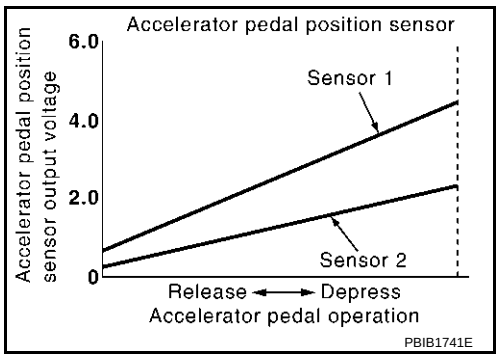
# DTC P2138 APP SENSOR

## Component Description

INFOID:0000000004409026

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.




Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

## CONSULT-III Reference Value in Data Monitor Mode

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Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| ACCEL SEN 1 | • Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.6 - 0.9 V |
| | | Accelerator pedal: Fully depressed | 4.0 - 4.8 V |
| ACCEL SEN 2* | • Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.6 - 0.9 V |
| | | Accelerator pedal: Fully depressed | 3.9 - 4.8 V |
| CLSD THL POS | • Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | ON |
| | | Accelerator pedal: Slightly depressed | OFF |

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

## On Board Diagnosis Logic

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This self-diagnosis has the on e trip detection logic.
NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-1496.

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P2138<br>2138 | Accelerator pedal position sensor circuit range/ performance | Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2. | • Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.)<br>• Accelerator pedal position sensor (APP sensor 1 and 2)<br>• Crankshaft position sensor (POS)<br>• Refrigerant pressure sensor<br>• EVAP control system pressure sensor |

FAIL-SAFE MODE
When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

| Engine operating condition in fail-safe mode |
| --- |
| The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.<br>The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.<br>So, the acceleration will be poor. |

## DTC Confirmation Procedure

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NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-1586, "Diagnosis Procedure".

## Wiring Diagram

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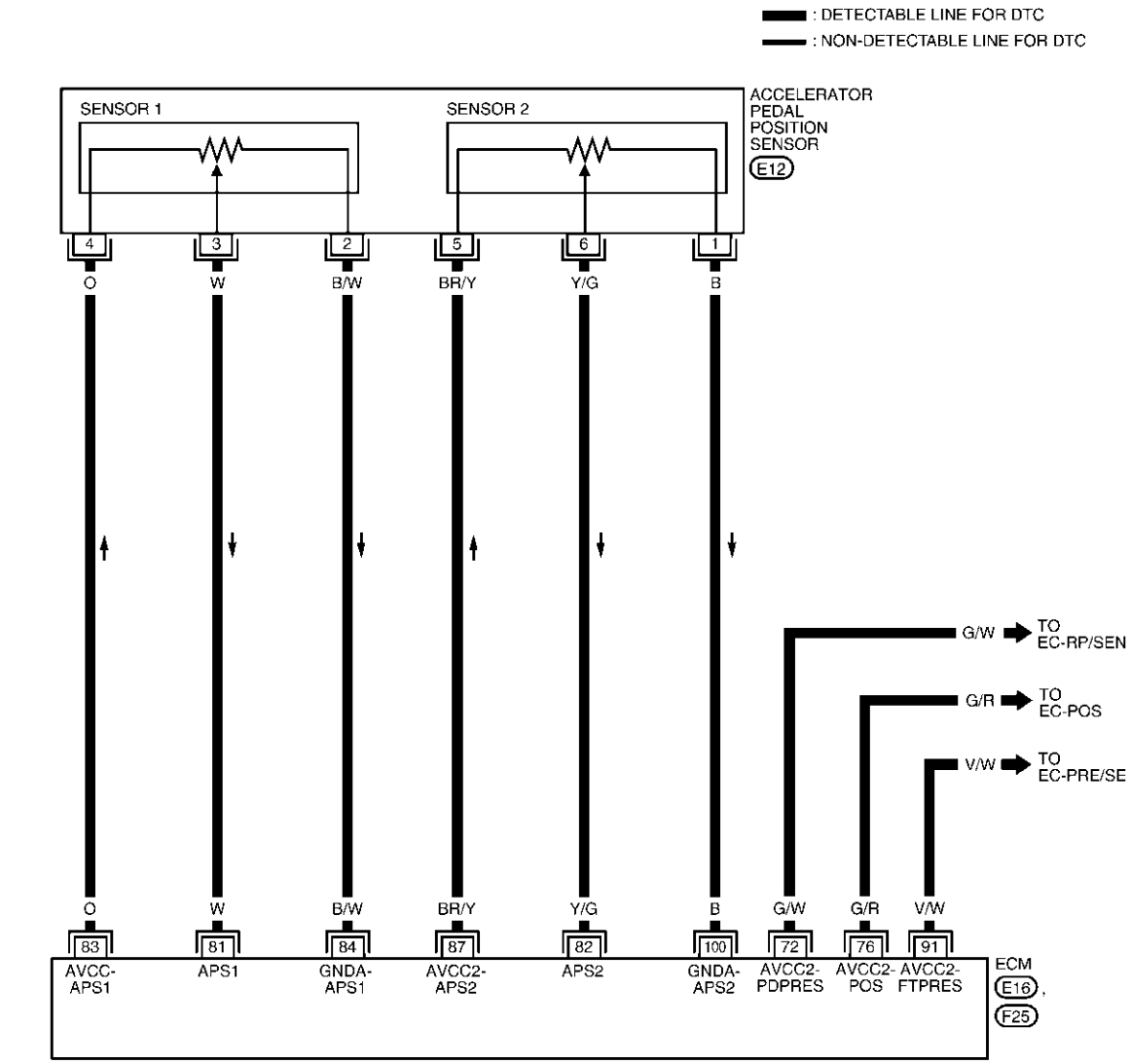
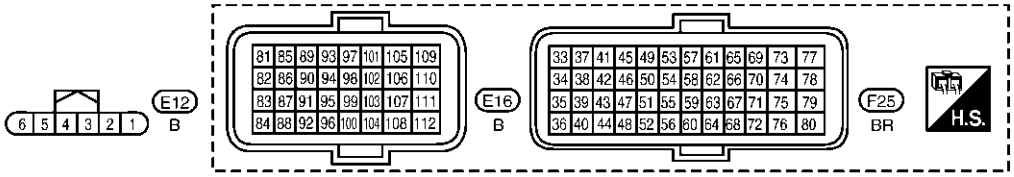
EC-APPS3-01




BBWA3058E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Never use ECM ground terminals wh en measuring input/outp ut voltage. Doing so may result in damage to the ECM's transistor. Use a ground ot her than ECM terminals, such as the ground.

| TER-MI-NAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 72 | G/W | Sensor power supply (Refrigerant pressure sensor) | [Ignition switch: ON] | Approximately 5 V |
| 76 | G/R | Sensor power supply [Crankshaft position sensor (POS)] | [Ignition switch: ON] | Approximately 5 V |
| 81 | W | Accelerator pedal position sensor 1 | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully released | 0.6 - 0.9 V |
| | | | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully depressed | 3.9 - 4.7 V |
| 82 | Y/G | Accelerator pedal position sensor 2 | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully released | 0.3 - 0.6 V |
| | | | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully depressed | 1.95 - 2.4 V |
| 83 | O | Sensor power supply (APP sensor 1) | [Ignition switch: ON] | Approximately 5 V |
| 84 | B/W | Sensor ground (APP sensor 1) | [Engine is running]<br>• Warm-up condition<br>• Idle speed | Approximately 0 V |
| 87 | BR/Y | Sensor power supply (APP sensor 2) | [Ignition switch: ON] | Approximately 5 V |
| 91 | V/W | EVAP control system pressure sensor power supply | [Ignition switch: ON] | Approximately 5 V |
| 100 | B | Sensor ground (APP sensor 2) | [Engine is running]<br>• Warm-up condition<br>• Idle speed | Approximately 0 V |

## Diagnosis Procedure

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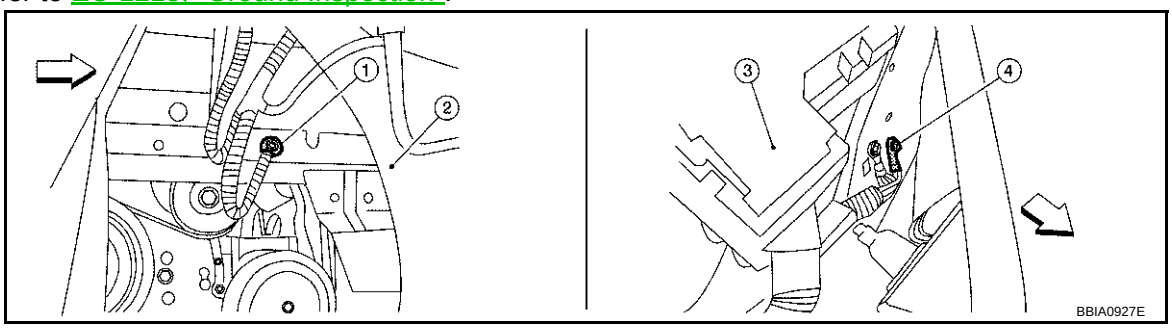
### 1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-1218, "Ground Inspection".




⇦: Vehicle front

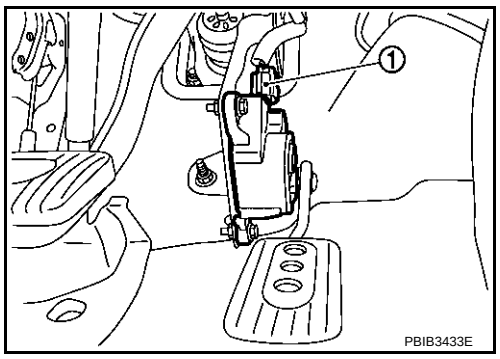
1. Body ground E9 (view with front wheel RH and fender protector RH removed.)
2. Washer tank
3. Fuse and fusible link box
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

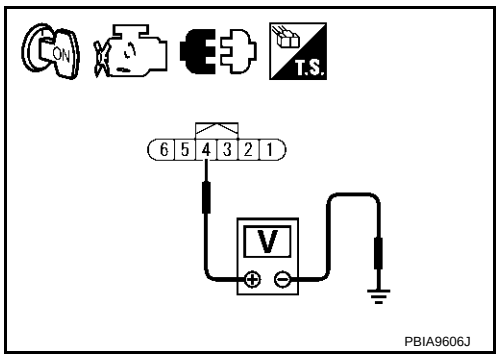
## 2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.




3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V



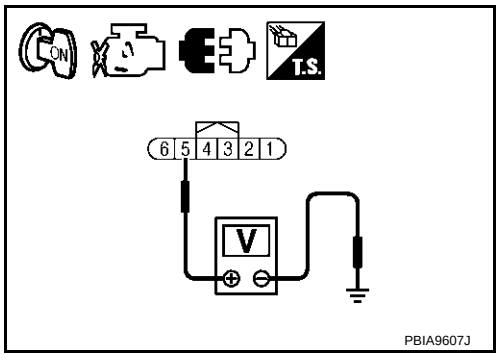

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between APP sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5 V




OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

## 4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 87. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit.

## 5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

| ECM terminal | Sensor terminal | Reference Wiring Diagram |
|---|---|---|
| 72 | Refrigerant pressure sensor terminal 3 | EC-1632, "Wiring Diagram" |
| 76 | Crankshaft position sensor (POS) terminal 1 | EC-1392, "Wiring Diagram" |
| 87 | APP sensor terminal 5 | EC-1573, "Wiring Diagram" |
| 91 | EVAP control system pressure sensor terminal 3 | EC-1450, "Wiring Diagram" |

OK or NG

OK >> GO TO 6.
NG >> Repair short to ground or short to power in harness or connectors.

## 6. CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-1396, "Component Inspection".)
- Refrigerant pressure sensor (Refer to MTC-26.)
- EVAP control system pressure (Refer to EC-1454, "Component Inspection".)

OK or NG

OK >> GO TO 11.
NG >> Replace malfunctioning component.

## 7. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following;
   ECM terminal 84 and APP sensor terminal 2,
   ECM terminal 100 and APP sensor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 8. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
   ECM terminal 81 and APP sensor terminal 3,
   ECM terminal 82 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 9. CHECK APP SENSOR

Refer to EC-1589, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

## 10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-1159, "Accelerator Pedal Released Position Learning".
3. Perform EC-1159, "Throttle Valve Closed Position Learning".
4. Perform EC-1159, "Idle Air Volume Learning".

>> INSPECTION END

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-1212.

>> INSPECTION END

## Component Inspection

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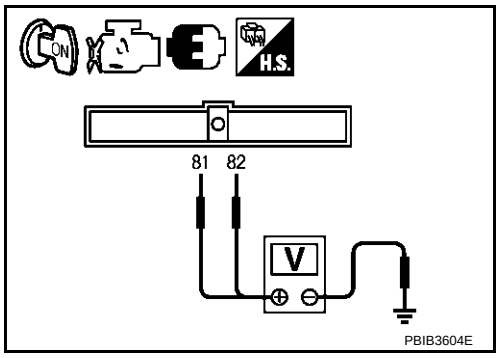
### ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 81 (APP sensor 1 signal), 82 (APP sensor 2 signal) and ground under the following conditions.




| Terminal | Accelerator pedal | Voltage |
|---|---|---|
| 81 (Accelerator pedal position sensor 1) | Fully released | 0.6 - 0.9 V |
| | Fully depressed | 3.9 - 4.7 V |
| 82 (Accelerator pedal position sensor 2) | Fully released | 0.3 - 0.6 V |
| | Fully depressed | 1.95 - 2.4 V |

4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-1159, "Accelerator Pedal Released Position Learning".
6. Perform EC-1159, "Throttle Valve Closed Position Learning".
7. Perform EC-1159, "Idle Air Volume Learning".

## Removal and Installation

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### ACCELERATOR PEDAL

Refer to ACC-3.