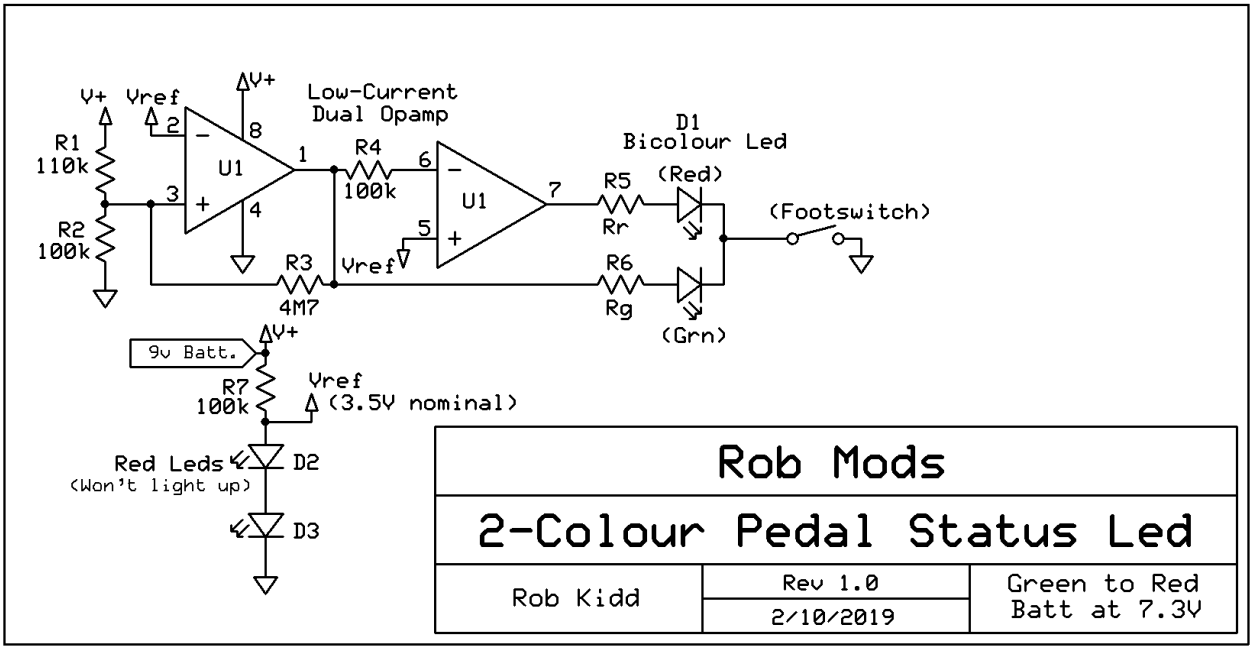
Rob Mods
Battery Monitor Status Light
(October, 2019)

Here's a circuit for a pedal status light that also monitors the battery level.



Both the opamps are wired as comparators. The first comparator is non-inverting and the second is inverting. Two standard cheap red LEDs (D2 and D3) are used as a reference voltage. With the tiny current provided by R7, they won't light up, but their combined forward voltage will stay very close to 3.5V as the battery voltage diminishes with use.

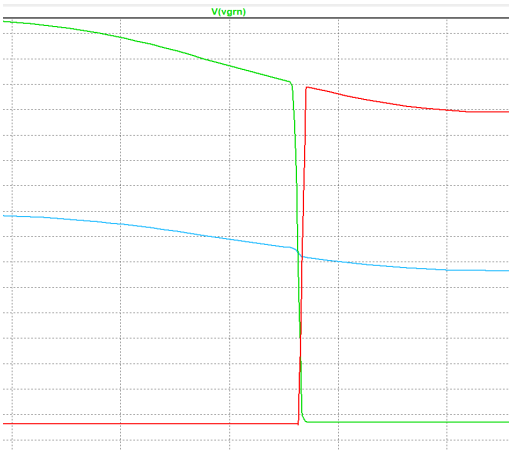
As shown, the status LED (D1) will switch from green to red at approximately 7.3V. If your LEDs give a significantly different Vref, or you would like to have your status light change colour at a different voltage, then different values for the voltage divider (R1 & R2) can be used. The formula is: Vout = Vbatt x R2 / (R1 + R2), where Vout is equal to the reference voltage when the battery is at the desired switching voltage. For my prototype this was 3.49V. Vbatt is the voltage of the battery where you would like the status light to change colour. For my crybaby pedal, this was 7.3V.

Unlike the first opamp, the second has its non-inverting input (pin 5) connected to the reference voltage. Pin 6 is held to the output voltage of the first comparator by R4. This way its output goes high when the output of the first opamp goes low.

A comparator seems to act a bit like a switch, but really it is amplifying the difference at its two inputs. An opamp has huge gain, and even the tiniest difference between the inverting and non-inverting inputs creates an extreme swing into saturation at its output. (In audio circuits this is normally tamed with some kind of feedback network.)

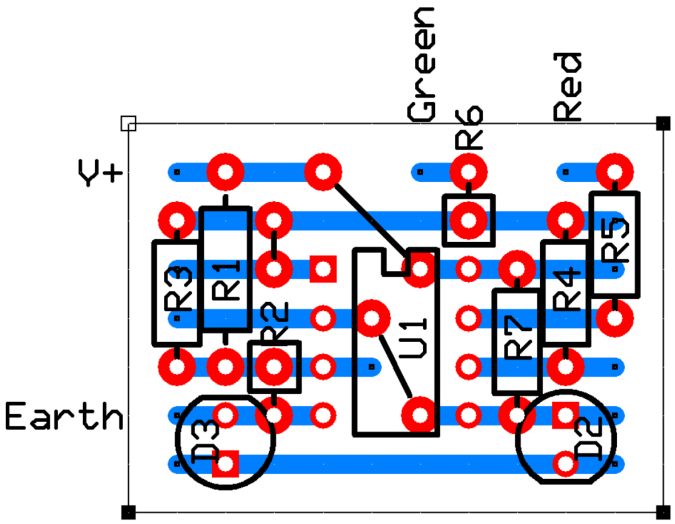
The brightness of the red and green led is controlled by R5 and R6. The prototype was made with an unknown LED from my salvaged parts box. R6 was 22k and R5 was 10k. (The green half of the LED was noticeably brighter than the red). You will likely have to experiment. More recently I have made this circuit with a “KINGBRIGHT L-93WSURKCGKC”. I used 10K for both.

R3 creates a small amount of hysteresis in the way the voltage at pin 3 changes. This is standard practise for this type of circuit and helps the circuit to change reliably through that switching region.

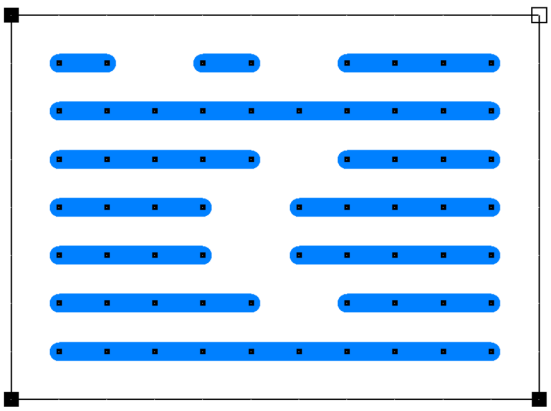


It means the status light will switch down from green to red at a slightly lower voltage than it switches up from red to green. In practise this is fine.

Here is a stripboard layout:



The underside:



Install the two diagonal jumpers before the IC socket, and be sure to orientate the IC and the LEDs correctly.