

Automobile IDIOT LIGHTS

Very low-cost circuit monitors your car's electrical system with high-low voltage indicators

By Richard M. Hilbert

Many people think "idiot" lights are just that. But how often do we really look at gauges and how many motorists really know when an instrument indicates a normal reading or a potential problem? On the other hand, a bright red light attracts attention immediately and warns of a malfunction.

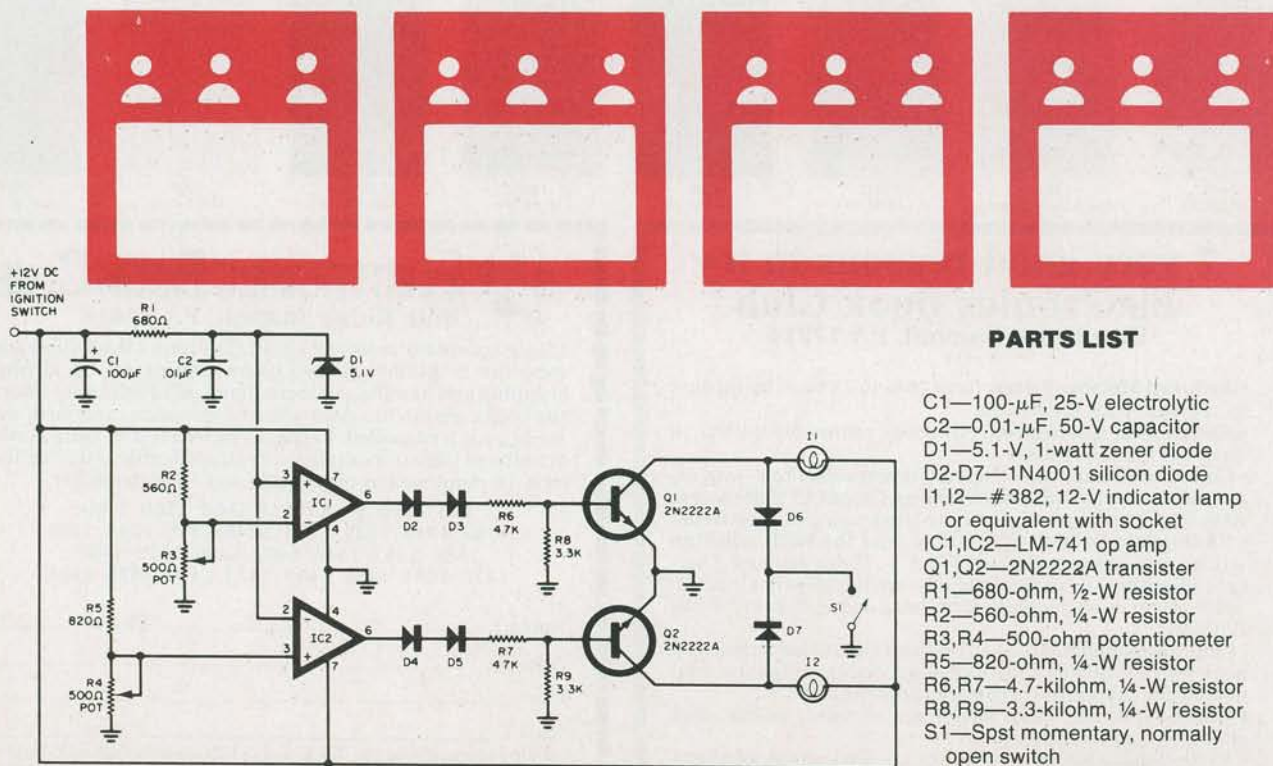
The high-low voltage unit described here monitors a vehicle's electrical system for a preset high and low voltage. For instance, a 12-volt system normally operates between 12 and 14.5 volts. Any drop below 12 volts turns on *I1* and any increase above 14.5 volts turns on *I2*. Either indicates a problem.

Construction. Construction of the unit is not critical and neither are parts. Many substitutions can be made. All components fit nicely on a 1 3/4" x 2 1/4" piece of phenolic perf board. Components *D6*, *D7*, and *S1* can be eliminated if desired. They were added to the original circuit to test the lamps because only the low-voltage lamp comes on during engine cranking (which is perfectly normal). Helitrim potentiometers do not have to be used, but they are easier to "fine tune" than regular potentiometers.

Calibration and Use. The circuit as shown is accurate to ±10 milli-

volts. A variable dc-power supply and a digital voltmeter were used to set up the unit. To calibrate, adjust the power supply to the desired low-limit voltage, hook up as shown on the schematic, and adjust *R3* until *I1* just goes out. Then increase power supply voltage to the desired high limit and adjust *R4* until *I2* turns on. All that is left to do is connect the unit to its permanent location.

In the prototype, *I1*, *I2*, *D6*, *D7*, and *S1* were mounted on a remote panel. However, all components could be installed in a minibox and mounted in, on, or under the dashboard. ♦



PARTS LIST

- C1—100- μ F, 25-V electrolytic
- C2—0.01- μ F, 50-V capacitor
- D1—5.1-V, 1-watt zener diode
- D2-D7—1N4001 silicon diode
- I1, I2—#382, 12-V indicator lamp or equivalent with socket
- IC1, IC2—LM-741 op amp
- Q1, Q2—2N2222A transistor
- R1—680-ohm, 1/2-W resistor
- R2—560-ohm, 1/4-W resistor
- R3, R4—500-ohm potentiometer
- R5—820-ohm, 1/4-W resistor
- R6, R7—4.7-kilohm, 1/4-W resistor
- R8, R9—3.3-kilohm, 1/4-W resistor
- S1—Spst momentary, normally open switch