DIDU4−01

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

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

CIRCUIT DESCRIPTION

Refer to DTC P2120 on page DI−299.

DTC No.	DTC Detecting Condition	Trouble Area
P2121	Conditions (a) and (b) continue for 0.5 seconds: (a) Difference between VPA and VPA2 exceeds the threshold (b) IDL is OFF	• Accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM

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 the accelerator pedal position sensor has a malfunction. The ECM turns on the MIL and a DTC is set.

FAIL SAFE

The accelerator pedal position sensor has two (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 two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening 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 STRATEGY

Related DTCs	P2121	Accelerator position sensor (rationality)
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever this DTC is not present	See page DI−18	
Either of the following conditions is met	Condition 1 or 2	
1. Ignition switch	ON	
2. Throttle control motor power	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Difference between VPA1 voltage (learned value) and VPA2 voltage (learned value)	Less than 0.4 V, or more than 1.2 V

WIRING DIAGRAM

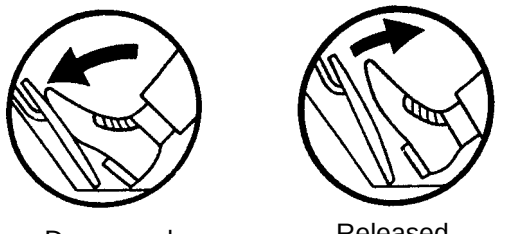
Refer to DTC P2120 on page DI−299.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester. Freeze frame data records the engine conditions when a malfunction is detected. 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, as well as other data from the time when a malfunction occurred.

1	**Connect hand−held tester, and read the voltage for accelerator pedal position sensor data.**



PREPARATION:

(a) Connect the hand−held tester to the DLC3.

(b) Turn the ignition switch to ON and push the hand−held tester main switch ON.

(c) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2.

CHECK:

Read the voltage for the accelerator pedal position sensor data.

OK:

Standard:

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 (See page SF−66).**

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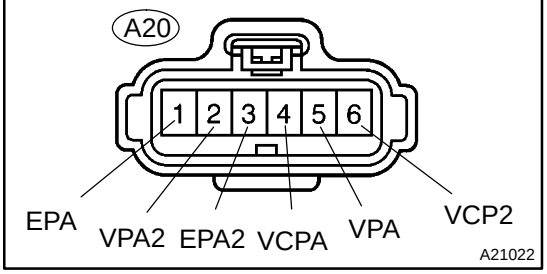
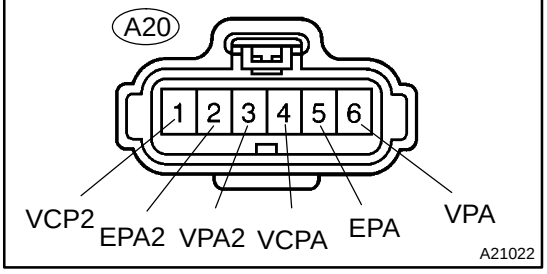
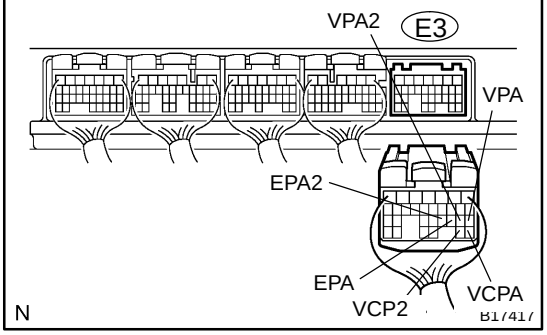
2	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM.**

Wire Harness Side:
Accelerator Pedal Position Sensor (M/T)



Wire Harness Side:
Accelerator Pedal Position Sensor (A/T)





PREPARATION:

(a) Disconnect the A20 accelerator pedal position sensor connector.

(b) Disconnect the E3 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard:

Tester Connection	Specified Condition
VPA (A20−5) − VPA (E3−18)*1	Below 1 Ω
VPA (A20−6) − VPA (E3−18)*2	Below 1 Ω
EPA (A20−1) − EPA (E3−20)*1	Below 1 Ω
EPA (A20−5) − EPA (E3−20)*2	Below 1 Ω
VCPA (A20−4) − VCPA (E3−26)	Below 1 Ω
VPA2 (A20−2) − VPA2 (E3−19)*1	Below 1 Ω
VPA2 (A20−3) − VPA2 (E3−19)*2	Below 1 Ω
EPA2 (A20−3) − EPA2 (E3−21)*1	Below 1 Ω
EPA2 (A20−2) − EPA2 (E3−21)*2	Below 1 Ω
VCP2 (A20−6) − VCP2 (E3−27)*1	Below 1 Ω
VCP2 (A20−1) − VCP2 (E3−27)*2	Below 1 Ω
VPA (A20−5) or VPA (E3−18) − Body ground*1	10 kΩ or higher
VPA (A20−6) or VPA (E3−18) − Body ground*2	10 kΩ or higher
EPA (A20−1) or EPA (E3−20) − Body ground*1	10 kΩ or higher
EPA (A20−5) or EPA (E3−20) − Body ground*2	10 kΩ or higher
VCPA (A20−4) or VCPA (E3−26) − Body ground	10 kΩ or higher
VPA2 (A20−2) or VPA2 (E3−19) − Body ground*1	10 kΩ or higher
VPA2 (A20−3) or VPA2 (E3−19) − Body ground*2	10 kΩ or higher
EPA2 (A20−3) or EPA2 (E3−21) − Body ground*1	10 kΩ or higher
EPA2 (A20−2) or EPA2 (E3−21) − Body ground*2	10 kΩ or higher
VCP2 (A20−6) or VCP2 (E3−27) − Body ground*1	10 kΩ or higher
VCP2 (A20−1) or VCP2 (E3−27) − Body ground*2	10 kΩ or higher

*1: M/T

*2: A/T

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

OK

Replace accelerator pedal pedal assembly.