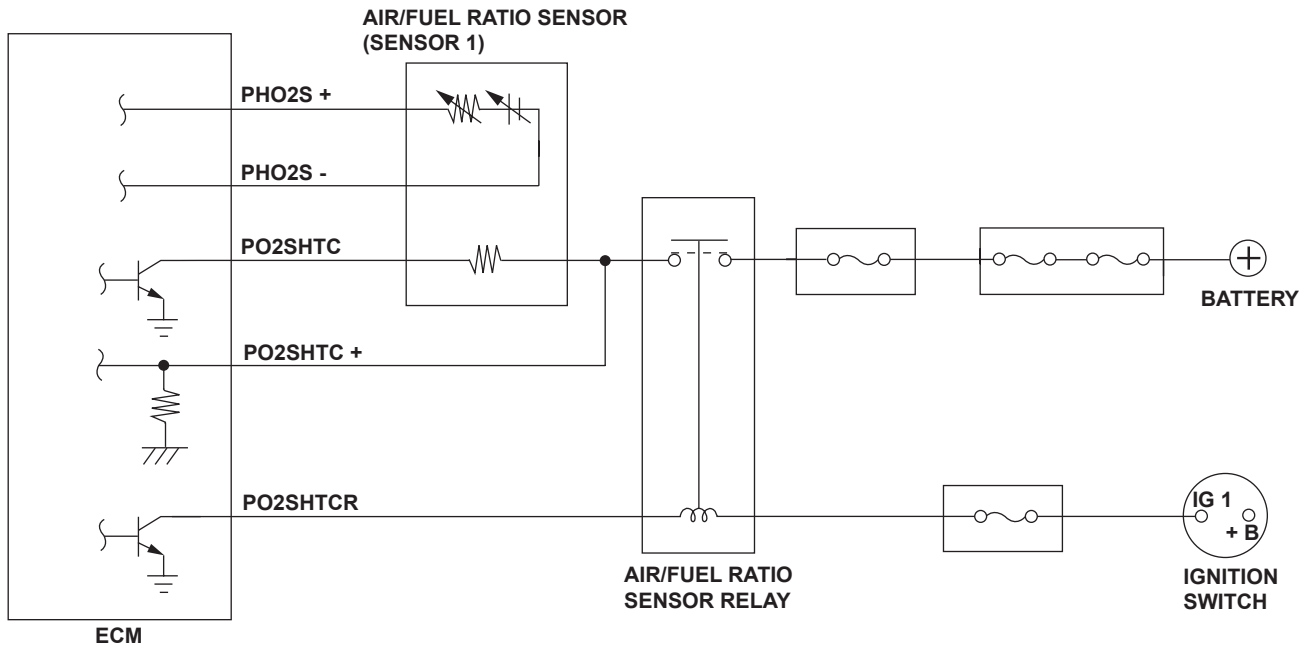# Advanced Diagnostics

DTC P1159: Air/Fuel Ratio (A/F) Sensor (Sensor 1) PHO2S + Circuit Low Voltage

P1149-0101

General Description

The air/fuel ratio (A/F) sensor (Sensor 1) is installed in the exhaust system and detects oxygen content in the exhaust gas. The A/F sensor outputs voltage to the engine control module (ECM). A heater for the sensor element is embedded in the A/F sensor (Sensor 1). When activated, it heats the sensor to stabilize and speed the detection of oxygen content by controlling current flow through the heater. The current diminishes as the voltage applied to the element reaches a certain range because the amount of oxygen that passes through the diffusion layer is limited. The current is proportional to oxygen content in the exhaust gas, so the air/fuel ratio is detected by the measurement of the current. The ECM compares the set target air/fuel ratio with the detected air/fuel ratio and adjusts the fuel injection duration.

If the A/F sensor (Sensor 1) voltage is low, the air/fuel ratio is lean, and the ECM uses A/F feedback control to issue a Rich command. If the A/F sensor (Sensor 1) voltage is high, the air/fuel ratio is rich, and the ECM uses A/F feedback control to issue a Lean command.

If the voltage at the ECM terminal is a set value for a specified time period, a malfunction is detected and a DTC is stored.

Monitor Execution, Sequence, Duration, DTC Type

Execution	Continuous
Sequence	None
Duration	3.9 seconds or more
DTC Type	One drive cycle, MIL ON

Enable Conditions

Condition	Minimum	Maximum
Engine coolant temperature	41ºF (5ºC)	—
Battery voltage	9.5 V	16.0 V
State of the engine	Running	
No active DTCs	A/F Sensor (Sensor 1), A/F Sensor Heater (Sensor 1)	

Malfunction Threshold

The voltage at the AFS+ terminal is 0.4 V or less for at least 3.9 seconds.

Diagnosis Details

Conditions for illuminating the MIL
When a malfunction is detected, the MIL comes on and the DTC and the freeze frame data are stored in the ECM memory.

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