

Mower battery voltage control

This on/off regulator was added to my 12hp B&S powered lawnmower, to prevent the battery overcharging. When the machine was used for long periods, I found that battery voltages in excess of 16V were common. The regulator could be added to any small engine with an electric start.

When the engine is started, relay RLB activates the unit automatically via contact RLB/1 to 'top up' the battery. If access to the alternator output is not available to switch this relay, then dispense with RLB and use a manual switch SW' instead.

The voltage control is based on an LF351 comparator (IC1), which uses a 78L08 (IC2) for a reference voltage, and compares this with the battery voltage via the potential divider composed of resistors R1, R2 and R3. Capacitor C1 smoothes the ripple appearing in the battery voltage. At start-up uncharged C1 holds pin 2 of IC1 low, so relay RLA is energised and connects the charger via contact RLA/1.

When the battery voltage rises to 13.8V, the comparator switches and de-energises RLA. Hysteresis provided by resistor R6 prevents the relay from re-operating until the battery voltage falls to 12.8V (or the engine is re-started).

The value of resistor R1 may be varied to change the 'fully charged' voltage. Do not measure this voltage

while the battery is charging, as the ripple present will cause a false reading.

But when is a battery 'fully charged'? My answer to this question is when the terminal voltage settles to around 13.8V within a minute or so of ceasing charging. I didn't want my circuit to cut out charging, then switch back on again after a minute or so when the voltage had settled!

I found that a voltage of 14.2V, measured as soon as I ceased charging, settled to 13.8V a minute later. Because the comparator voltage needed for switching is measured while still charging, this setting must be made slightly higher than 14.2V, to allow for voltage drop caused by the battery's internal impedance. So my values for resistors R4, R5 and R6 were chosen by trial and error to achieve this result.

These resistor values gave me a turn-on voltage of 12.8V — which seems reasonable, as a fully charged battery would have a terminal voltage of around 12.5V after sitting for a day or so.

It is essential to connect the unit directly to the battery terminals, to avoid effects due to the charging current. Likewise, the negative lead from relay RLB and capacitor C2 should be taken separately to ground.

Remember that the unit will be subjected to considerable vibration, and must be constructed to withstand these conditions.

John Symons,
Woodend, Vic

\$45

