DTC	P2120/19	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT

DTC	P2122/19	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT LOW INPUT

DTC	P2123/19	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D” CIRCUIT HIGH INPUT

DTC	P2125/19	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT

DTC	P2127/19	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT LOW INPUT

DTC	P2128/19	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”E” CIRCUIT HIGH INPUT

DTC	P2138/19	THROTTLE/PEDAL POSITION SENSOR/SWITCH ”D”/”E” VOLTAGE CORRELATION

HINT:
These DTCs relate to the accelerator pedal position sensor.

CIRCUIT DESCRIPTION

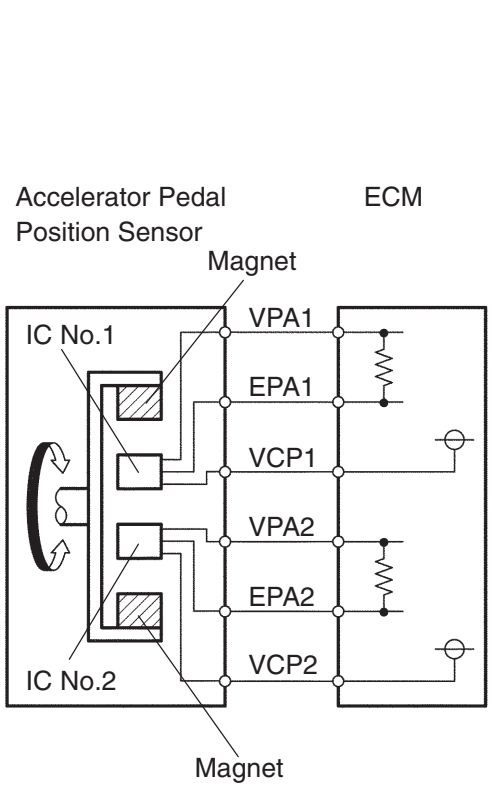
HINT:

- This electrical throttle system is no used throttle cable.
- This accelerator pedal position sensor is non–contact type.

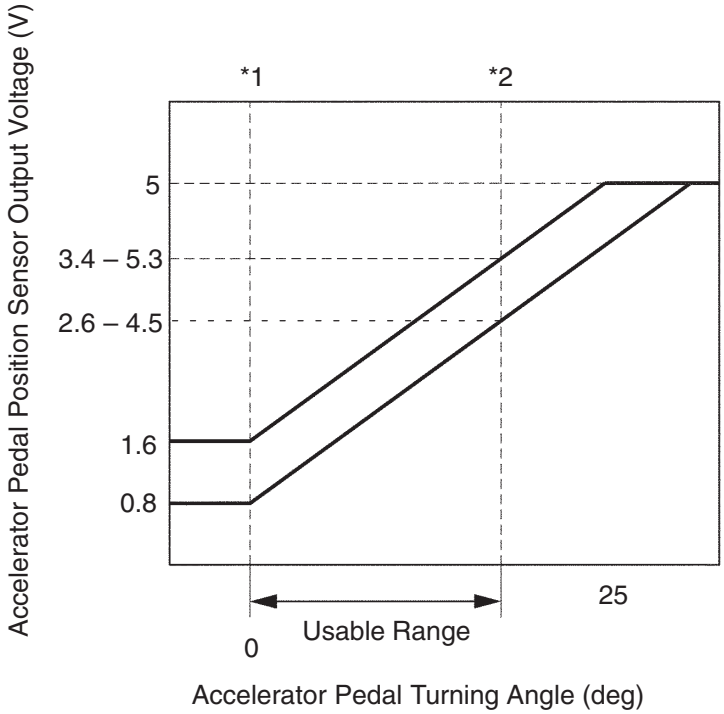
The accelerator pedal position sensor is mounted on the accelerator pedal to detect the opening angle of the accelerator pedal. Since this sensor is electronically controlled with hall elements, accurate control and reliability can be obtained. It have the 2 sensors to detect the accelerator position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



A19694



*1: Accelerator Pedal Fully Released

*2: Accelerator Pedal Fully Depressed

A19803

DTC No.	DTC Detection Condition	Trouble Area
P2120/19	VPA1 quickly fluctuates up and down beyond upper and lower malfunction thresholds for 0.5 seconds or more	• Accelerator pedal position sensor • ECM
P2122/19	Condition (a) continues for 0.5 seconds or more when accelerator pedal is fully released: (a) VPA1 is 0.2 V or less	• Accelerator pedal position sensor • Open in VCP1 circuit • Open or ground short in VPA1 circuit • ECM
P2123/19	Condition (a) continues for 2.0 seconds or more: (a) VPA1 is 4.8 V or more	• Accelerator pedal position sensor • Open in EPA circuit • ECM
P2125/19	VPA2 quickly fluctuates up and down beyond upper and lower malfunction thresholds for 0.5 seconds or more	• Accelerator pedal position sensor • ECM
P2127/19	Condition (a) continues for 0.5 seconds or more when accelerator pedal is fully released: (a) VPA2 is 0.5 V or less	• Accelerator pedal position sensor • Open in VCP2 circuit • Open or ground short in VPA2 circuit • ECM
P2128/19	Conditions (a) and (b) continue for 2.0 seconds or more: (a) VPA2 is 4.8 V or more (b) VPA1 is 0.2 V or more and VPA1 is 3.45 V or less	• Accelerator pedal position sensor • Open in EPA2 circuit • ECM
P2138/19	Condition (a) or (b) continues for 2.0 seconds or more: (a) Difference between VPA1 and VPA2 is 0.02 V or less (b) VPA1 is 0.2 V or less and VPA2 is 0.5 V or less	• VPA1 and VPA2 circuits are short–circuited • Accelerator pedal position sensor • ECM

HINT:

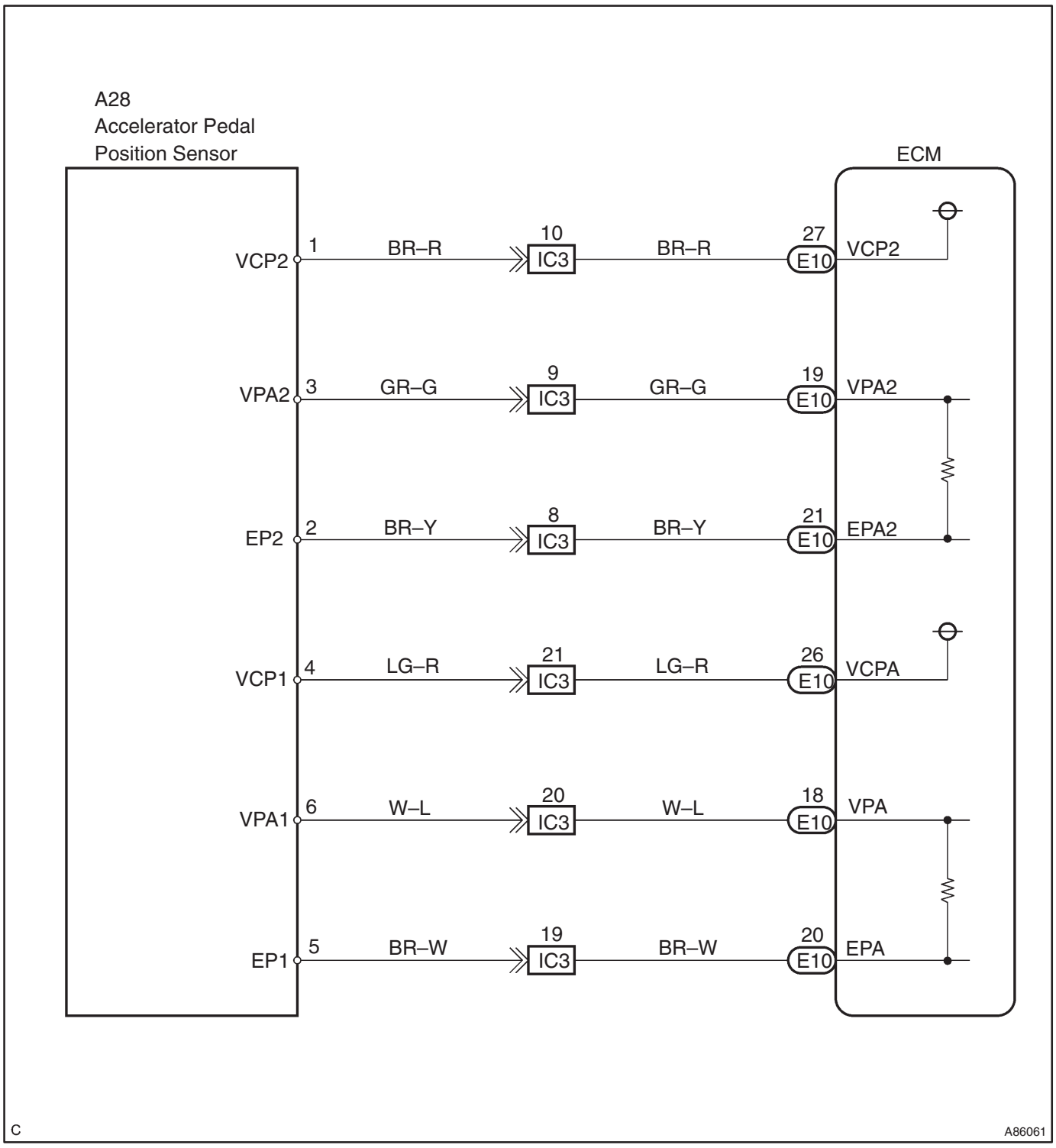
When DTC P2120, P2122, P2123, P2125, P2127, P2128 and/or P2138 is detected, check the output voltage of the accelerator pedal position sensor by selecting Powertrain / Engine and ECT / Data List / Accelerator POS No.1 and Accelerator POS No.2 on the intelligent tester II.

Reference:

Trouble Area	Accelerator Pedal Position (Voltage Output)			
	Accelerator Pedal Released		Accelerator Pedal Depressed	
	Accelerator POS No.1	Accelerator POS No.2	Accelerator POS No.1	Accelerator POS No.2
Normal condition	0.5 to 1.1 V	1.2 to 2.0 V	2.6 to 4.5 V	3.4 to 5.0 V
VCP circuit open	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V
Open or ground short in VPA1 circuit	0 to 0.2 V	1.2 to 2.0 V	0 to 0.2 V	3.4 to 5.0 V
Open or ground short in VPA2 circuit	0.5 to 1.1 V	0 to 0.2 V	2.6 to 4.5 V	0 to 0.2 V
EPA circuit open	4.5 to 5.0 V	4.5 to 5.0 V	4.5 to 5.0 V	4.5 to 5.0 V

Accelerator pedal position is expressed as voltages.

WIRING DIAGRAM

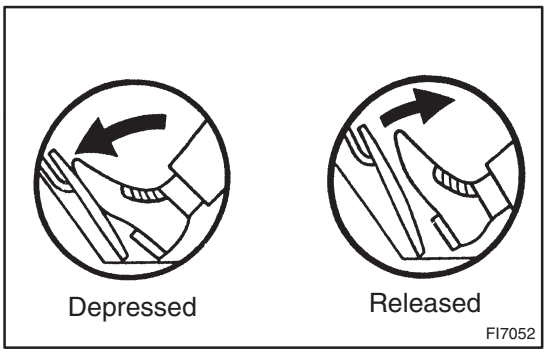


INSPECTION PROCEDURE

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, if the air–fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE OF INTELLIGENT TESTER II(ACCELERATOR POS NO.1 AND ACCELERATOR POS NO.2)



(a) Connect the intelligent tester II to the DLC3.
(b) Turn the ignition switch to ON and turn the intelligent tester II ON.
(c) Select the following menu items: Powertrain / Engine and ECT / Data List / Accelerator POS No.1 and Accelerator POS No.2.
(d) Read the value.

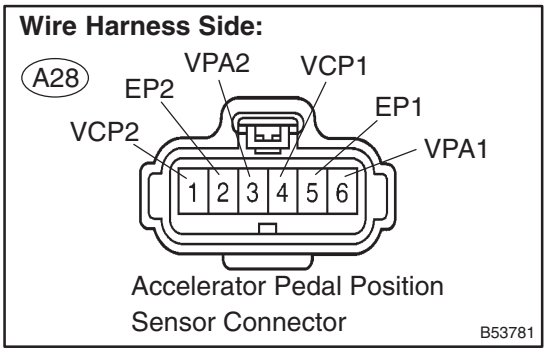
Standard:

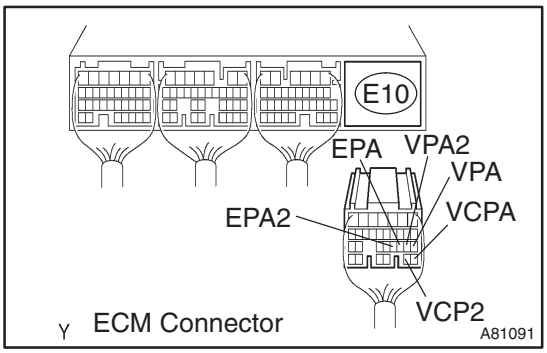
Accelerator Pedal	Accelerator POS No.1	Accelerator POS No.2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.0 V

OK	Go to step 4

NG

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





(a) Disconnect the A28 accelerator pedal position sensor connector.
(b) Disconnect the E10 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard (Check for open):

Tester Connection	Specified Condition
VPA1 (A28–6) – VPA (E10–18)	Below 1 Ω
EP1 (A28–5) – EPA (E10–20)	Below 1 Ω
VCP1 (A28–4) – VCPA (E10–26)	Below 1 Ω
VPA2 (A28–3) – VPA2 (E10–19)	Below 1 Ω
EP2 (A28–2) – EPA2 (E10–21)	Below 1 Ω
VCP2 (A28–1) – VCP2 (E10–27)	Below 1 Ω

Standard (Check for short):

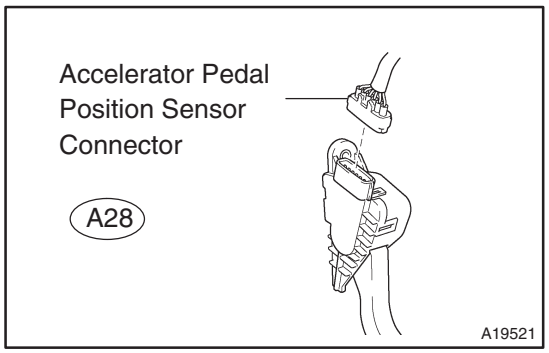
Tester Connection	Specified Condition
VPA1 (A28–6) or VPA (E10–18) – Body ground	10 kΩ or higher
EP1 (A28–5) or EPA (E10–20) – Body ground	10 kΩ or higher
VCP1 (A28–4) or VCPA (E10–26) – Body ground	10 kΩ or higher
VPA2 (A28–3) or VPA2 (E10–19) – Body ground	10 kΩ or higher
EP2 (A28–2) or EPA2 (E10–21) – Body ground	10 kΩ or higher
VCP2 (A28–1) or VCP2 (E10–27) – Body ground	10 kΩ or higher

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

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

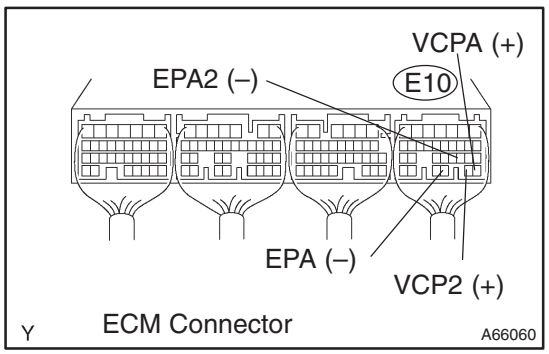
3	INSPECT ECM(VCPA AND VCP2 VOLTAGE)



(a) Disconnect the A28 accelerator pedal position sensor connector.
(b) Turn the ignition switch to ON.
(c) Measure the voltage according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
VCPA (E10–26) – EPA (E10–28)	4.5 to 5.0 V
VCP2 (E10–27) – EPA2 (E10–21)	4.5 to 5.0 V



NG → **REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10–13)**

OK

4	REPLACE ACCELERATOR PEDAL ROD ASSY (See page 10–13)

NEXT

5	CHECK IF DTC OUTPUT RECURS(ACCELERATOR PEDAL POSITION SENSOR DTCS)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the ignition switch to ON and turn the intelligent tester II ON.
(c) Clear DTCs (see page 05–18).
(d) Start the engine.
(e) Run the engine at idling speed for 15 seconds or more.
(f) Select the following menu items: Powertrain / Engine and ECT / DTC.
(g) Read DTCs (see page 05–18).

Result:

Display (DTC Output)	Proceed To
P2120, P2122, P2123, P2125, P2127, P2128 and/or P2138	A
No output	B

B → **SYSTEM OK**

A

REPLACE ECM (See page 10–12)