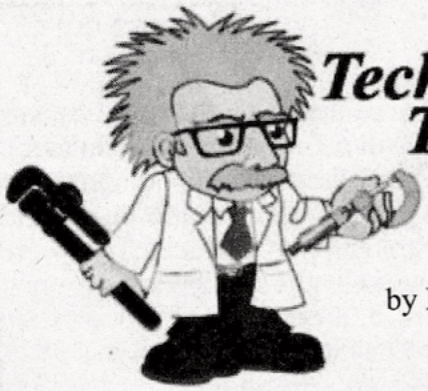


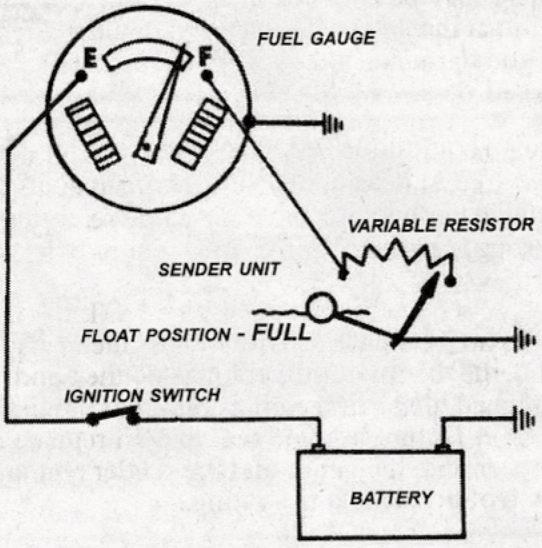
Tech-Tips

by Lee Carroll

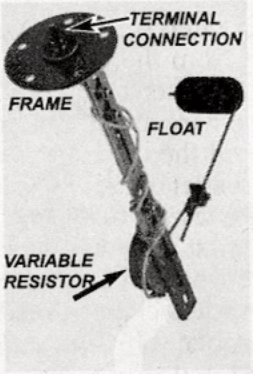
Fuel Gauge Doesn't Work?

The electric fuel gauge is a two part unit. It works on a system of resistance. (This does not include fuel gauges like the King-Seeley. That is not electric and requires a totally different maintenance procedure.) The most evident part of the two-part system is the dash gauge. The part that you can see is the gauge face and the needle. The needle moves from Empty to Full as the gas tank is filled, and from Full to Empty as you drive. Behind the dashboard is the gauge instrument. It works by an electric current passing through coils which create a magnetic field. There are two terminals on the back of the gauge instrument (perhaps a third if the gauge is lighted). One terminal is connected to the ignition – probably through the ammeter. It is activated when the key is turned to the 'On' position. The second terminal is the connection from the sender unit.

The second part of the system is within the gas tank itself. It is the sender unit. Essentially the sender unit is a variable resistor. A movable arm

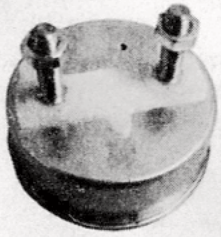


with a float on the end fits inside the tank. As the float rises in the gasoline in the tank, the resistance increases or decreases depending on the type of system used. When the float is in the 'Empty' position, the resistance should read either zero or



the measured resistance of the unit (For example early GM vehicles used a 30 ohms system. See chart which follows). The resistance, measured in ohms, is actually a measurement of the resistance in the ground circuit. The sending unit has a terminal which connects, through a wire, to the second terminal of the dash gauge. The sender unit has to be matched (in ohms potential) to the dash gauge. A 0-30 ohm sender unit will not operate properly with a 0-90 ohm dash gauge.

Check the dash gauge first. Using a multimeter set to 'Volts' (one end of the ground wire of the meter connected to a good known ground) determine which is the 'hot' terminal and which is the sender unit wire. The 'hot' terminal should read very close to battery voltage.



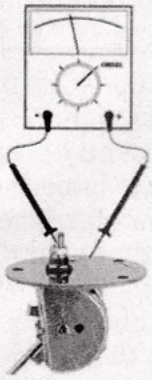
If the fuel gauge always shows FULL there are several possibilities:

1. the wire from the sender unit to the gauge is broken or disconnected
2. the sender unit is not grounded*
3. the resistance coil in the sender unit is broken

To determine the cause of the problem, first use a small jumper wire. Connect one end to a good ground and the other end to the frame or housing of the sender unit.
If the needle moves, it is an indication that the sender unit is not grounded adequately.

Next disconnect the wire from the terminal on the sender unit. Ground the wire to a good known ground. If the gauge now reads EMPTY, the sender unit is not grounded, or the sender unit is defective.

Use a small jumper wire and connect it between the sender unit terminal on the back of the gauge, and connect the other end to a good ground. If the gauge now reads empty, the wire from the sender unit is broken or disconnected.



The next step is to remove the sender unit from the gas tank. Switch the multimeter to 'Ohms' and connect one wire to the sender unit terminal and the other to the frame of the sender unit. As the float arm is lowered, the meter should read the first number on the following chart; when the float arm rises the meter should begin to read the second number. If it doesn't react, the sender unit is bad.

If the fuel gauge always shows EMPTY there are several possibilities:

1. the wire between the dash gauge and the sender unit is shorted to ground.
2. the sending unit is shorted or defective.
3. the float on the sender unit is saturated or may have a hole in it and doesn't rise.

In order to determine the problem, first remove the wire from the terminal of the sender unit. With the wire disconnected, the gauge should read FULL. If it doesn't the sender unit is defective. Next disconnect the wire from the back of the gauge (sender unit terminal). If, with the wire disconnected, the gauge reads full, the wire between the sender unit and gauge is probably shorted to ground.

Finally, remove the sender unit from the tank. Check the float for gas inside the float. If you shake it, you will hear a sloshing sound. Test the float in a tray of water to be sure it floats.

If the gauge does not read accurately, it may mean that the gauge is defective, the float arm is not properly adjusted, the sender unit is shorted, or that the gauge/sender unit has to be calibrated**. Adjusting the gauge itself, or the resistance coil in the sending unit for that matter, is not a job for the novice. Send both units to Williamson's Instrument (see ad page 35). They will test both units and advise you of any problems that they find.

The fuel sender resistance must match that of the gauge. For instance, the resistance of the stock gauge in a 1940 Chevy has a value of '0' ohms when empty and '30' ohms when full. The following list is for stock gauges. Numerous after-market gauges use other resistance criteria.

Ford up to 1986 - 73-10 Ohms
Ford 1987 & up - 16-158 Ohms
GM up to 1964 - 0-30 Ohms
GM 1965-1997 - 0-90 Ohms
GM 1998 & up - 40-250 Ohms
Mopar up to 1986 - 73-10 Ohms
AMC 1950-1977 - 73-10 Ohms

The first number represents the empty Ohm reading and the second number is the full reading.

It is probably needless to say, but whenever you are working with gasoline there are fumes. Those fumes are extremely volatile. Do not smoke or have a flame anywhere near the gas tank when you are working on it, or when you are removing or testing the sender unit. And do not use a 120 volt light for illumination. Each time the light is turned on or off, a spark can occur.

If added illumination is necessary use a portable battery-operated work light or flash light.

* Do not assume that just because the sender unit is screwed into the steel gas tank that there is a good ground. Often the gas tank itself is not fully grounded. At the top there may be a wooden frame, under the straps there may be a leather cushion, and a rubber hose at one of the fuel lines all could prevent a good ground.

You can ground the tank/sender unit by attaching one end of a piece of wire to a good ground on the frame, and the other end should be attached under one of the screws securing the sender unit.

** Gas tank sender units are NOT universal and interchangeable. When factory installed, the resistance (ohms) of the sender unit had to match the ohms rating of the dash gauge. Do not assume that, if you replace a sender unit, the gauge and the sender unit are both of the same ohms rating.

S.K.