| DTC | P1130 | A/F Sensor Circuit Range/Performance Malfunction (Bank 1 Sensor 1) |
|---|---|---|

## CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI–52.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P1130 | Output* voltage of A/F sensor remains at 3.8 V or more, or 2.8 V or less, during engine running after engine is warmed up (2 trip detection logic)<br>*: Output value changes at inside of engine ECU only | • Open or short in A/F sensor circuit<br>• A/F sensor<br>• Air induction system<br>• Fuel pressure<br>• Injector<br>• Engine ECU |
| | Output* voltage of A/F sensor does not change from 3.30 V, during engine running after engine is warmed up (2 trip detection logic)<br>*: Output value changes at inside of engine ECU only | |
| | Open or short in A/F sensor circuit (2 trip detection logic) | |

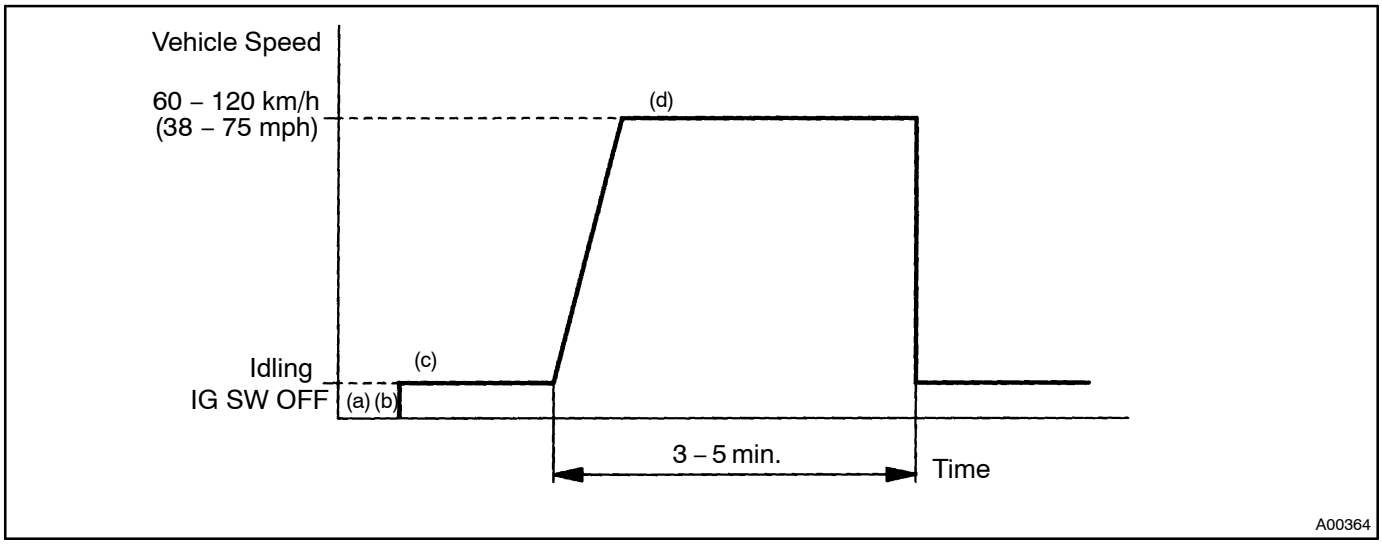
HINT:

- After confirming DTC P1130, use the hand–held tester to confirm output voltage of the A/F sensor (AFS B1 S1/O2S B1 S1) from the CURRENT DATA.
- The A/F sensor's output voltage and the short–term fuel value can be read using the hand–held tester.
- The engine ECU controls the voltage of AFL+ and AFL– terminals of engine ECU to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without the hand–held tester.

## WIRING DIAGRAM

Refer to DTC P0125 on page DI–52.

## CONFIRMATION DRIVING PATTERN




(a) Connect the hand–held tester to the DLC3.
(b) Switch the hand–held tester from the normal mode to the check mode (See page DI–3).
(c) Start the engine and warm it up with all the accessory switches OFF.
(d) Drive the vehicle at 60 – 120 km/h (38 – 75 mph) and the engine speed at 1,600 – 3,200 rpm for 3 – 5 minutes.

HINT:
If a malfunction exists, the engine warning light will light up during step (d).
**NOTICE:**
- **If the conditions in this test are not strictly followed, detection of the malfunction will not be possible.**
- **If you have no hand–held tester, turn the ignition switch OFF after performing steps (c) and (d), and then perform steps (c) and (d) again.**

## INSPECTION PROCEDURE

HINT:
- If DTC P1130 is displayed, check bank 1 sensor 1 circuit.
- Read freeze frame data using the hand–held tester. Because 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 | **Are there any other codes (besides DTC P1130) being output?** |

**YES** → **Go to relevant DTC chart (See page DI–13).**

**NO**

| | |
|---|---|
| 2 | **Connect hand–held tester, and read value for output voltage of A/F sensor.** |

**PREPARATION:**
(a) Connect the hand–held tester to the DLC3.
(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
**CHECK:**
Read the voltage of the A/F sensor on the screen of hand–held tester when performing all the following conditions.
HINT:
The voltage of the AFL+ terminal of the engine ECU is fixed at 3.3 V and the voltage of the AFL– terminal is fixed at 3.0 V. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AFL+/AFL–) of the engine ECU.

**OK:**

| Condition | A/F Sensor Voltage value |
|---|---|
| Engine idling | • Not remains at 3.30 V<br>• Not remains at 3.8 V or more<br>• Not remains at 2.8 V or less |
| Engine racing | |
| Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operating throttle valve open and close. | |

HINT:

- When the fuel is abundant there is a case that the output voltage of the A/F sensor is below 2.8 V. This is considered normal.
- When the fuel is cut, there is a case that the output voltage of the A/F sensor is above 3.8 V. This is considered normal.
- If the output voltage of the A/F sensor remains at 3.30 V even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V or more, or 2.8 V or less even after performing all the above conditions, the A/F sensor circuit may be short.

**OK** → **Go to step 8.**

**NG**

| | |
|---|---|
| 3 | **Check for open and short in harness and connector between engine ECU and A/F sensor (See page IN–19).** |

**NG** → **Repair or replace harness or connector.**

**OK**

| | |
|---|---|
| 4 | **Check resistance of A/F sensor heater (See page FI–2).** |

**NG** → **Replace A/F sensor.**

**OK**

| | |
|---|---|
| 5 | Check air induction system (See page FI–1 of Pub. No. RM584E). |

NG → Repair or replace.

OK

| | |
|---|---|
| 6 | Check fuel pressure (See page FI–1 of Pub. No. RM652E). |

NG → Check and repair fuel pump, fuel pipe line and filter (See page FI–1 of Pub. No. RM652E).

OK

| | |
|---|---|
| 7 | Check injector injection (See page FI–17 of Pub. No. RM584E). |

NG → Replace injector.

OK

Replace A/F sensor.

| | |
|---|---|
| 8 | Perform confirmation driving pattern (See page DI–106). |

Go

| | |
|---|---|
| 9 | **Is there DTC P1130 being output again?** |

**YES** → **Check and replace engine ECU (See page IN–19).**

**NO**

| | |
|---|---|
| 10 | **Did vehicle run out of fuel in past?** |

**NO** → **Check for intermittent problems (See page DI–3).**

**YES**

**DTC P1130 is caused by shortage of fuel.**