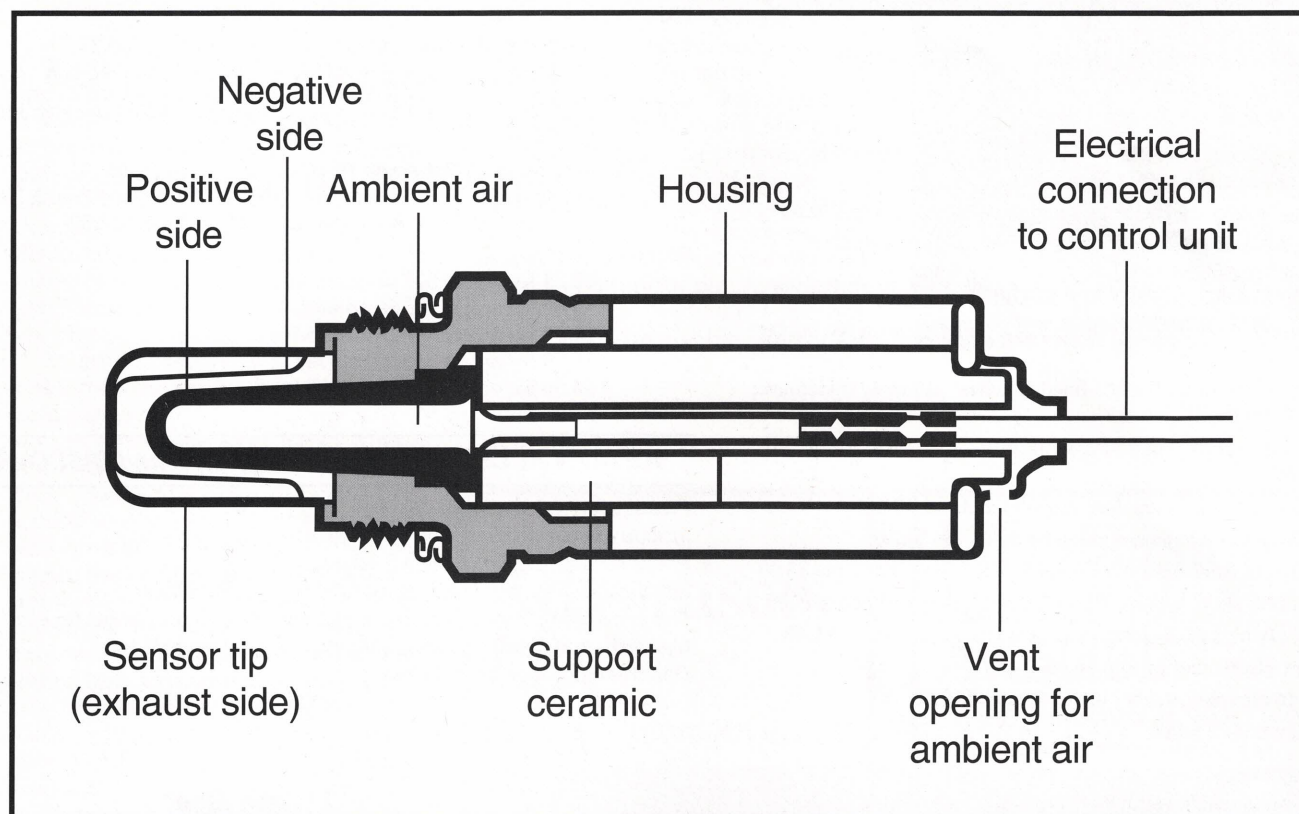


THE LAMBDA SENSOR

BY BRUCE BENSON, CHAPTER 3 COORDINATOR



The term Lambda may sound like the latest dance out of Latin America, but in reality it's the name the Bosch Corporation chose for their ingenious system of managing the air/fuel mix in their family of fuel injection systems. The name comes from a letter in the Greek alphabet and in this case refers to the properly balanced air/fuel mixture technically called the "stoichiometric ratio" — a ratio of 14.1 parts air to 1 part fuel.

The K-Jetronic injection system on the DeLorean began life as a strictly mechanical system. Intake air forces a paddle to move a lever connected to a valve in the fuel distributor which then allows the fuel to move to the injectors and on into the cylinders to be

"...an ingenious system of managing the air/fuel mix ..."

combusted. It worked quite well, but lacked the means to make the constant mixture adjustments needed to conform with the increasingly stringent emission requirements.

The Lambda arrangement was developed and added to the K-Jetronic system and in the simplest terms involves an electronic nervous system which senses the need for specific corrections in the air/fuel ratio. The Lambda system's nerves are located in the Lambda sensor

— also called the oxygen sensor. This is the device resembling a sparkplug which is located in the exhaust pipe between the engine and the catalytic converter. It is essentially a small battery that generates a voltage signal based on the differential between the oxygen content of the exhaust gas and the oxygen content of the ambient air. It reports this information to the brain — the ECU, ENGINE CONTROL UNIT — located in the well behind the driver's seat. The ECU analyzes this signal and converts it into yet another voltage-based signal which it sends to the frequency valve, the muscle behind this operation.

The frequency valve is the small valve clipped to the passenger-side valve cover,

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involves frequency changes in the signal coming from the ECU and results in the proper amount of fuel being mixed with the incoming air.

The Lambda sensor continuously monitors the oxygen differential between the ambient air and the exhaust gas, sends the information to the ECU, which decides the proper adjustment to get the ratio right for the catalytic converter. This is necessary if the converter is to make the right chemical changes in the exhaust gas. The converter's ability to make these changes is related directly to this ratio. The information is then passed on to the frequency valve, which makes the adjustment. If the sensor fails or is unplugged, the ECU is programmed to tell the frequency valve to provide a middle-of-the-road to slightly rich mixture. The car will run fine, but most likely would fail an emission test. Long term driving in a slightly rich mode could raise havoc with the catalytic converter. The wisest course to follow would be to have the system repaired.

The Lambda light on the instrument panel will come on at a pre-prescribed time based on miles driven. This doesn't mean the sensor has failed. It only means the factory felt its life span is near the end

and it is time for servicing. The switch activating the light is located in the service counter which is located at the base of the speedometer cable coming down from the instrument cluster, just above the brake and clutch pedals. This is actually an odometer and is designed to trip the switch at approximately 30,000 miles.

To replace the Lambda sensor — located in the front corner of the driver's side of the engine compartment — you will find the easiest route is from under the car. Once you've located the sensor, follow its wire to the forward part of the wheel well and unplug it. The wire does not unplug at the sensor. Unscrew the sensor as you would a spark plug and when installing the new one, be sure to coat the threads with Never-Seez to prevent the threads from welding themselves together in the hostile exhaust pipe environment. Take care not to get any of the Never-Seez on the probe areas below the threads.

To reset the Lambda light, remove the two Phillips screws holding the service counter in place and look for a 1/4 inch diameter red dot on the side of it. There are two small holes in the dot and using something, such as a tru-arc pliers, turn

the dot clockwise until the counter returns to zero. The light will go out for another 30,000 miles and you are back in business.

Past issues of DeLOREAN WORLD have contained excellent articles about the K-JETRONIC fuel system and when Kay asked for an article about the Lambda sensor, I was hesitant. It's a little like asking for an article about one's thumb. How do you write about it without involving the rest of the hand. I tried not to be too repetitive of past articles, but if you want more on the fuel system, I'll suggest the best book available:

BOSCH FUEL INJECTION and ENGINE MANAGEMENT

by Charles O. Probst SAE

published by Robert Bentley, Inc.

phone: 1-800-423-4595

The price at this writing is \$29.95 and can be ordered using the above phone number. 