Lead Acid Battery Protector

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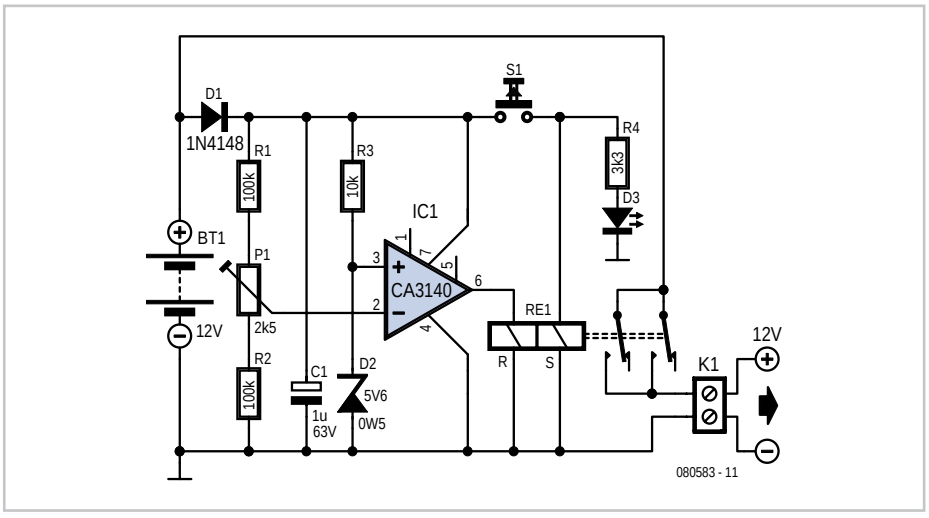
The circuit described here can be used to ensure that a 12 V sealed lead acid (SLA) gel battery isn't discharged too deeply. The principal part of the circuit is a bistable relay, which is driven by the output of an op amp.

The battery voltage is first reduced via D1, R1, P1 and R2, and then continuously compared with a reference voltage set up by diode D2. When the battery discharges too much and its terminal voltage drops below the level set by P1, the output of the opamp becomes High, which causes the relay to toggle. This in turn isolates the load from the battery. The battery can be reconnected via S1 once the battery has been replaced or recharged.

The relay used in the prototype is a 5 V bistable type made by Omron (G6AK-234P-ST-US 5 VDC). The two windings of the relay each have a resistance of 139 Ω (for the RAL-D 5 W-K made by Fujitsu this is 167 Ω). When the battery voltage starts to become too low and the relay is being reset the current consumption of the circuit is about 45 mA. Shortly after the load has been disconnected, when the battery voltage rises above the reference voltage again, the reset coil will no longer be powered and the current consumption drops back to about 2.5 mA.



The range of P1 has intentionally been kept small. With a reference voltage of 5.6 V (D2) and a voltage drop of 0.64 V across D1, the circuit reacts within a voltage span of 11.5 V and 11.8 V. This range is obviously dependent on the zener diode used and the tolerance.

For a greater span you can use a larger value for P1 without any problems. With the potentiometer at its mid setting the circuit switches at about 11.6 V.

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Automatic Curtain Opener

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This circuit can be used with a timer clock to open and close curtains or (vertical) Venetian blinds. The curtain or blind is driven by an electric motor with a reduction gearbox fitted to the control mechanism of the curtain or blind. This circuit is ideal for giving your home an occupied appearance while you are away on holiday or for some other reason. In the author's house, this arrangement has provided several years of trouble-free service on a number of windows fitted with Venetian blinds.
The original design was a simple relay circuit with pushbuttons for opening and closing and reed switches acting as limit switches. The mechanical drive is provided by a small DC motor with a reduction gearbox and pulley (all from Conrad Electronics).
It was later modified to work automatically with a timer clock. The timer operates a small 230-VAC (or 120-VAC) relay with a changeover contact. Thanks to the two timers, the motor stops after a few seconds if one of the reed switches is missed due to a mechanical defect.
The circuit works as follows (see Figure 1).
In the quiescent state, relays RE1–RE3 are de-energised and the motor is stopped.
Open the blind:
When the timer clock applies power to the 230-V (120-V) relay RE3, the voltage at the junction of C1 and R1 goes high. IC1 (a 555) then receives a trigger pulse on pin 2, which causes its output (pin 3) to go High and energise RE1, which in turn causes the motor to start running. When the magnet reaches reed switch S1 ('Open'), the 555 is reset. If the reed switch does not operate for some reason, the relay is de-energised anyhow when the monostable times out (time delay = 1.1 RC; approximately 5 seconds).
Close the blind:
The timer clock removes power from RE3, which causes a trigger pulse to be applied to