

ELECTRONIC ENGINE CONTROLS

By: Ralph Seekins

Question: My car just quit running for no apparent reason. I had gas, the engine would turn over, but it wouldn't fire off. When I had it towed in for repairs, they told me it needed a new electronic control unit. What is an electronic control unit and what does it do?

Answer: Today's engines don't have carburetors, distributors, or points like those made in my younger years. Now they have electronic engine controls that operate the fuel injection system. The electronic control unit (ECU) is the computer that controls things like the fuel injection system, the spark plug firing, the fuel pump, the air conditioning, the exhaust gas recirculating system and more. The ECU is the brains of the system. It collects input from a number of different sensors that measure things like the ambient temperature, barometric pressure, engine coolant temperature, air flow, how much oxygen is in the exhaust gas, the position of the gas pedal, vehicle speed – as many as 14 different sensors in some vehicles. Then, based on the input, the ECU tells the injectors how long to stay open in order to get the right air/fuel mixture and determines when to fire the spark plugs. This microprocessor makes up to a million decisions per second with the objective of getting the best possible fuel economy and the lowest possible emissions based on the operating demand.

Needless to say, if the brain quits, the car stops. The only thing you can do is to get a new ECU. Most often there is no warning when the ECU fails. It just quits. However, modern units make allowances for sensor failures. The little yellow "check engine" light on your car's dashboard comes on whenever the ECU detects that one of the sensors is operating out of its design parameters. That yellow light means – "I have a problem. If it continues, I may need to see the Doctor." Then, in most cases, if something is wrong with a sensor, the ECU will activate a "limp home" system that will plug in a known good value to help you from being stranded on the side of the road.

A problem with operating in our extreme cold weather in Interior Alaska is that some sensors can be a bit sluggish checking in with the ECU when temperatures dip giving you a false alarm – kind of like some of us human beings. If it is lower than 20 below and the "check engine" light comes on, a good idea is to get to operating temperature, shut the engine off and re-start it. If the light comes back on, you may have a problem. But, even then, some ECU's will keep the yellow light lit for 200 or more starts even if nothing is wrong.

It's the red warning light on your dashboard that should scare you. When it comes on, it means "TAKE ME TO THE EMERGENCY ROOM – NOW!" And typically, if the red light comes on, you should get off the road and shut off the engine as soon as safely possible. Prolonged operation may cause massive amounts of damage and could possibly be a threat to passenger safety.

The good thing about electronic engine controls is that vehicles start and run in cold weather much more reliably than in years past. You have less chance of being stranded along the side of the road. You get better fuel economy. You produce fewer emissions. You go farther between tune-ups. Overall engine performance is better. Manufacturers make smaller engines with more horsepower than we thought possible just a few years back. Much of that improvement is a result of the sophisticated

electronic engine controls presently in place. While it is very rare that the ECU fails, you should be glad you have an electronically controlled vehicle.