DTC	P2121	Throttle / Pedal Position Sensor / Switch "D" Circuit Range / Performance

HINT:
This is the repair procedure for the "accelerator pedal position sensor".

DESCRIPTION

Refer to DTC P2120 (See page ES-258).

DTC No.	DTC Detection Condition	Trouble Area
P2121	Conditions (a) and (b) continue for 0.5 sec.: (a) Difference between VPA and VPA2 deviates from standard (b) IDL is OFF	• Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM

ES

FAIL-SAFE

The accelerator pedal position sensor has 2 (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the 2 sensor circuits and switches to fail-safe mode. In fail-safe mode, the functioning circuit is used to calculate the accelerator pedal opening angle to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a "pass" condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket. The accelerator pedal position sensor has 2 sensor elements / signal outputs: VPA1 and VPA2. VPA1 is used to detect the actual accelerator pedal angle (used for engine control) and VPA2 is used to detect malfunctions in VPA1. When the difference between the voltage outputs of VPA1 and VPA2 deviates from the standard, the ECM concludes that the accelerator pedal position sensor has a malfunction. The ECM turns on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P2121: APP sensor malfunction
Required sensors / components (Main)	APP sensor
Required sensors / components (Related)	-
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	None
Ignition Switch	ON

TYPICAL MALFUNCTION THRESHOLDS

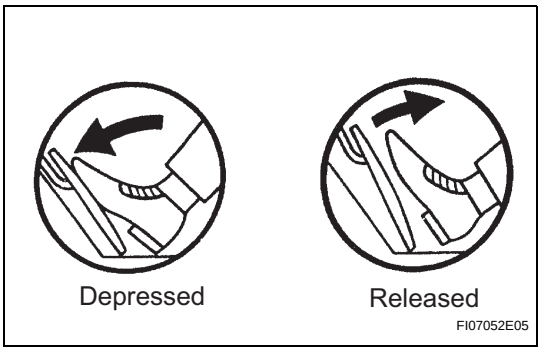
Difference between VPA1 and VPA2 voltages	Less than 0.4 V, or more than 1.2 V

WIRING DIAGRAM

Refer to DTC P2120 (See page ES-262).

HINT:
Read freeze frame data using the intelligent tester or the OBD II scan tool. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 READ VALUE OF INTELLIGENT TESTER (ACCEL POS #1 AND ACCEL POS #2)



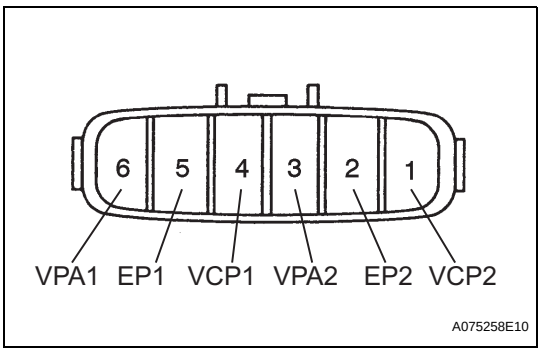
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch ON.
(c) On the intelligent tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ACCEL POS #1 and ACCEL POS #2. Read the values.
Standard voltage

Accelerator Pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK → REPLACE ECM

NG

2 INSPECT ACCELERATOR PEDAL ROD ASSEMBLY (ACCELERATOR PEDAL POSITION SENSOR)



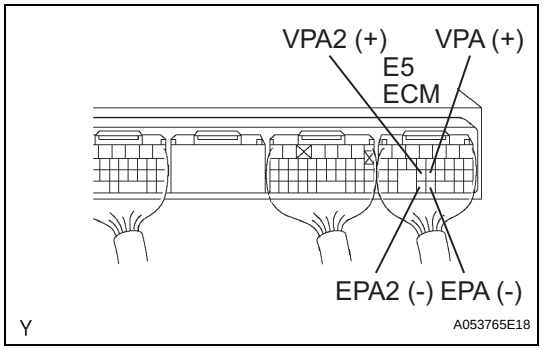
(a) Disconnect the A12 sensor connector.
(b) Measure the resistance of the sensor terminals.
Standard resistance

Tester Connection	Specified Condition
3 (VPA2) - 5 (EPA)	5.0 kΩ or less
6 (VPA1) - 2 (EPA2)	5.0 kΩ or less
4 (VCP1) - 5 (EPA)	2.25 to 4.75 kΩ
1 (VCP2) - 2 (EPA2)	2.25 to 4.75 kΩ

NG → REPLACE ACCELERATOR PEDAL ROD ASSEMBLY

OK

3 INSPECT ECM (VPA, VPA2 VOLTAGE)



(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connector.
Standard voltage

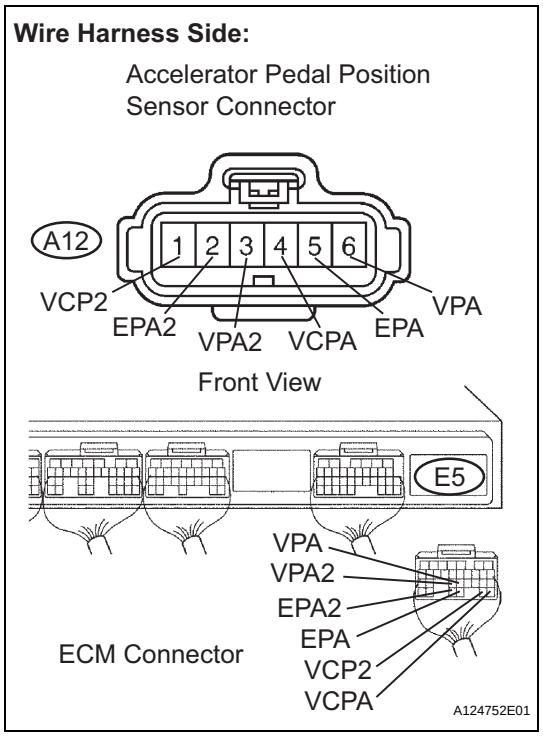
Tester Condition	Accelerator Pedal Condition	Specified Condition
E5-22 (VPA) - E5-28 (EPA)	Released	0.5 to 1.1 V
E5-22 (VPA) - E5-28 (EPA)	Depressed	2.6 to 4.5 V
E5-23 (VPA2) - E5-29 (EPA2)	Released	1.2 to 2.9 V
E5-23 (VPA2) - E5-29 (EPA2)	Depressed	3.4 to 5.5 V

ES

OK → **REPLACE ECM**

NG

4 CHECK HARNESS AND CONNECTOR (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A12 accelerator pedal position sensor connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
A12-6 (VCP1) - E5-26 (VCPA) A12-5 (VPA1) - E5-22 (VPA) A12-4 (VCP2) - E5-27 (VCP2) A12-3 (EP1) - E5-28 (EPA) A12-2 (VPA2) - E5-23 (VPA2) A12-1 (EP2) - E5-29 (EPA2)	Below 1 Ω
A12-6 (VCP1) or E5-26 (VCPA) - Body ground A12-5 (VPA1) or E5-22 (VPA) - Body ground A12-4 (VCP2) or E5-27 (VCP2) - Body ground A12-3 (EP1) or E5-28 (EPA) - Body ground A12-2 (VPA2) or E5-23 (VPA2) - Body ground A12-1 (EP2) or E5-29 (EPA2) - Body ground	10 kΩ or higher

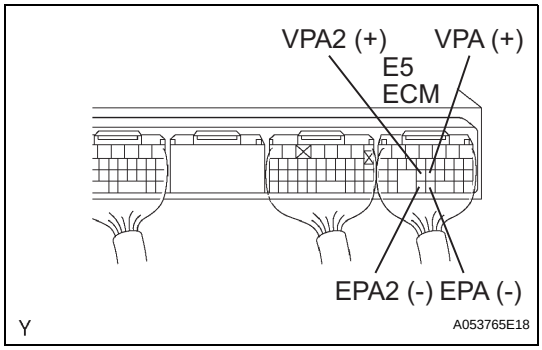
(d) Reconnect the accelerator sensor and ECM connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ACCELERATOR PEDAL ROD ASSEMBLY

1	INSPECT ECM (VPA, VPA2 VOLTAGE)



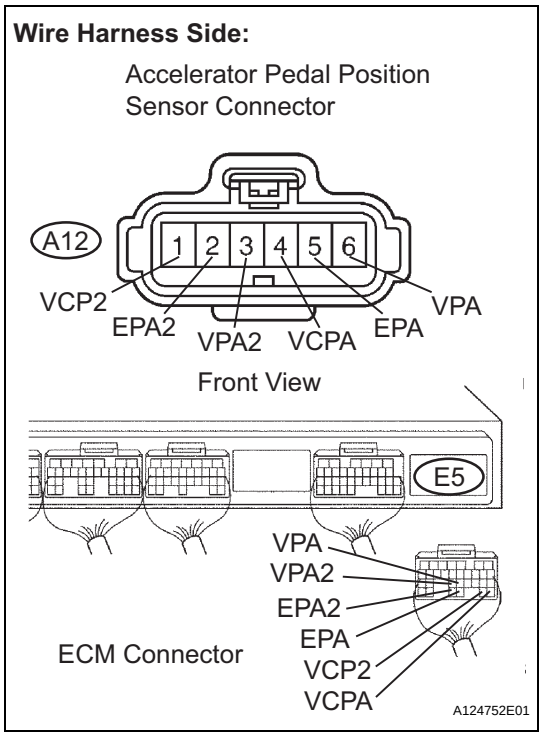
(a) Turn the ignition switch ON.
(b) Measure the voltage of the ECM connector.
Standard voltage

Tester Condition	Accelerator Pedal Condition	Specified Condition
E5-22 (VPA) - E5-28 (EPA)	Released	0.5 to 1.1 V
E5-22 (VPA) - E5-28 (EPA)	Depressed	2.6 to 4.5 V
E5-23 (VPA2) - E5-29 (EPA2)	Released	1.2 to 2.9 V
E5-23 (VPA2) - E5-29 (EPA2)	Depressed	3.4 to 5.5 V

OK → REPLACE ECM

NG

2	CHECK HARNESS AND CONNECTOR (ACCELERATOR PEDAL POSITION SENSOR - ECM)



(a) Disconnect the A12 accelerator pedal position sensor connector.
(b) Disconnect the E5 ECM connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
A12-6 (VCP1) - E5-26 (VCPA) A12-5 (VPA1) - E5-22 (VPA) A12-4 (VCP2) - E5-27 (VCP2) A12-3 (EP1) - E5-28 (EPA) A12-2 (VPA2) - E5-23 (VPA2) A12-1 (EP2) - E5-29 (EPA2)	Below 1 Ω
A12-6 (VCP1) or E5-26 (VCPA) - Body ground A12-5 (VPA1) or E5-22 (VPA) - Body ground A12-4 (VCP2) or E5-27 (VCP2) - Body ground A12-3 (EP1) or E5-28 (EPA) - Body ground A12-2 (VPA2) or E5-23 (VPA2) - Body ground A12-1 (EP2) or E5-29 (EPA2) - Body ground	10 kΩ or higher

(d) Reconnect the accelerator pedal position sensor connector and ECM connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ACCELERATOR PEDAL ROD ASSEMBLY