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| DTC | P2237 | Oxygen Sensor Pumping Current Circuit / Open (for A/F sensor) (Bank 1 Sensor 1) |
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CIRCUIT DESCRIPTION

Refer to DTC P2195 on page [DI-185](#).

HINT:

This DTC is related to A/F sensor, although the caption is oxygen sensor.

| DTC No. | DTC Detection Condition | Trouble Area |
|---------|--|--|
| P2237 | A/F sensor circuit (bank 1 sensor 1) | HINT: Main trouble area • Open or short in A/F sensor circuit |
| | Condition (a) and (b) continues for 5.0 sec. or more: (a) AF+ \leq 0.5 V (b) AF+ > 4.5 V | • Open or short in A/F sensor circuit • A/F sensor |
| | Condition (a) and (b) continues for 5.0 sec. or more: (a) AF+ – AF- \leq 0.1 V (b) AF+ – AF- > 0.8 V | • A/F sensor heater • EFI main relay |

HINT:

- After confirming DTC P2195, P2196, P2237, use the hand-held tester or OBD II scan tool to confirm an output voltage of the A/F sensor (AFS B1 S1/O2S B1 S1) from the "DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL".
- The A/F sensor's output voltage and the short-term fuel value can be read using the OBD II scan tool or hand-held tester.
- The ECM controls the voltage of AF+ and AF- terminals of ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBD II scan tool or hand-held tester.
- OBD II scan tool (excluding hand-held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the hand-held tester.

WIRING DIAGRAM

Refer to DTC P0134 on page [DI-50](#).

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following "A/F CONTROL" (A/F sensor, heated oxygen sensor or another can be distinguished).

Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

"A/F CONTROL" is an ACTIVE TEST which change the injection volume to -12.5 % or +25 %.

- (1) Connect the hand-held tester to the DLC3 on the vehicle.
- (2) Turn the ignition switch ON.
- (3) Warm up the engine with the engine speed at 2,500 rpm for approx. 90 sec.
- (4) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST/ A/F CONTROL".
- (5) Perform "A/F CONTROL" when idle condition (press the ← or → button).

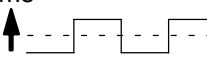
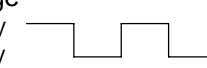
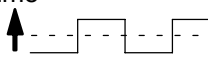
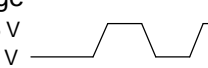
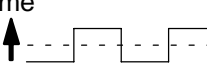

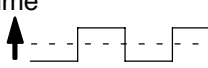
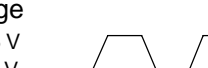


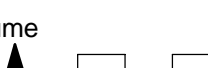

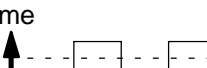

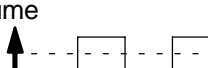

Result:

A/F sensor reacts in synchronizing with increase and decrease of injection volume (+25 % → rich output: Less than 3.0 V, -12.5 % → lean output: More than 3.35 V)

Heated oxygen sensor reacts in synchronizing with increase and decrease of injection volume (+25 % → rich output: More than 0.55 V, -12.5 % → lean output: Less than 0.4 V)

NOTICE:

However, there is a few second delay in the A/F sensor output. And there is about 20 seconds delay in the heated oxygen sensor.

| | Output voltage of A/F sensor (sensor 1) | Output voltage of heated oxygen sensor (sensor 2) | Mainly suspect trouble area |
|--------|---|--|---|
| Case 1 | Injection volume +25 % ↑ -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  OK | Injection volume +25 % ↑ -12.5 %  Output voltage More than 0.55 V Less than 0.4 V  OK | — |
| Case 2 | Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG | Injection volume +25 % ↑ -12.5 %  Output voltage More than 0.55 V Less than 0.4 V  OK | A/F sensor (A/F sensor, heater, A/F sensor circuit) |
| Case 3 | Injection volume +25 % ↑ -12.5 %  Output voltage More than 3.35 V Less than 3.0 V  OK | Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG | Heated oxygen sensor (heated oxygen sensor, heater, heated oxygen sensor circuit) |
| Case 4 | Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG | Injection volume +25 % ↑ -12.5 %  Output voltage No reaction  NG | Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc) |

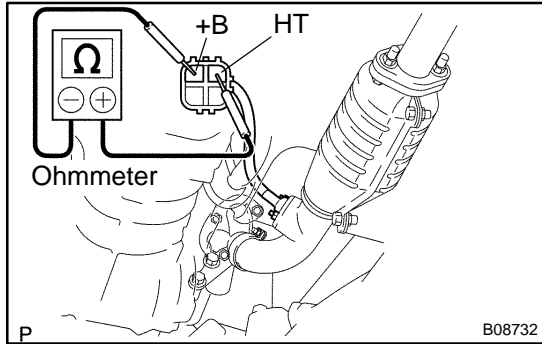
The following procedure of A/F CONTROL enable that to check its output (show its graph indication) of A/F sensor and heated oxygen sensor.

To display the graph indication. Select and push the "YES or NO" button 2 data "AFS B1S1 and O2S B1S2" or "AFS B2S1 and O2S B2S2" and press button "4" after selecting "ACTIVE TEST/ A/F CONTROL/USER DATA".

HINT:

Read frame freeze data using the hand-held tester or the OBD II scan tool, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1 Check resistance of A/F sensor heater.



PREPARATION:

Disconnect the sensor connector.

CHECK:

Using an ohmmeter, measure the resistance between terminals +B and HT.

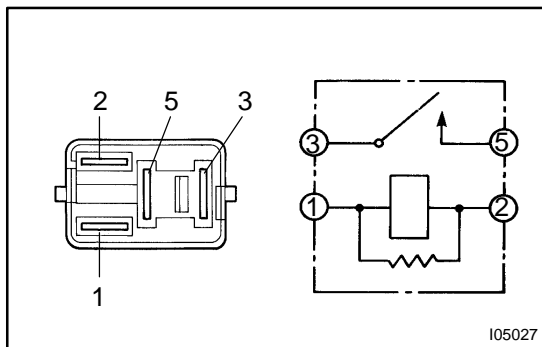
OK:

| | |
|--------------------|-------------|
| at 20°C (68°F) | 0.8 – 1.4 Ω |
| at 800°C (1,472°F) | 1.8 – 3.2 Ω |

NG Replace A/F sensor.

OK

2 Check EFI main relay (Marking: EFI).



PREPARATION:

Remove the EFI main relay from RB No. 2.

CHECK:

Inspect the EFI main relay.

OK:

| Condition | Tester connection | Specified condition |
|-------------------------------------|-------------------|---------------------|
| Constant | 1 – 2 | Continuity |
| | 3 – 5 | No continuity |
| Apply B+ between terminals 1 and 2. | 3 – 5 | Continuity |

NG Replace EFI main relay.

OK

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|----------|---|
| 3 | Check for open and short in harness and connector between ECM and A/F sensor (See page IN-28). |
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|-----------|--|
| NG | Repair or replace harness or connector. |
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|-----------|
| OK |
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|----------------------------|
| Replace A/F sensor. |
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