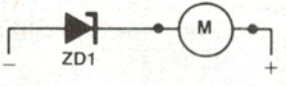
Range extension

Barry Bown of **Lalor Victoria** sent us this idea.

A problem with multimeters is that the 5, 10, and 50 volt range selection do not allow very accurate determination of voltages that lie just outside the range, like 12 volts.

He uses a 10 volt zener to convert the five volt range into a 10-15 volt range. In a similar way, almost any range can be obtained with the correct selection of zener values and meter range.

Meter Range	Zener Voltage	Extended Range
5 V	10 V	10-15 V
10 V	10 V	10-20 V
5 V	5 V	5-20 V
5 V	15 V	15-20 V



Low voltage alarm

J. Chubb of **Kingsford NSW** sent us his useful little circuit. It will light a LED when the supply voltage is above a certain level, and flash it when the batteries need replacing.

The values shown are for 9 V operation. Flashing starts at about 7V5 and the lamp won't light at all below 2 V.

The circuit consists of a 555 timer connected in the bistable mode and driving a LED. The trick is to connect a zener diode between pin 7 and ground. In normal operation pin 7 oscillates between one-third and two-thirds of the supply rail voltage Vcc. If 2/3 Vcc is greater than the zener voltage then the function of the 555 will be inhibited.

Thus to customise the circuit for your own requirements, decide on the minimum voltage that will operate the equipment correctly, and multiply by 2/3. This is the zener voltage. R may also need to be changed to suit the particular LED you use.

As originally constructed the indicator drew 7 mA at 9 V, falling to 5 mA at 7 V. If these values are likely to cause problems try the CMOS version of the 555, the 7555.