DTC	P2120	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT

DTC	P2122	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT LOW INPUT

DTC	P2123	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT HIGH INPUT

DTC	P2125	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT

DTC	P2127	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT LOW INPUT

DTC	P2128	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT HIGH INPUT

DTC	P2138	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D”/”E” VOLTAGE CORRELATION

CIRCUIT DESCRIPTION

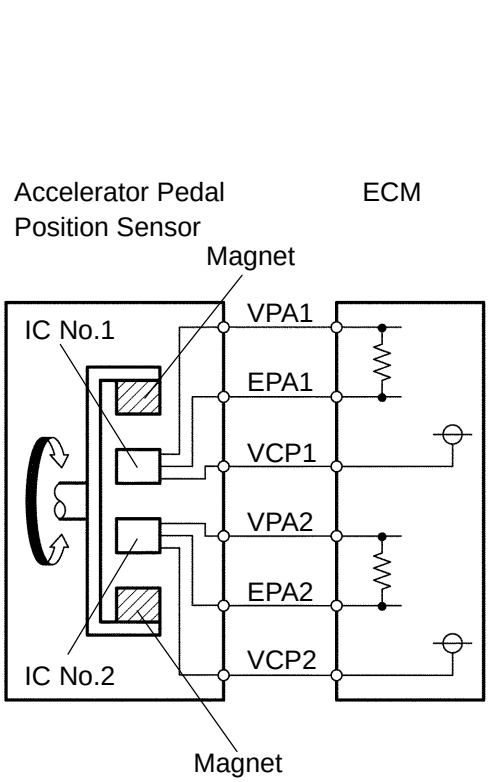
HINT:

- This is repair procedure of ”accelerator pedal position sensor”.
- This electrical throttle system is no used throttle cable.
- This accelerator pedal position sensor is non-contact type.

The accelerator pedal position sensor is mounted in the accelerator pedal to detect the opening angle of the accelerator pedal. Since this sensor is electronically controlled with hall elements, accurate control and reliability can be obtained. It have the 2 sensors to detect the accelerator position and a malfunction of the accelerator position sensor.

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

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



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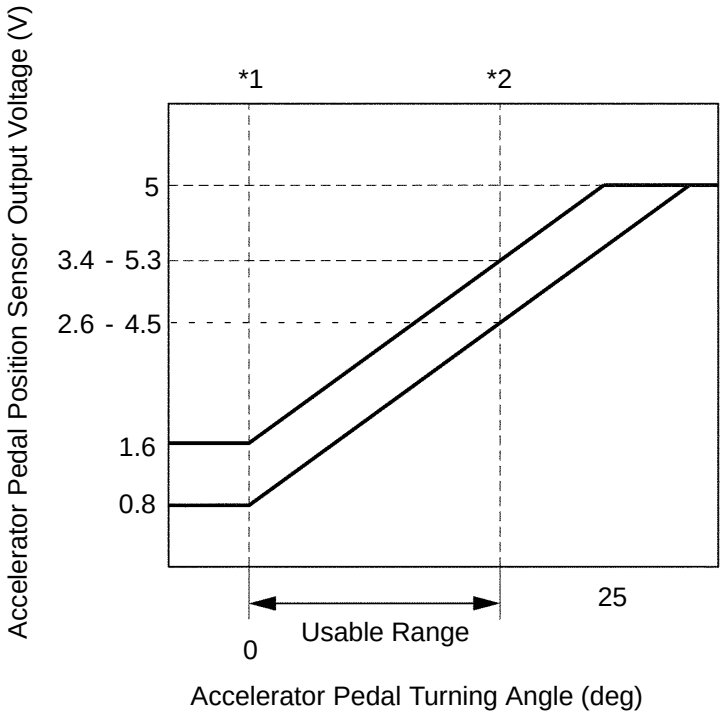

*1: Accelerator Pedal Fully Released

*2: Accelerator Pedal Fully Depressed

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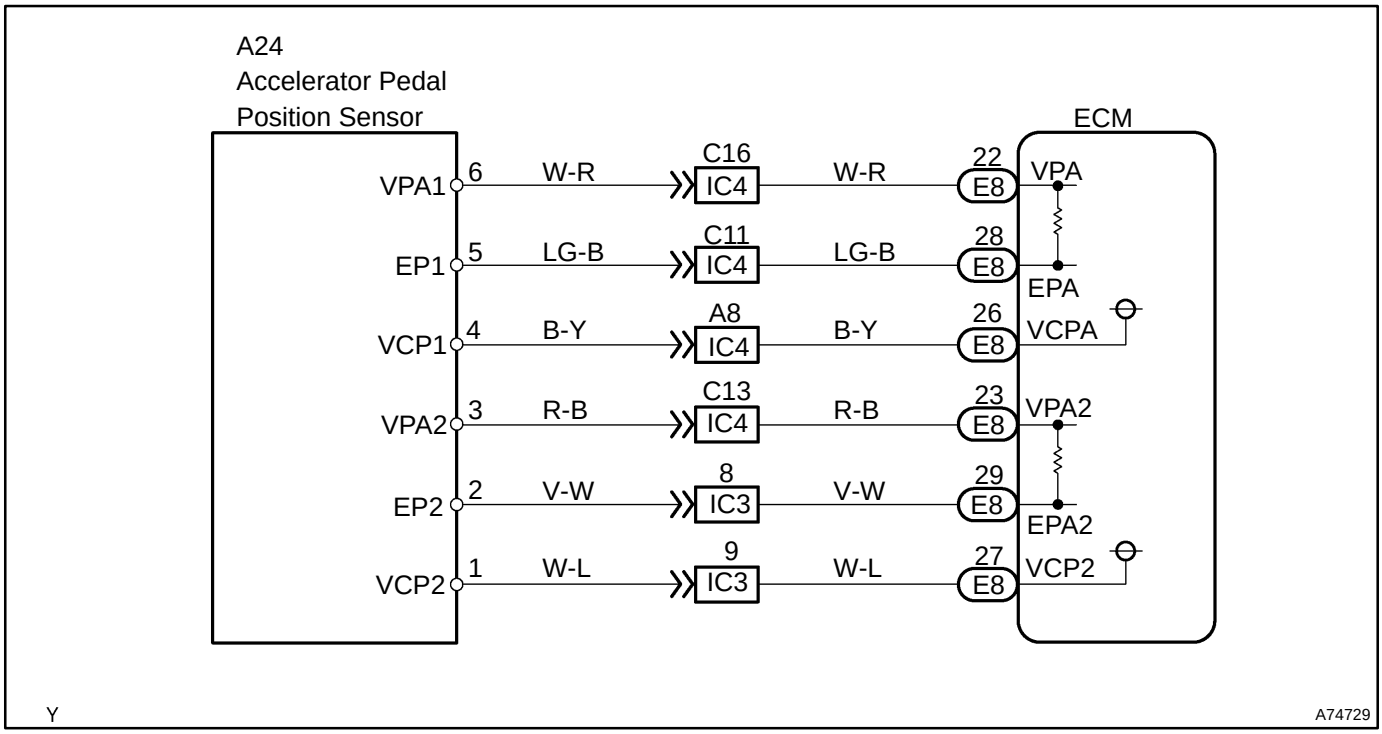
DTC No.	DTC Detection Condition	Trouble Area
P2120	Condition (a) continues for 0.5 sec. or more: (a) VPA1 ≦ 0.2 V and VPA2 ≧ 0.97 deg, or VPA1 ≧ 4.8 V	• Accelerator pedal position sensor • ECM
P2122	Condition (a) and (b) continues for 0.5 sec. or more: (a) VPA1 ≦ 0.2 V (b) VPA2 ≧ 0.97 deg	• Accelerator pedal position sensor • VCP1 circuit open • VPA1 circuit open or ground short • ECM
P2123	Condition (a) continues for 2.0 sec. or more: (a) VPA1 ≧ 4.8 V	• Accelerator pedal position sensor • EPA1 circuit open • ECM
P2125	Condition (a) continues for 0.5 sec. or more: (a) VPA2 ≦ 0.5 V and VPA1 ≧ 0.97 deg, or VPA2 ≧ 4.8 V and 0.2 V ≦ VPA1 ≦ 3.45 V	• Accelerator pedal position sensor • ECM
P2127	Condition (a) and (b) continues for 0.5 sec. or more: (a) VPA2 ≦ 0.5 V (b) VPA1 ≧ 0.97 deg	• Accelerator pedal position sensor • VCP2 circuit open • VPA2 circuit open or ground short • ECM
P2128	Condition (a) and (b) continues for 2.0 sec. or more: (a) VPA2 ≧ 4.8 V (b) 0.2 V ≦ VPA1 ≦ 3.45 V	• Accelerator pedal position sensor • EPA2 circuit open • ECM
P2138	Condition (a) or (b) continues for 2.0 sec. or more: (a) |VPA1 - VPA2| ≦ 0.02 V (b) VPA1 ≦ 0.2 V and VPA2 ≦ 0.5 V	• VPA1 and VPA2 circuit are short circuited • Accelerator pedal position sensor • ECM

HINT:

After confirming DTC ”P2120, P2122, P2123, P2125, P2127, P2128 and P2138”, use the hand-held tester or the OBD II scan tool to confirm the throttle valve opening percentage.

Trouble area	Accelerator pedal position expressed as voltage			
	Accelerator pedal released		Accelerator pedal depressed	
	ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2
VC circuit open	0 - 0.2 V	0 - 0.2 V	0 - 0.2 V	0 - 0.2 V
VPA circuit open or ground short	0 - 0.2 V	1.2 - 2.0 V	0 - 0.2 V	3.4 - 5.3 V
VPA2 circuit open or ground short	0.5 - 1.1 V	0 - 0.2 V	2.6 - 4.5 V	0 - 0.2 V
E2 circuit open	4.5 - 5.5 V	4.5 - 5.5 V	4.5 - 5.5 V	4.5 - 5.5 V

WIRING DIAGRAM



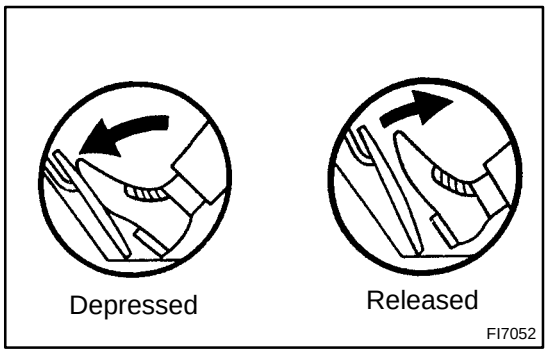
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool, as 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.

Hand-held tester:

1	READ VALUE OF HAND-HELD TESTER(ACCEL POS #1 AND ACCEL POS #2)



(a) Turn the ignition switch ON.

(b) Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST/ETCS/ACCEL POS #1 and ACCEL POS #2” and read its value displayed on the hand-held tester.

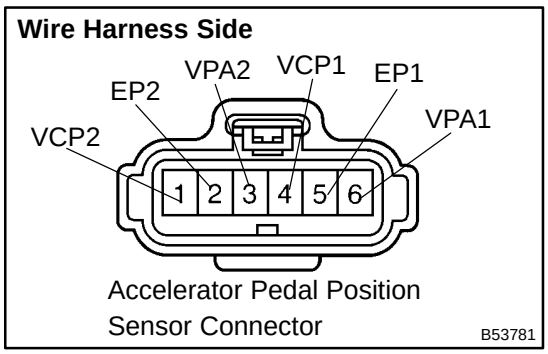
Standard:

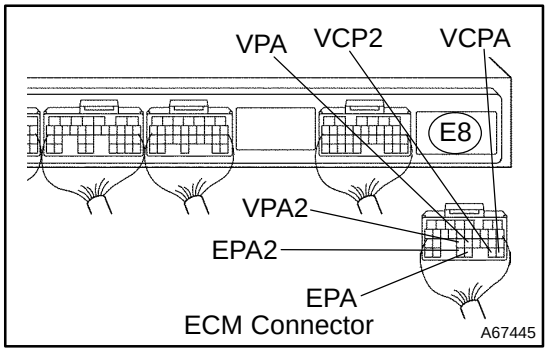
Accelerator pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 - 1.1 V	1.2 - 2.0 V
Depressed	2.6 - 4.5 V	3.4 - 5.3 V

OK	Go to step 5

NG

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





(a) Disconnect the accelerator pedal position sensor connector.
(b) Disconnect the ECM E8 connector.
(c) Check the continuity between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
VPA1 (6) ⇔ VPA (E8-22)	Continuity
EP1 (5) ⇔ EPA (E8-28)	
VCP1 (4) ⇔ VCPA (E8-26)	
VPA2 (3) ⇔ VPA2 (E8-23)	
EP2 (2) ⇔ EPA2 (E8-29)	
VCP2 (1) ⇔ VCP2 (E8-27)	

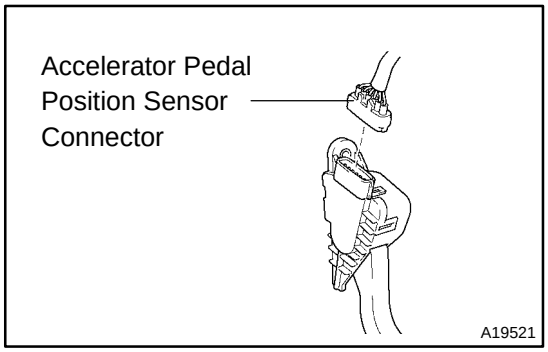
Standard (Check for short):

Symbols (Terminal No.)	Specified condition
VPA1 (6) or VPA (E8-22) ⇔ Body ground	No continuity
EP1 (5) or EPA (E8-28) ⇔ Body ground	
VCP1 (4) or VCPA (E8-26) ⇔ Body ground	
VPA2 (3) or VPA2 (E8-23) ⇔ Body ground	
EP2 (2) or EPA2 (E8-29) ⇔ Body ground	
VCP2 (1) or VCP2 (E8-27) ⇔ Body ground	

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

OK

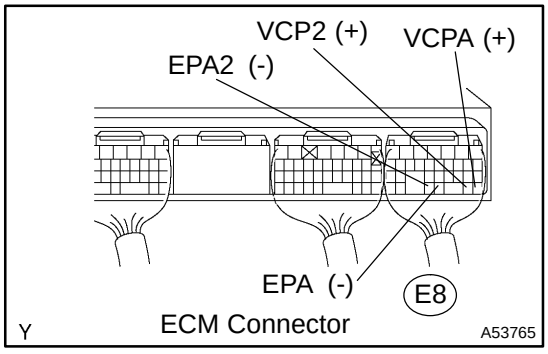
3 INSPECT ECM(VCPA AND VCP2 VOLTAGE)



(a) Disconnect the accelerator pedal position sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the terminals of the E8 ECM connector.

Standard:

Symbols (Terminal No.)	Specified condition
VCPA (E8-26) ⇔ EPA (E8-28)	4.5 - 5.5 V
VCP2 (E8-27) ⇔ EPA2 (E8-29)	



NG → **CHECK AND REPLACE ECM (See page 01-35)**

OK

4	REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-8)

GO

5	READ OUTPUT DTC(ACCELERATOR PEDAL POSITION SENSOR DTCS ARE OUTPUT AGAIN)

(a) Clear the DTC (See page 05-5).
(b) Start the engine.
(c) Drive the engine at idle for 15 sec. or more.
(d) Read the DTC (See page 05-5).

Result:

Display (DTC output)	Proceed to
”P2120, P2122, P2123, P2125, P2127, P2128 and/or P2138” are output again	A
No DTC output	B

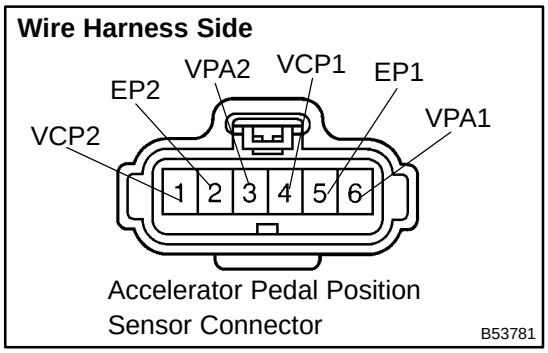
B → **SYSTEM OK**

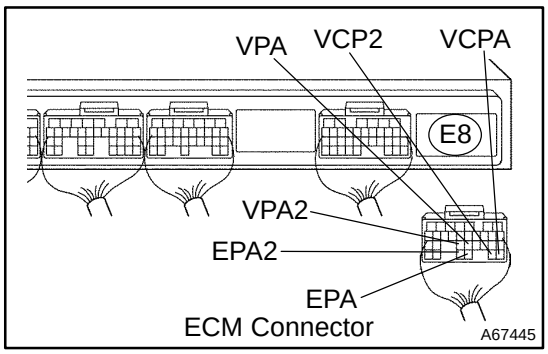
A

CHECK AND REPLACE ECM (See page 01-35)

OBD II scan tool (excluding hand-held tester):

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





(a) Disconnect the accelerator pedal position sensor connector.

(b) Disconnect the ECM E8 connector.

(c) Check the continuity between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	Specified condition
VPA1 (6) ⇔ VPA (E8-22)	Continuity
EP1 (5) ⇔ EPA (E8-28)	
VCP1 (4) ⇔ VCPA (E8-26)	
VPA2 (3) ⇔ VPA2 (E8-23)	
EP2 (2) ⇔ EPA2 (E8-29)	
VCP2 (1) ⇔ VCP2 (E8-27)	

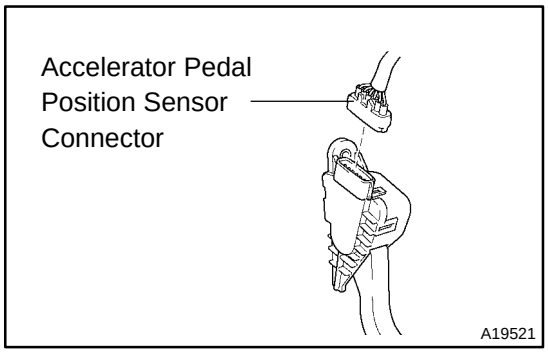
Standard (Check for short):

Symbols (Terminal No.)	Specified condition
VPA1 (6) or VPA (E8-22) ⇔ Body ground	No continuity
EP1 (5) or EPA (E8-28) ⇔ Body ground	
VCP1 (4) or VCPA (E8-26) ⇔ Body ground	
VPA2 (3) or VPA2 (E8-23) ⇔ Body ground	
EP2 (2) or EPA2 (E8-29) ⇔ Body ground	
VCP2 (1) or VCP2 (E8-27) ⇔ Body ground	

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

OK

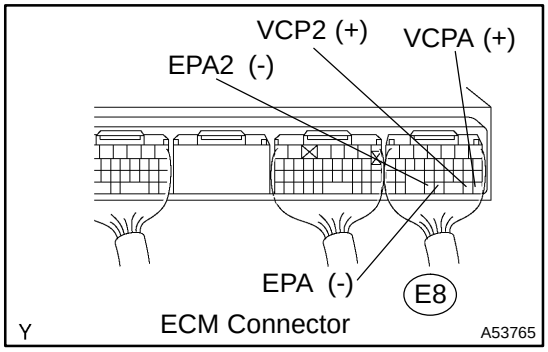
2 INSPECT ECM(VCPA AND VCP2 VOLTAGE)



(a) Disconnect the accelerator pedal position sensor connector.
(b) Turn the ignition switch ON.
(c) Measure the voltage between the terminals of the E8 ECM connector.

Standard:

Symbols (Terminal No.)	Specified condition
VCPA (E8-26) ⇔ EPA (E8-28)	4.5 - 5.5 V
VCP2 (E8-27) ⇔ EPA2 (E8-29)	



NG → **CHECK AND REPLACE ECM (See page 01-35)**

OK

3 REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10-8)

GO

4 READ OUTPUT DTC(ACCELERATOR PEDAL POSITION SENSOR DTCS ARE OUTPUT AGAIN)

(a) Clear the DTC (See page 05-5).
(b) Start the engine.
(c) Drive the engine at idle for 15 sec. or more.
(d) Read the DTC (See page 05-5).

Result:

Display (DTC output)	Proceed to
”P2120, P2122, P2123, P2125, P2127, P2128 and/or P2138” are output again	A
No DTC output	B

B → **SYSTEM OK**

A

CHECK AND REPLACE ECM (See page 01-35)