



## 1. Check your Oxygen Sensor(s):

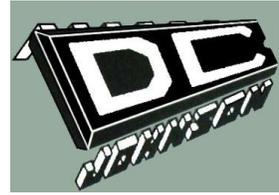
For a closed loop mixture controlled engine, the number one source of poor fuel mileage, poor idle performance, and poor acceleration or power is a bad oxygen sensor.

- a. When an O<sub>2</sub> sensor gets old, the output voltage range drops off which causes the control system to detect a lean condition when the air/fuel mixture may actually be rich. The system then causes the mixture to become even richer. Causing poor mileage, reduced power, and possibly leading to quenching of the spark and further problems such as rough idle and hesitation.
- b. Even a new oxygen sensor can fail. We have witnessed a new O<sub>2</sub> sensor suffer a break in the signal wire. The loose wire became grounded by touching the frame. The resultant “full lean” reading at the controller caused the engine to run full rich.
- c. Similar to item b. above check the signal wire to make sure the insulation is not melted or worn down causing the conductor to contact any other metal. Any grounding of the signal wire will cause a false lean reading.
- d. The O<sub>2</sub> sensor can become contaminated. This condition is similar to a worn out sensor except it can happen quickly. Lead in the fuel, Silicone oil ingested by the engine intake, or other contaminants in the fuel can “Poison” the O<sub>2</sub> sensor.  
CAUTION: This can also destroy the catalytic converter.

There are some inexpensive air/fuel gauges available to read the output of the Oxygen Sensor directly. With one of these gauges it's easy to see if the sensor is functioning within an acceptable range. When the engine is at idle and the sensor is at operating temperature, the display should move up and down from lean to rich once every 0.5 to 2 seconds. It may go all the way from -100mv to 1100mv (-0.1volts to +1.1 volts) or perhaps a bit less. As long as the range is from less than 300mv to greater than 800mv (0.3 volts to 0.8 volts) the sensor is considered good.

NOTE: An oxygen sensor output that does not oscillate from lean to rich does not always indicate a bad sensor. The fuel system may be so far out of adjustment that the control system cannot compensate far enough to bring it under control.

IMPORTANT: If you have an air/fuel gauge, it can be helpful in correcting any bad mixture adjustment or diagnosing fuel delivery system problems such as clogged fuel filter, a bad fuel pump, or a bad fuel pressure regulator. However, be sure to disconnect the O<sub>2</sub> sensor from the controller when making any mixture adjustments. IF the system is in “Closed Loop” mode when you make any mixture adjustments it will try to compensate for your adjustments (sort of like a dog chasing it's tail). MAKE SURE THAT THE DISCONNECTED SIGNAL WIRE IS NOT TOUCHING ANYTHING SO IT IS NOT GROUNDED.



## 2. Checking the Controller (FAC-1):

If your car is equipped with an FAC-1 controller, there are several ways to check it.

- a. Listen for an audible buzz at the Pulse valve (fuel distributor bypass valve). If the Pulse valve (the electrical valve attached to the fuel distributor) makes an audible buzz at idle then it's working. If no buzz is heard, disconnect the Oxygen sensor signal wire. Does the valve buzz with the Oxygen sensor disconnected? If so, this is an indication that the controller is working but the mixture is too far out of range, or the Oxygen sensor is bad.
- b. Using an Oscilloscope, look for a waveform at the Power Resistor or the Orange wire to the Pulse valve. Again, with the Oxygen sensor signal wire disconnected from the controller, a waveform should be present at either of these points. The waveform should exhibit a 50% duty cycle (half of the time high and half of the time low) with the Oxygen sensor signal wire disconnected from the controller. If you do not have an Oscilloscope, an automotive Dwell Meter can also be used.
- c. If no buzz or waveform is detected by following steps a. and/or b. above disconnect the yellow wires from the full throttle switch and air temperature switch then repeat the checks in a. and/or b. If this corrects the problem, one or both of these switches may be at fault. Reconnect them one at a time to isolate the bad switch.

**CAUTION:** Although there are several adjustment potentiometers inside the FAC-1 control unit, these are not field adjustable! The internal adjustments are strictly for bench calibration of new or repaired units. **ANY ATTEMPT TO ADJUST THESE POTENTIOMETERS ON AN INSTALLED UNIT MAY RENDER IT INOPERABLE.** If it is suspected that the internal calibration adjustments have been altered, the unit must be checked and recalibrated on a test bench. Refer to the "Bench Test and Calibration Procedure" document for further information on bench calibration.

For further inquiries, please contact us by email:

[info@dc-johnson.com](mailto:info@dc-johnson.com)