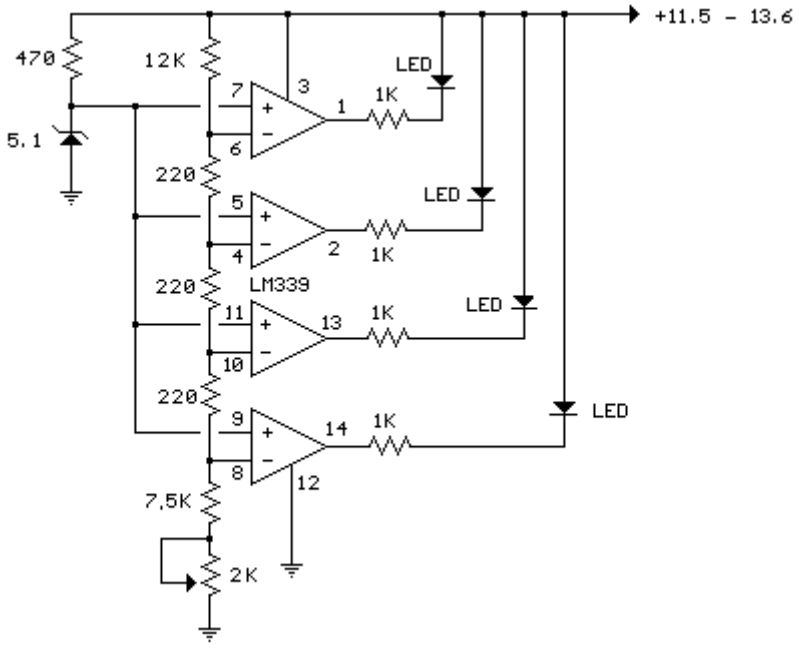
LED 12 Volt Lead Acid Battery Meter

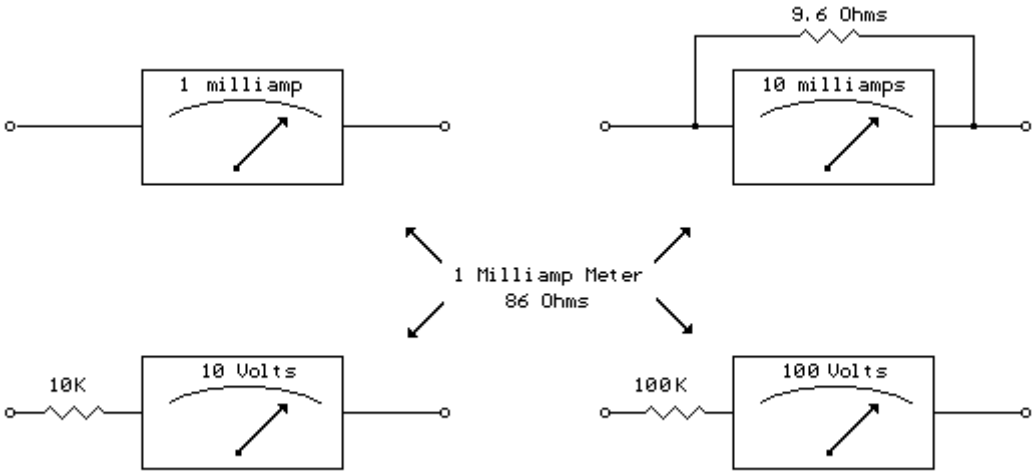
In the circuit below, a quad voltage comparator (LM339) is used as a simple bar graph meter to indicate the charge condition of a 12 volt, lead acid battery. A 5 volt reference voltage is connected to each of the (+) inputs of the four comparators and the (-) inputs are connected to successive points along a voltage divider. The LEDs will illuminate when the voltage at the negative (-) input exceeds the reference voltage. Calibration can be done by adjusting the 2K potentiometer so that all four LEDs illuminate when the battery voltage is 12.7 volts, indicating full charge with no load on the battery. At 11.7 volts, the LEDs should be off indicating a dead battery. Each LED represents an approximate 25% change in charge condition or 300 millivolts, so that 3 LEDs indicate 75%, 2 LEDs indicate 50%, etc. The actual voltages will depend on temperature conditions and battery type, wet cell, gel cell etc. Additional information on battery maintenance can be found at:
Battery Maintenance Tutorial



Menu

Analog Milliamp Meter Used as Voltmeter

A milliamp meter can be used as a volt meter by adding a series resistance. The resistance needed is the full scale voltage reading divided by the full scale current of the meter movement. So, if you have a 1 milliamp meter and you want to read 0-10 volts you will need a total resistance of 10/.001 = 10K ohms. The meter movement itself will have a small resistance which will be part of the total 10K resistance, but it is usually low enough to ignore. The meter in the example below has a resistance of 86 ohms so the true resistor value needed would be 10K-86 or 9914 ohms. But using a 10K standard value will be within 1% so we can ignore the 86 ohms. For a full scale reading of 1 volt, the meter resistnace would be more significant since it would be about 8% of the total 1K needed, so you would probably want to use a 914 ohm resistor, or 910 standard value. The milliamp meter can also be used to measure higher currents by adding a parallel resistance. The meter resistance now becomes very significant since to increase the range by a factor of ten, we need to bypass 9/10 of the total current with the parallel resistor. So, to convert the 1 milliamp meter to a 10 milliamp meter, we will need a parallel resistor of 86/9 = 9.56 ohms.



Menu