FUEL RESERVE INDICATOR FOR VEHICLES

■ D. MOHAN KUMAR

Here is a simple circuit for monitoring the fuel level in vehicles. It gives an audiovisual indication when the fuel level drops alarmingly below the reserve level, helping you to avoid running out of petrol on the way.

Nowadays vehicles come with a dash-mounted fuel gauge meter that indicates the fuel levels on an analogue display. The 'reserve' level is indicated by a red marking in some vehicles, but the needle movement through the red marking may be confusing and not precise. This circuit monitors the fuel tank below the reserve level and warns through LED indicators and audible beeps when the danger level is approaching.

The fuel sensor system consists of a tank-mounted float sensor and a current meter (fuel meter), which are connected in series. The float-driven sensor attached to an internal rheostat offers high resistance when the tank is empty. When the tank is full, the resistance decreases, allowing more current to pass through the meter to give a higher reading.

The fuel monitoring circuit works by sensing the voltage variation developed across the meter and activates the beeper when the fuel tank is almost empty. Its point A is connected to the input terminal of the fuel meter and point B is connected to the body of the vehicle.

The circuit consists of an op-amp IC CA3140 (IC1), two 555 timer ICs (IC2 and IC3) and decade counter CD4017 (IC4).

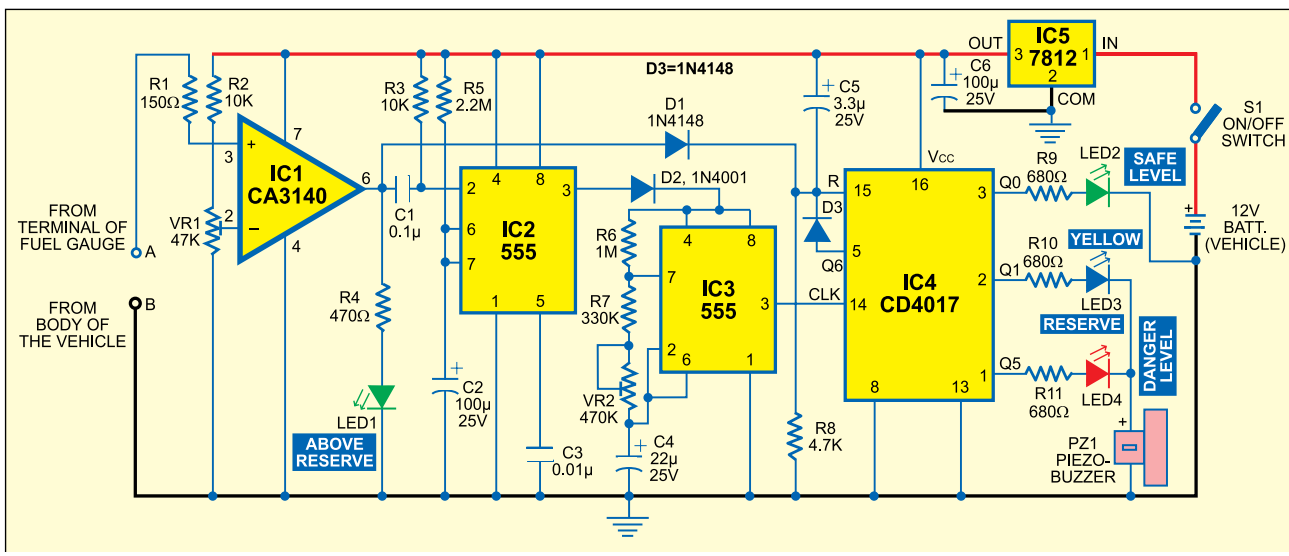
Op-amp IC CA3140 is wired as a voltage comparator. Its inverting input (pin 2) receives a reference voltage controlled through VR1. The non-inverting input (pin 3) receives a variable voltage tapped from the input terminal of the fuel meter through resistor R1.

When the voltage at pin 3 is higher than at pin 2, the output of IC1 goes high and the green LED (LED1) glows. This condition is maintained until the voltage at pin 3 drops below that at pin 2. When this happens, the output of IC1 swings from high to low, sending a low pulse to the trigger pin of the monostable (usually held high by R3) via C1. The monostable triggers and its output goes high for a predetermined time based on the values of R5 and C2. With the given values, the 'on' time will be around four minutes.

The output of IC2 is used to power the astable circuit consisting of timer 555 (IC3) via diode D2. Oscillations of IC3 are controlled by R6, R7, VR2 and C4. With the given values, the 'on' and 'off' time periods are 27 and 18 seconds, respectively. The pulses from IC3 are given to the clock input (pin 14) of decade counter CD4017 (IC4) and its outputs go high one by one.

When the circuit is switched on, LED1 and LED2 glow if your vehicle has sufficient petrol in the tank. When the fuel goes below the reserve level, the output of IC1 goes low, LED1 turns off and a negative triggering pulse is received at pin 2 of IC2. The output of IC2 goes high for around four minutes and during this time period, clock pin 14 of IC4 receives the clock pulse (low to high) from the output of IC3.

For the first clock pulse, Q0 output of IC4 goes high and the green LED (LED2) glows for around 50 seconds. On receiving the second clock pulse, Q1 goes high to light up the yellow LED (LED3) and sound the buzzer for



around 45 seconds. This audio-visual signal warns you that the vehicle is running out of fuel. On receiving the third clock pulse, LED3 and the buzzer go off. There is a gap of around two-and-a-half minutes before Q5 output goes high.

By the time Q5 goes high and the red LED (LED4) glows, four minutes elapse and the power supply to IC3 is cut off. The output state at Q5 will not change unless a low-to-high clock input is received at its pin 14. Thus LED4 will glow continuously along with the beep. The continuous glowing of the red LED (LED4) and the beep from the buzzer indicate that the vehicle will run out of fuel very shortly.

Q6 output of IC4 is connected to its reset pin 15 via diode D3. This means that after 'on' state of Q5, the count will always start from Q0. Capacitor C5 provides power-on reset to IC4 when switch S1 is closed. The output of IC1 is also connected to reset pin of IC4 via diode D1 (1N4148). So when your vehicle is refueled above the reserve level, LED2 glows to indicate that the tank has sufficient fuel.

IC5 provides regulated 12V DC for proper functioning of the circuit even when the battery is charged to more than 12V.

The circuit can be assembled on a perforated board**.** Adjust VR1 until the voltage at pin 2 of IC1 drops to 1.5V. When point A is connected to the fuel meter (fuel gauge) terminal that goes to the fuel sensor, green LEDs (LED1 and LED2) glow to indicate the normal fuel level. VR2 can be varied to set the 'on' time period of IC3 at around 20 seconds.

Enclose the circuit in a small case and mount on the dashboard using adhesive tape. The circuit works only in vehicles with negative grounding of the body. ●