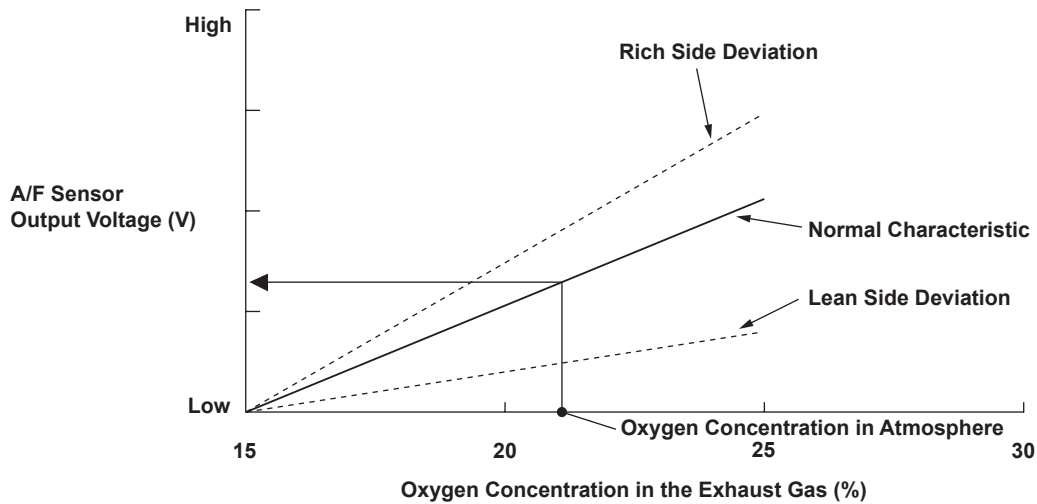


# Advanced Diagnostics

## DTC P1164: Air/Fuel Ratio (A/F) Sensor (Sensor 1) Range/Performance Problem



P1164-9871

### General Description

The air/fuel ratio (A/F) sensor has a linear signal output in relation to the oxygen concentration. The engine control module (ECM) computes the air/fuel ratio from A/F sensor output voltage and uses the fuel feedback control to improve exhaust emissions. The ECM monitors A/F sensor output voltage during deceleration with the throttle fully closed, and it detects a malfunction and stores a DTC if the output voltage deviates greatly from normal oxygen concentration levels.

\* Output to the scan tool exhibits a relationship between the A/F sensor output and oxygen concentration, which is opposite to the characteristic shown in the graph. That is, a deviation toward the rich side increases the output voltage and one toward the lean side decreases the output voltage as the stoichiometric ratio is 0.

### Monitor Execution, Sequence, Duration, DTC Type

Execution	Once per driving cycle
Sequence	None
Duration	2 seconds or more
DTC Type	Two drive cycles, MIL ON

## Enable Conditions

Condition	Minimum	Maximum
Elapsed time after starting the engine	60 seconds	—
Engine coolant temperature	140°F (60°C)	—
Intake air temperature	-14°F (-25°C)	—
Engine speed	—	2,700 rpm
Vehicle speed	30 mph (48 km/h)	—
Fuel feedback	During deceleration	
Monitoring priority	Catalyst System* <sup>1</sup> , EVAP* <sup>1</sup>	
No active DTCs	ECM, A/F Sensor* <sup>2</sup> , A/F Sensor Heater* <sup>2</sup> , CKP, TP* <sup>1</sup> , BARO, VSS, Fuel System, EVAP, A/T System* <sup>1</sup>	
Other	Other than when there is excessive vapor generation (fuel level is 40 - 80%)	

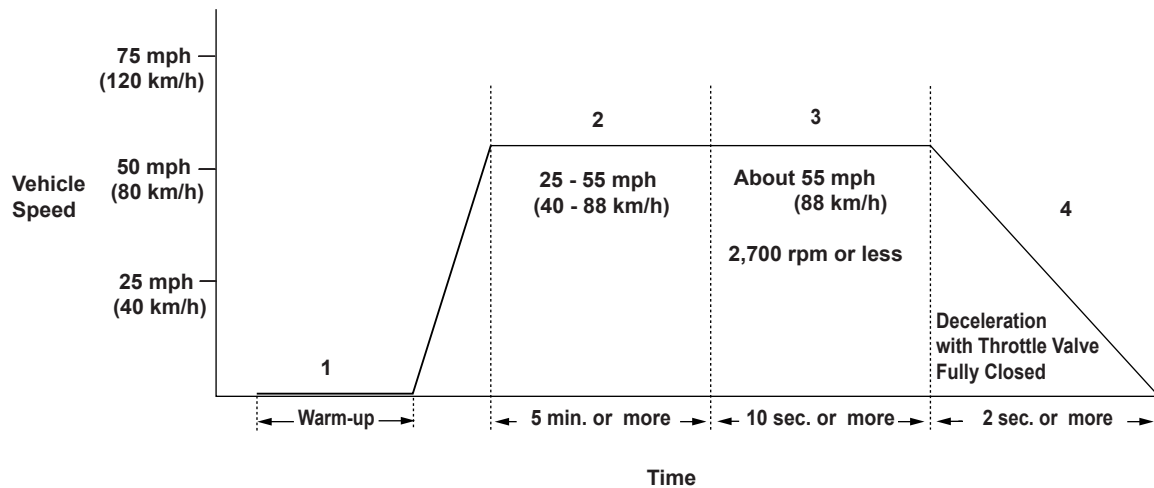
\*1: CVT

\*2: M/T

## Malfunction Threshold

The A/F sensor output voltage is 3.01 V\*<sup>2</sup>, 3.00 V\*<sup>1</sup> or less (rich side), or 4.18 V\*<sup>2</sup>, 4.52 V\*<sup>1</sup> or more (lean side).

## Driving Pattern



P1164-0171

1. Start the engine. Hold the engine at 3,000 rpm with no load (in park or neutral) until the radiator fan comes on.
2. Drive the vehicle at a speed between 25 - 55 mph (40 - 88 km/h) for at least 5 minutes.
3. Drive the vehicle at a speed about 55 mph (88 km/h) with an engine speed of 2,700 rpm or less for at least 5 seconds.
4. Decelerate with the throttle fully closed for at least 2 seconds.

- If the EVAP monitor runs instead of the HO<sub>2</sub>S monitor, turn the engine off, then restart it, and the HO<sub>2</sub>S monitor will restart.
- If you have difficulty duplicating the DTC, retest after turning off electrical components such as the audio system and A/C, and try a different gear position.
- Drive the vehicle in this manner only if the traffic regulations and ambient conditions allow.

## Diagnosis Details

### Conditions for illuminating the MIL

When a malfunction is detected during the first drive cycle, a Temporary DTC is stored in the ECM memory. If the malfunction recurs during the next (second) drive cycle, the MIL comes on and the DTC and the freeze frame data are stored.

### Conditions for clearing the MIL

The MIL will be cleared if the malfunction does not recur during three consecutive trips in which the diagnostic runs.

The MIL, the DTC, the Temporary DTC, and the freeze frame data can be cleared by using the scan tool Clear command or by disconnecting the battery.