

DTC	P2120	THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT
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HINT:

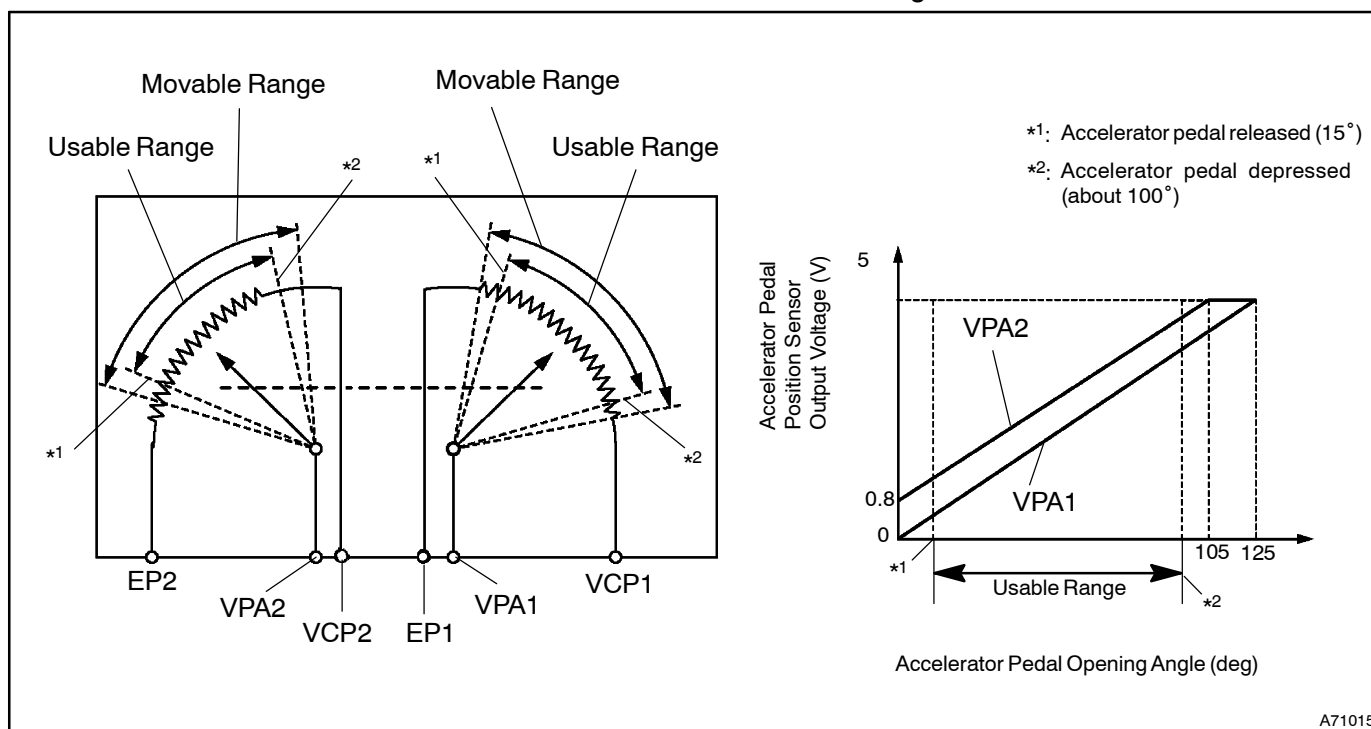
- This is the procedure of troubleshooting the accelerator pedal position sensor.
- This ETCS (Electronic Throttle Control System) does not use a throttle cable.

CIRCUIT DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket and it has the 2 sensors to detect the accelerator position and malfunctions of the accelerator position sensor itself.

In the accelerator pedal position sensor, the voltage applied to pedal terminals VPA1 and VPA2 of the ECM changes between 0 V and 5 V in proportion to the opening angle of the accelerator pedal. The VPA1 is a signal to indicate the actual accelerator pedal opening angle which is used for engine control, and the VPA2 is a signal to indicate the information about the opening angle which is used for detecting a malfunction in the sensor.

The ECM judges the current accelerator pedal opening angle with the signals from pedal terminals VPA1 and VPA2, and the ECM controls the throttle motor based on these signals.



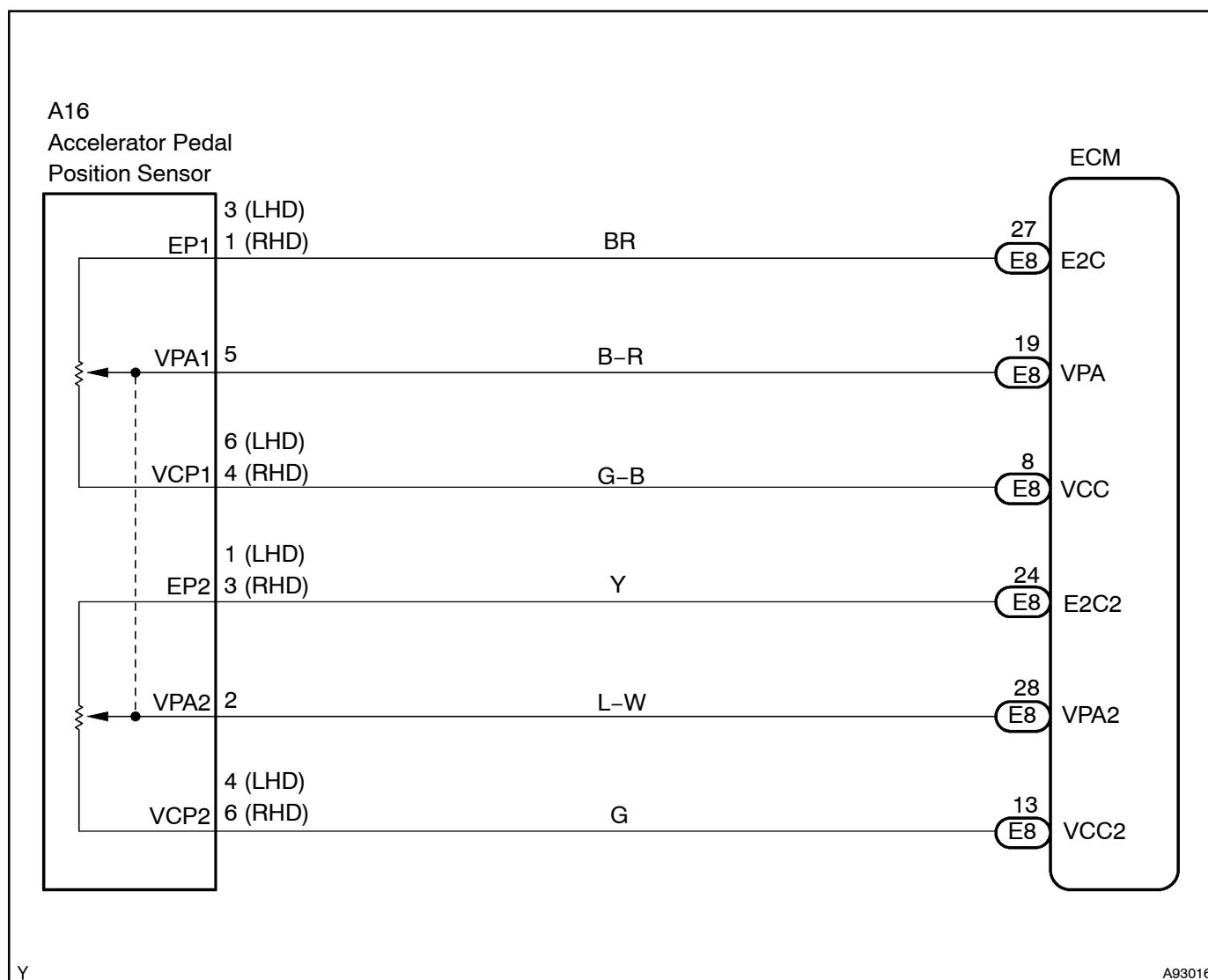
DTC No.	DTC Detection Condition	Trouble Area
P2120	Condition (a), (b), (c) or (d) continues for 2 seconds or more: (1 trip detection logic) (a) VPA1 is greater than 4.8 V (b) VPA2 is greater than 4.8 V, and VPA1 is between 0.2 V and 3.45 V (c) Difference between VPA1 and VPA2 is less than 0.02 V (d) VPA1 is less than 0.2 V, and VPA2 is less than 0.5 V	<ul style="list-style-type: none"> • Open or short in accelerator pedal position sensor circuit • Accelerator pedal position sensor • ECM
	Conditions (a) or (b) continue for 0.5 seconds or more: (1 trip detection logic) (a) VPA1 is less than 0.2 V (b) VPA2 is less than 0.5 V	

HINT:

When DTC P2120 is detected, check the accelerator pedal position sensor output voltage by selecting Powertrain / Engine and ECT / Data List / Accel Position on the intelligent tester II.

Reference:

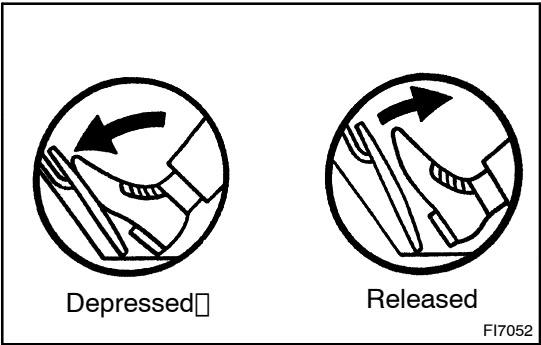
Accelerator pedal opening position expressed as percentage		Trouble area
Accelerator pedal fully closed	Accelerator pedal fully open	
0 %	0 %	<ul style="list-style-type: none"> • Open in VCC circuit • Open or short in VA or VAS circuit
Approximately 100 %	Approximately 100 %	<ul style="list-style-type: none"> • Open in E2C circuit

WIRING DIAGRAM**INSPECTION PROCEDURE****HINT:**

Read freeze frame data using the intelligent tester II. Freeze frame data record the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, and other data from the time the malfunction occurred.

1

READ VALUE OF INTELLIGENT TESTER (ACCEL POSITION)



- (a) Connect the Intelligent Tester to the DLC3.
- (b) Turn the Ignition switch to ON and turn the Intelligent Tester ON.
- (c) Select the following menu items: Powertrain / Engine and ECT / Data List / Accel Position.
- (d) Read the value.

Standard:

Fully depressed	Approx. 75 %
Fully released	Approx. 16 %

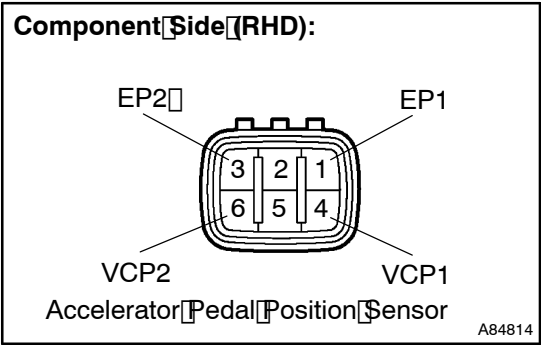
OK

REPLACE ECM (See page 10-30)

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2

INSPECT ACCELERATOR PEDAL ASSY (ACCELERATOR PEDAL POSITION SENSOR)



- (a) Disconnect the A16 accelerator pedal position sensor connector.
- (b) Measure the resistance between each pair of terminals.

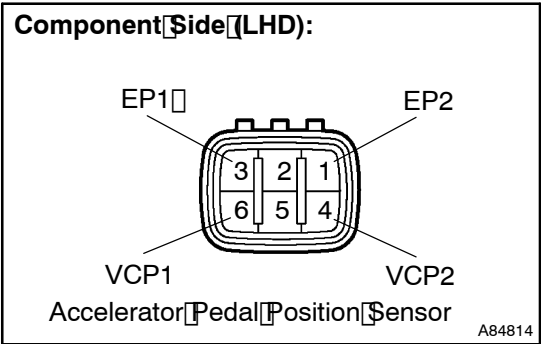
Standard (RHD):

Tester Connection	Specified Condition
EP1 (1) - VCP1 (4)	2.25 to 4.75 kΩ at 20°C (68°F)
EP2 (3) - VCP2 (6)	

Standard (LHD):

Tester Connection	Specified Condition
EP1 (3) - VCP1 (6)	2.25 to 4.75 kΩ at 20°C (68°F)
EP2 (1) - VCP2 (4)	

- (c) Reconnect the accelerator pedal position sensor connector.

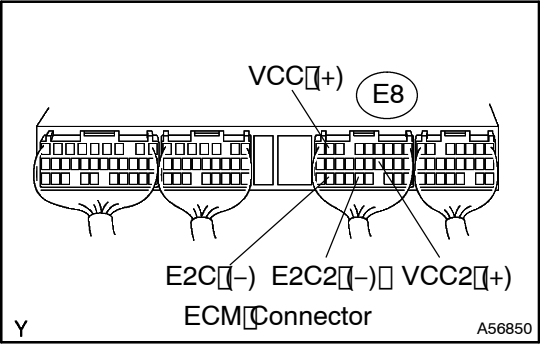


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REPLACE ACCELERATOR PEDAL ASSY

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3 INSPECT ECM (VCC AND VCC2 VOLTAGE)



- (a) Turn the ignition switch to ON.
(b) Measure the voltage between the specified terminals of the E8 ECM connector.

Standard:

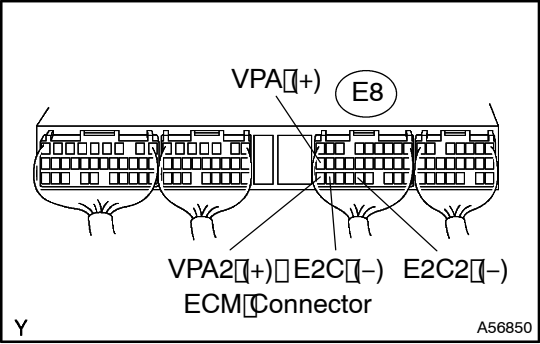
Tester Connection	Specified Condition
VCC (E8-8) - E2C (E8-27)	4.5 to 5.5 V
VCC2 (E8-13) - E2C2 (E8-24)	

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REPLACE ECM (See page 10-30)

OK

4 INSPECT ECM (VPA AND VPA2 VOLTAGE)



- (a) Turn the ignition switch to ON.
(b) Measure the voltage between the specified terminals of the E8 ECM connector.

Standard:

Accelerator Pedal Position	Tester Connection	Specified Condition
Released	VPA (E8-19)	0.5 to 1.1 V
Depressed	- E2C (E8-27)	2.6 to 4.5 V
Released	VPA2 (E8-28)	1.2 to 2.0 V
Depressed	- E2C2 (E8-24)	3.4 to 5.3 V

OK

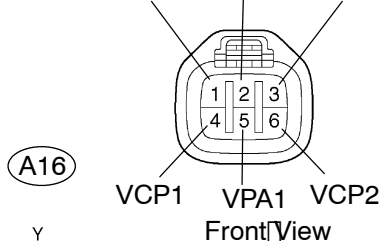
REPLACE ECM (See page 10-30)

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

Wire Harness Side (RHD):

Accelerator Pedal Position Sensor Connector EP1 VPA2 EP2



- Disconnect the A16 accelerator pedal position sensor connector.
- Disconnect the E8 ECM connector.
- Check the resistance.

Standard (Check for open) (RHD):

Tester Connection	Specified Condition
VPA1 (A16-5) - VPA (E8-22)	Below 1 Ω
EP1 (A16-1) - E2C (E8-28)	
VCP1 (A16-4) - VCC (E8-26)	
VPA2 (A16-2) - VPA2 (E8-23)	
EP2 (A16-3) - E2C2 (E8-29)	
VCP2 (A16-6) - VCC2 (E8-27)	

Standard (Check for open) (LHD):

Tester Connection	Specified Condition
VPA1 (A16-5) - VPA (E8-19)	Below 1 Ω
EP1 (A16-3) - E2C (E8-27)	
VCP1 (A16-6) - VCC (E8-8)	
VPA2 (A16-2) - VPA2 (E8-28)	
EP2 (A16-1) - E2C2 (E8-24)	
VCP2 (A16-4) - VCC2 (E8-13)	

Standard (Check for short) (RHD):

Tester Connection	Specified Condition
VPA1 (A16-5) or VPA (E8-19) - Body Ground	10 kΩ or higher
EP1 (A16-1) or E2C (E8-27) - Body Ground	
VCP1 (A16-4) or VCC (E8-8) - Body Ground	
VPA2 (A16-2) or VPA2 (E8-28) - Body Ground	
EP2 (A16-3) or E2C2 (E8-24) - Body Ground	
VCP2 (A16-6) or VCC2 (E8-13) - Body Ground	

Standard (Check for short) (LHD):

Tester Connection	Specified Condition
VPA1 (A16-5) or VPA (E8-19) - Body Ground	10 kΩ or higher
EP1 (A16-3) or E2C (E8-27) - Body Ground	
VCP1 (A16-6) or VCC (E8-8) - Body Ground	
VPA2 (A16-2) or VPA2 (E8-28) - Body Ground	
EP2 (A16-1) or E2C2 (E8-24) - Body Ground	
VCP2 (A16-4) or VCC2 (E8-13) - Body Ground	

- Reconnect the accelerator pedal position sensor connector.
- Reconnect the ECM connector.

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REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM (See page 10-30)