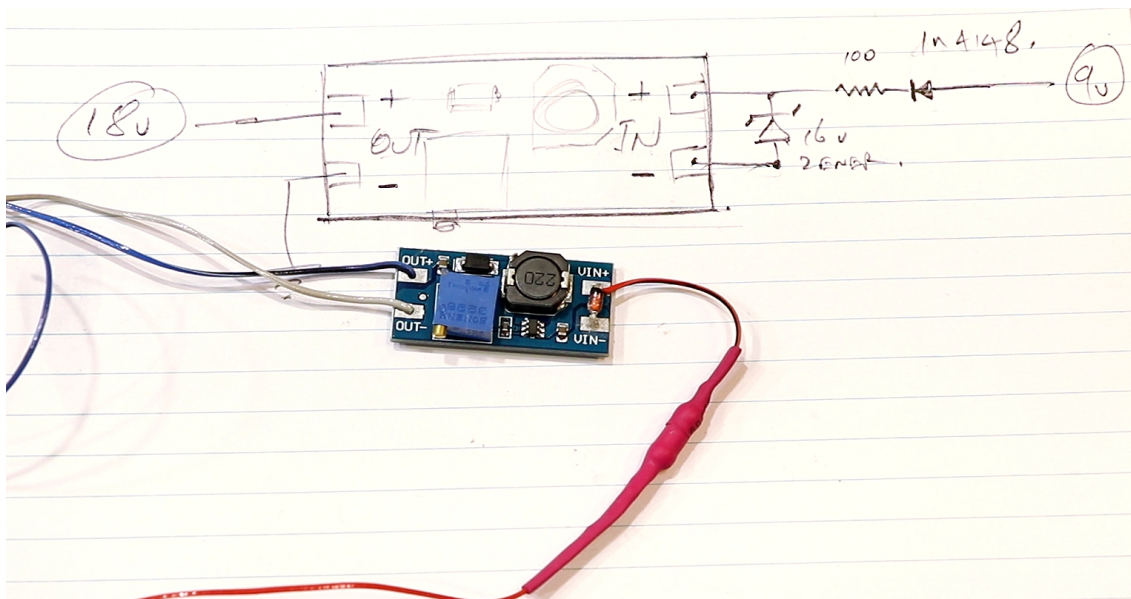
Another way to get 18v from a 9v supply is to use a DC to DC Boost Converter Module. The MT3608 is ideal. It's easy to set up, and very cheap.



There are two precautions. Firstly, the output voltage should be set with the module on the bench before it is installed. There's no way of knowing where the multi-turn trimpot is set otherwise. Also, this is only designed to boost, so it's important to keep the input voltage below the output voltage that you have set. With this in mind, I have added a 16v zener diode and a current limiting resistor.



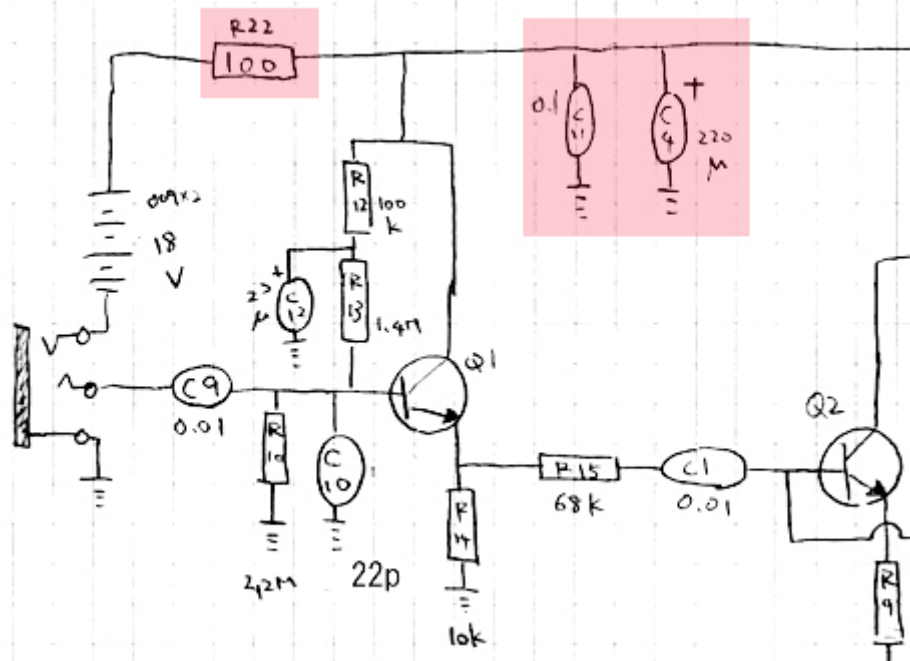
The diode can be soldered directly to the board, and the other parts can be wired in line and covered with heatshrink.



In my 18v Cry Baby pedal there is plenty of room for either of these circuits, but if your pedal doesn't have enough spare space inside, either of these circuits could be built into a small case with input and output 2.1mm DC jacks.

The MT3608 module is easy to use, and cheap (around \$1), but it is really designed for higher current applications and it's not terribly efficient with typical stompboxes. If you plan to use your pedal with batteries from time to time, building the Max1044 circuit is more than likely worth the effort for the extra battery life.

Also, the switching speed of the MT3608 module is sensitive to its current load. With only 4mA that my crybaby pedal draws, its switching speed will drop down into the top octave of the audio range. The pedal has a 100 ohm resistor, plus 220uF and 100nF caps that serves to filter any power supply noise.



(Schematic found on music-electronics-forum.com)

This is a fairly typical arrangement and filters any switching noise to sub-audible levels. If your circuit also has such a low current draw, and you have an audible high-pitched whine, check for this RC arrangement. You may need to increase the value of either or both components to lower the roll-off frequency, or perhaps install another RC pair to make it a second order filter.

In the video, even though I removed the 100 ohm resistor as a convenient place to patch in the converter, it was returned to the circuit as a flying lead from the module's output.

