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

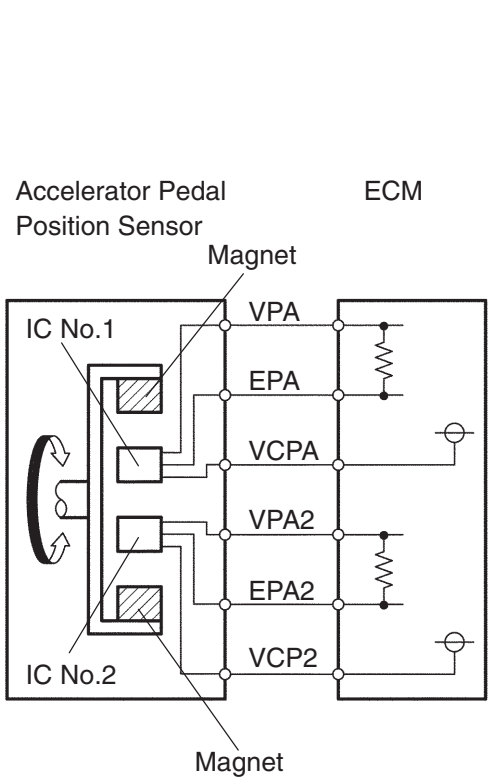
HINT:

- This is the repair procedure of the ”accelerator pedal position sensor”.
- This electrical throttle system does not use the throttle cable.
- This accelerator pedal position sensor is non–contact type.

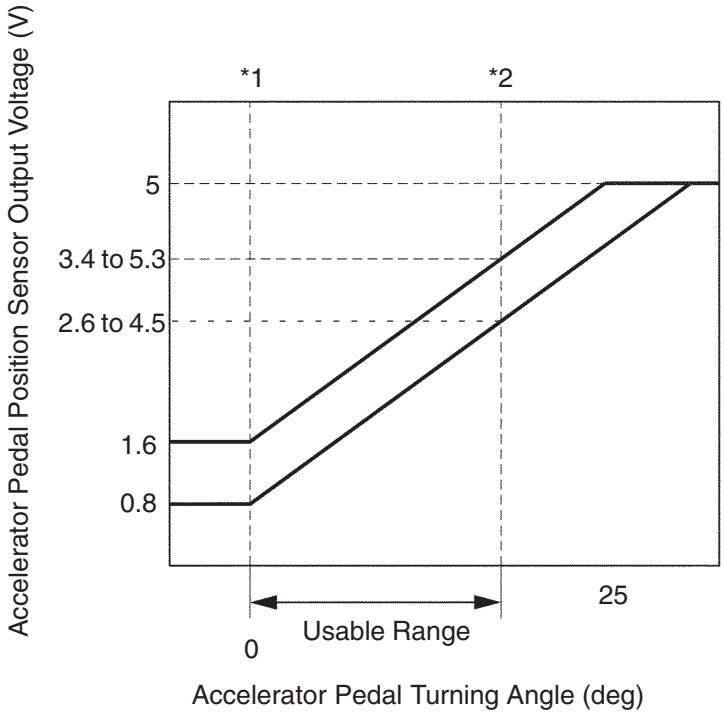
The accelerator pedal position sensor is mounted in the accelerator pedal to detect the opening angle of the accelerator pedal. Since this sensor is electronically controlled with hall elements, accurate control and reliability can be obtained. It has 2 sensors to detect the accelerator position and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

In the accelerator pedal position sensor, the voltage applied to 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 VPA1 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

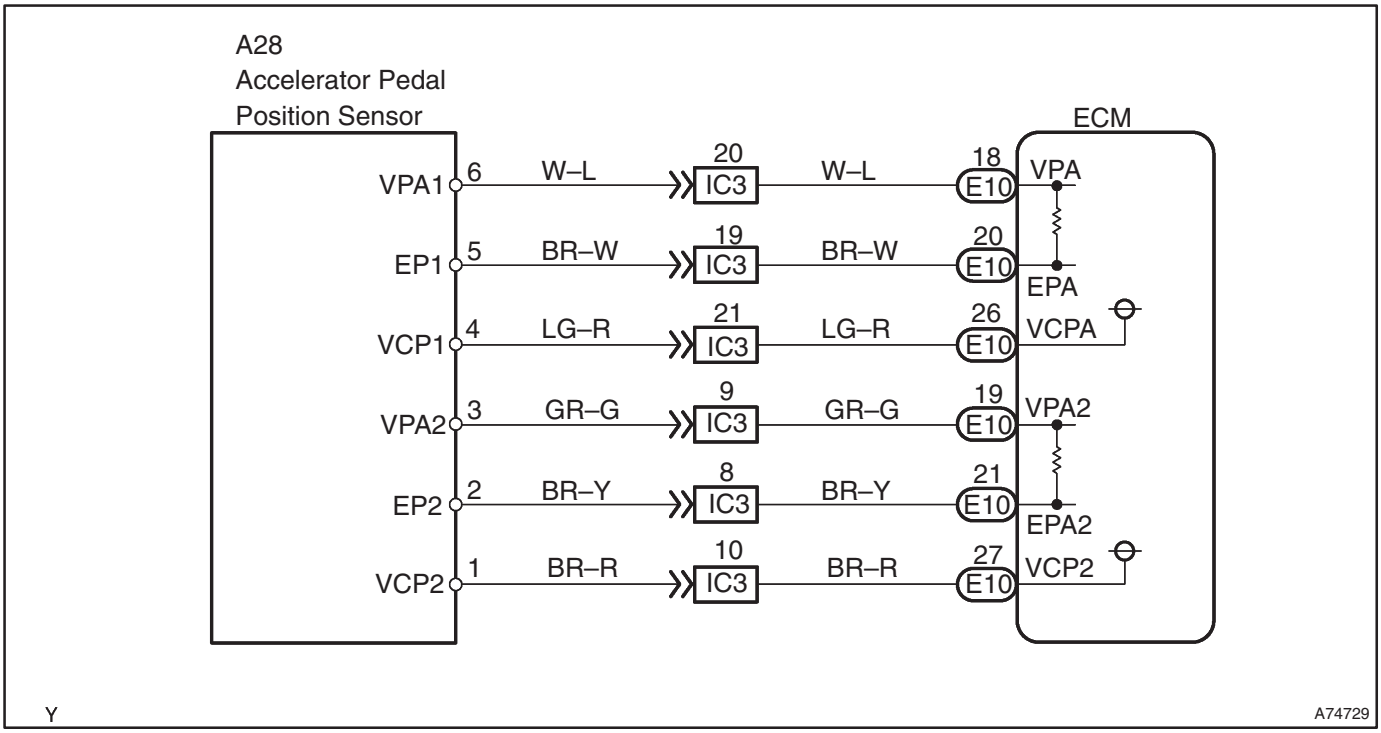
DTC No.	DTC Detection Condition	Trouble Area
P2120	Condition (a) continues for 0.5 sec. or more: (a) VPA1 ≦ 0.2 V and VPA2 ≧ 0.97 deg, or VPA1 ≧ 4.8 V	• Accelerator pedal position sensor • ECM
P2122	Conditions (a) and (b) continue for 0.5 sec. or more: (a) VPA1 ≦ 0.2 V (b) VPA2 ≧ 0.97 deg	• Accelerator pedal position sensor • Open in VCP1 circuit • 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 • Open in EPA1 circuit • 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	Conditions (a) and (b) continue for 0.5 sec. or more: (a) VPA2 ≦ 0.5 V (b) VPA1 ≧ 0.97 deg	• Accelerator pedal position sensor • Open in VCP2 circuit • VPA2 circuit open or ground short • ECM
P2128	Conditions (a) and (b) continue for 2.0 sec. or more: (a) VPA2 ≧ 4.8 V (b) 0.2 V ≦ VPA1 ≦ 3.45 V	• Accelerator pedal position sensor • Open in EPA2 circuit • 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 Intelligent Tester II to confirm the accelerator pedal position sensor output voltage.

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

WIRING DIAGRAM

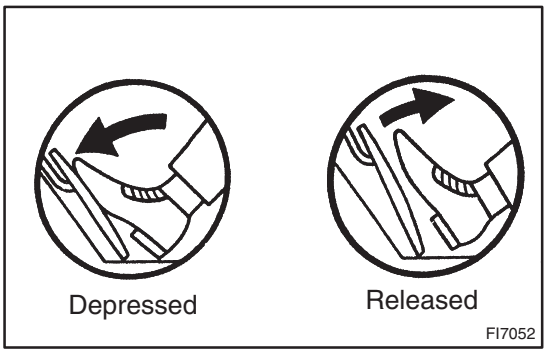


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Intelligent Tester II. 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, and other data from the time the malfunction occurred.

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



(a) Connect the Intelligent Tester ll to the DLC3.
(b) Turn the engine switch ON (IG) and turn the Intelligent Tester ll ON.
(c) Select the following menu items: Powertrain / Engine and ECT / Data List / Accelerator POS No.1.
(d) Read the value.

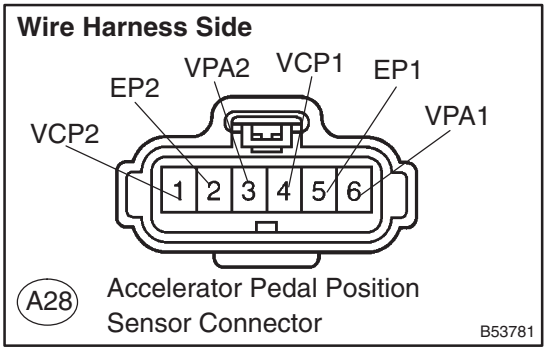
Standard:

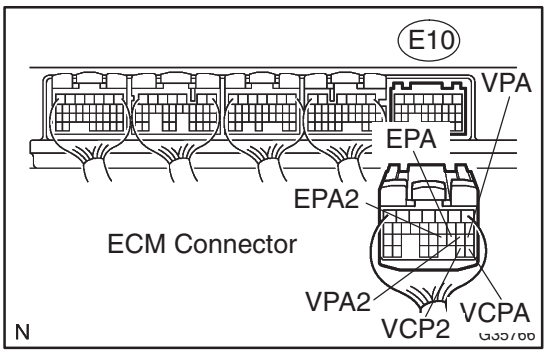
Accelerator pedal	Accelerator POS No.1	Accelerator POS No.1
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.0 V

OK	Go to step 5

NG

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





(a) Disconnect the accelerator pedal position sensor connector.
(b) Disconnect the ECM E10 connector.
(c) Check for resistance between the wire harness side connectors.

Standard (Check for open):

Symbols (Terminal No.)	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

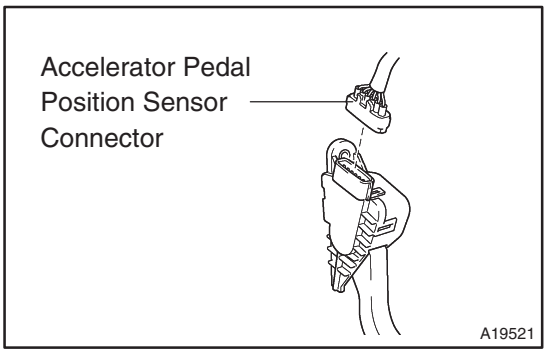
Standard (Check for short):

Symbols (Terminal No.)	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

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

OK

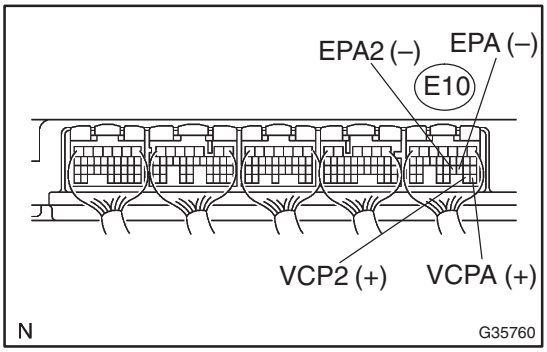
3 INSPECT ECM(VCPA AND VCP2 VOLTAGE)



(a) Disconnect the accelerator pedal position sensor connector.
(b) Turn the ignition switch to ON.
(c) Measure the voltage between the terminals of the E10 ECM connector.

Standard:

Symbols (Terminal No.)	Specified condition
VCPA (E10–26) – EPA (E10–20)	4.5 to 5.5 V
VCP2 (E10–27) – EPA2 (E10–21)	4.5 to 5.5 V



NG → **REPLACE ECM (See Pub. No. RM1017E, page 10–11)**

OK

4	**REPLACE ACCELERATOR PEDAL ROD ASSY (See Pub. No. RM1017E, page 10–12)**

GO

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

(a) Clear the DTC (See page 05–209).
(b) Start the engine.
(c) Run the engine at idle for 15 sec. or more.
(d) Read the DTC (See page 05–209).

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

REPLACE ECM (See Pub. No. RM1017E, page 10–11)