Circuit & Design Ideas

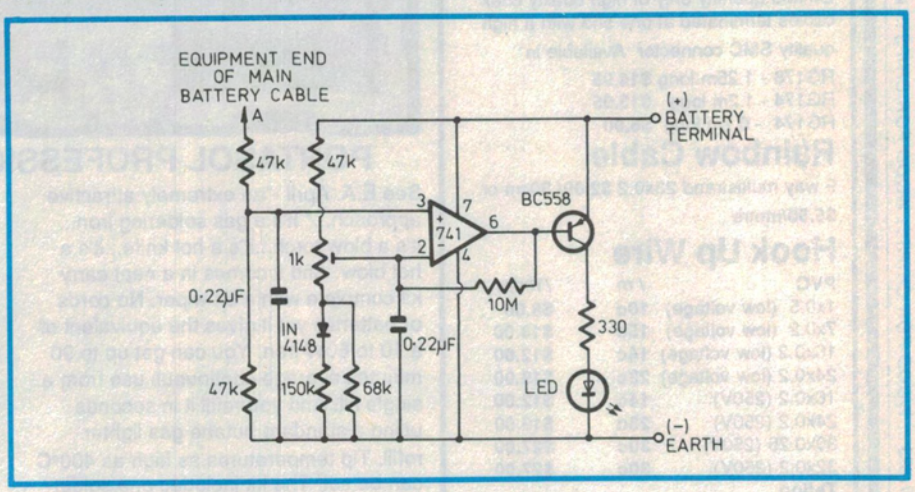
Interesting circuit ideas from readers and technical literature. While this material has been checked as far as possible for feasibility, the circuits have not been built and tested by us. As a consequence, we cannot accept responsibility, enter into correspondence or provide constructional details.

Car battery discharge indicator

The introduction of the alternator to auto electrical systems overcame many of the problems of battery maintenance suffered in the days of the DC generator. In one stroke it was possible to have the battery charging with the engine idling.

Since then, however many accessories have been added and only one or two of them can draw more current than the alternator is able to supply at engine idling speed. Normally this does not matter but the combination of a wet night, heavy traffic and perhaps a doubtful battery can cause considerable inconvenience when the battery goes flat quite suddenly – or apparently so.

An ammeter would show what was happening if (a) one were fitted and (b) one thought to look at it. The alternator warning light is, incidentally, useless in this context since it merely indicates that the alternator is generating current – but not whether this current is sufficient to supply all the electrical devices which happen to be operating at the time.



This circuit detects the sense of the small voltage drop across the cable from the battery terminal to all the electrical equipment (except the starter). Note that a number of modern cars split this cable about 20cm from the battery terminal and it is necessary to connect point A on the circuit diagram to the point where the cable divides (if it does so).

Because the op amp LM741 is operating at a gain of about 400 and also because of the rather harsh environment in the engine compartment, some additional temperature compensation is needed. This is provided by the 1N4148 diode and associated resistors. The LED should be mounted in an appropriate spot on the instrument panel but it is probably best to mount the unit itself near the battery to minimise the run of 'hot' leads. Only a single lead from bottom end of the 330 ohm resistor need to run to the LED, the cathode of which can be earthed locally.

The components were mounted on a PCB 37×33mm and fitted in a box measuring 40×35×20mm folded from thin sheet aluminium. This was lined with plastic sheet cut from an ice cream container lid (semi rigid and sufficiently heat resistant) to prevent any shorts to the box.

Setting up is simply a matter of adjusting the preset 1k pot so that the LED is just off with no battery load. Battery voltage should not be above about 12.5V when this is done as any surplus charge will result in an oversensitive setting because of the effect of the diode network.

Only the 330 ohm resistor needs to be ½W rating; the remainder can be ¼W.

The voltage drop across a 20cm length of the usual 4mm cable will give an indication of discharge at about 2.5 amps.

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Dreamed up a great idea?

If YOU have developed an interesting circuit or design idea, like those we publish in this column, why not send us in the details? As you can see, we pay for those we publish — not a fortune, perhaps, but surely enough to pay for the effort of drawing out your circuit, jotting down some brief notes and popping the lot in the post (together with your name and address, or course!). Send them to Jim Rowe, Electronics Australia, PO Box 227, Waterloo 2017.