Oxygen Sensor (O2S) control, checking

Notes:

- *Do not use sealants containing silicone to seal the intake area on engines with oxygen sensors. Silicone particles are not consumed during combustion, consequently the unburned particles travel via the exhaust stream to the oxygen sensor where they can eventually coat the sensor probe and interrupt or destroy proper oxygen sensor function. Do not use electrical contact cleaner (or equivalent) in the area of the heated oxygen sensor harness connector because it can lead to corrosion damage of the oxygen sensor.*

- *The heated oxygen sensor compares the oxygen content of the "outside" air with the quantity of oxygen in the exhaust stream and generates a corresponding voltage signal as an input to the Engine Control Module (ECM). The "mixture too rich" voltage signal (low oxygen content) is approx. 0.6 to 0.9 volts. The "mixture too lean" voltage signal (high oxygen content) is about 0.0 to 0.3 volts. During the transition from "rich" to "lean" (or the reverse) the voltage fluctuates between 0.6 to 0.9 volts and 0.0 to 0.3 volts.*

- *Due to the abrupt voltage fluctuation, oxygen sensor output can correspond to the ideal or "stoichiometric" mixture (λ = 1.0), but mixture control is not held constant to this value; instead, the control constantly fluctuates back and forth in a window between the "mixture too lean" and "mixture too rich" conditions. For a warm engine, the control frequency during idle is 0.5 Hz. minimum (30 cycles per minute). With increased engine speed (2500 to 2800 RPM) the control frequency must be at least 1Hz.(60 cycles per minute). One cycle means a voltage swing from the highest value to the lowest value and back again to the highest.*

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If the voltage does not fluctuate, or the sensor responds too slowly (lazy), the following conditions are possible causes:

- *Slits or holes in the oxygen sensor tip are plugged*
- *Sensor was thermally overloaded*
- *Sensor damaged via silicone contamination (various sprays)*
- *Sensor was lead poisoned with fuel containing lead. Check for lead content using a "PLUMBTESMO" test strip*
- *Terminal resistance in the signal wire*
- *Oxygen sensor too cold-oxygen sensor heater does not function and sensor does not reach ideal operating temperature*
- *Oxygen sensor control switched off (fuel injection system malfunctions stored in DTC memory)*
- *Oxygen sensor damaged with electrical contact cleaner (or equivalent). The spray is drawn in through the signal wire via capillary action resulting from pressure differential and temperature fluctuation and ends up coating the sensor element and air passages causing reduced sensitivity or control failure.*