DIB1Q–01

DTC	P0120	Throttle Pedal Position Sensor/Switch ”A” Circuit (w/ ETCS)

DTC	P0122	Throttle Pedal Position Sensor/Switch ”A” Circuit Low Input (w/ ETCS)

DTC	P0123	Throttle Pedal Position Sensor/Switch ”A” Circuit High Input (w/ ETCS)

DTC	P0220	Throttle/Pedal Position Sensor/Switch ”B” Circuit (w/ ETCS)

DTC	P0222	Throttle Pedal Position Sensor/Switch ”B” Circuit Low Input (w/ ETCS)

DTC	P0223	Throttle Pedal Position Sensor/Switch ”B” Circuit High Input (w/ ETCS)

DTC	P2135	Throttle/Pedal Position Sensor/Switch ”A”/”B” Voltage Correction (w/ ETCS)

CIRCUIT DESCRIPTION

HINT:

This is the procedure of throttle position sensor (w/ ETCS).

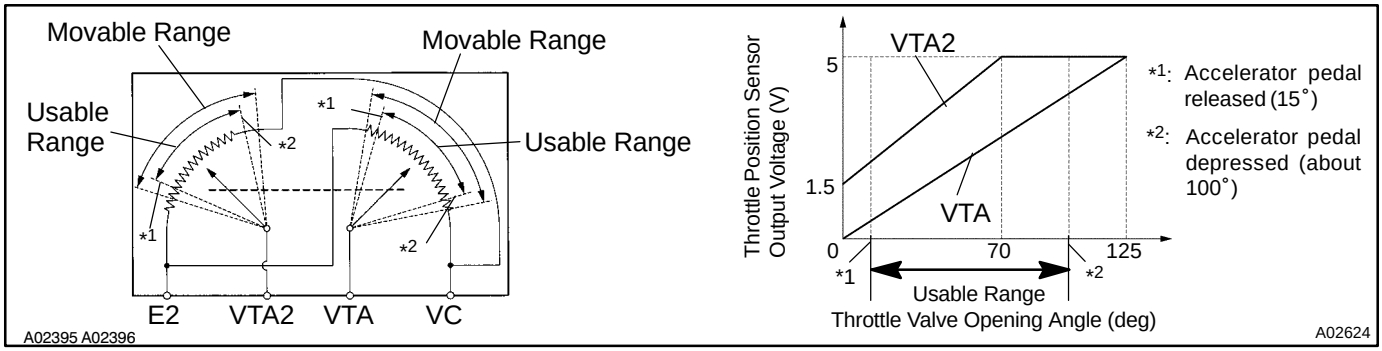
The throttle position sensor is mounted on the throttle body and it have 2 sensors to detect the throttle opening angle and a malfunction of the throttle position sensor.

The voltage applied to the terminals VTA and VTA2 of the ECM changes between 0 V and 5 V in proportion to the opening angle of the throttle valve. The VTA is a signal to indicate the actual throttle valve opening angle which is used for the engine control, and the VTA2 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 throttle valve from these signals input from terminals VTA and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to the driving condition.

If this DTC is stored, the ECM shuts down the power for the throttle motor and the electromagnetic clutch, and the throttle valve is fully closed by the return spring.

However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.



DTC No.	DTC Detection Condition	Trouble Area
Condition (a) of DTC P0120, P0122, P0123, P0220, P0222 or P0223 continues for 2 sec.		• Open or short in throttle position sensor circuit • Throttle position sensor • Wire harness • ECM
P0120	Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied (a) VTA ≦ 0.2 V or VTA ≧ 4.8 V	
P0122	(a) VTA ≦ 0.2 V	
P0123	(a) VTA ≧ 4.8 V	
P0220	Detection conditions for DTCs P0222 and P0223 are not satisfied but condition (a) is satisfied (a) (VTA2 ≦ 0.5 V) or (VTA2 ≧ 4.97 V and 0.2 V ≦ VTA ≦ 1.8 V)	
P0222	(a) VTA2 ≦ 0.5 V	
P0223	(a) (VTA2 ≧ 4.97 V) and (0.2 V ≦ VTA ≦ 1.8 V)	
P2135	Condition (a) continues for 2 sec. or more, or condition (b) continues for 0.4 sec. or more: (a) |VTA – VTA2| ≦ 0.02 V (b) VTA ≦ 0.2 V and VTA2 ≦ 0.5 V	

HINT:

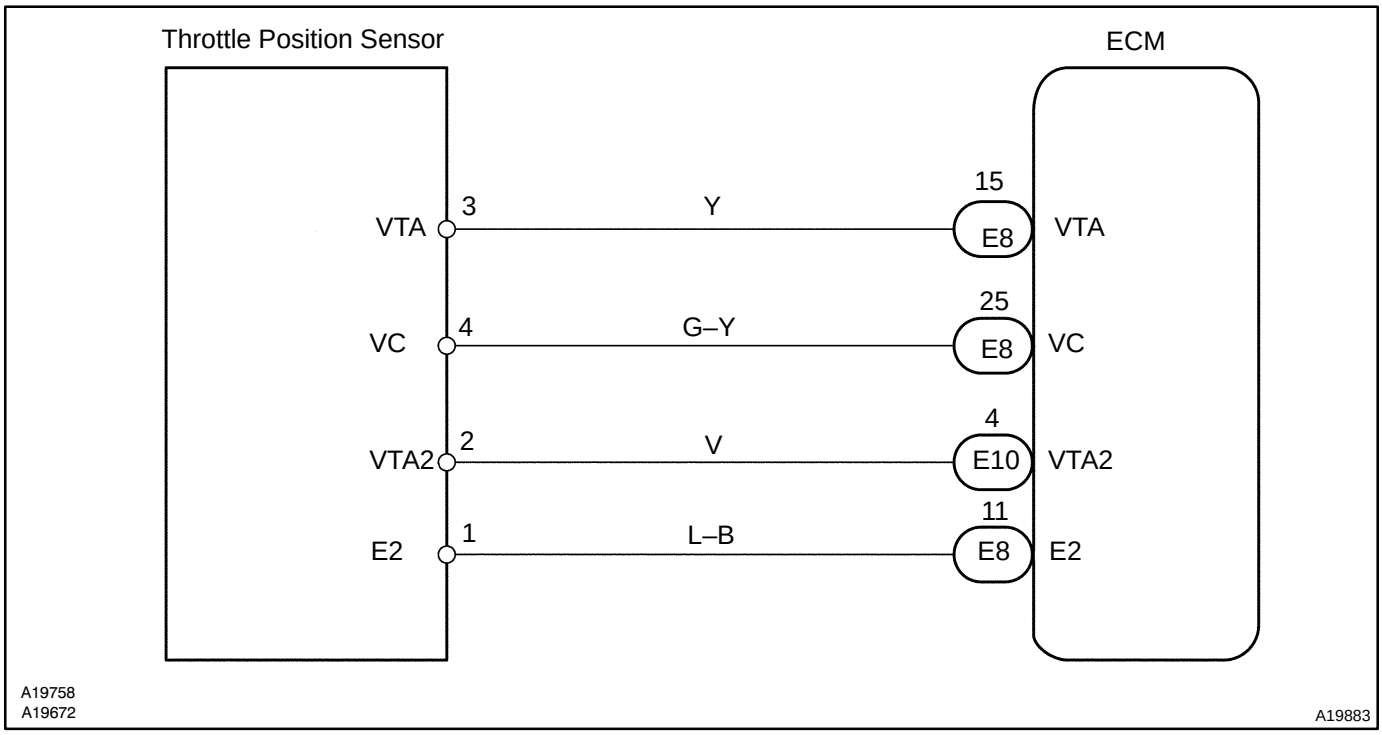
DTC No.	Main Trouble Area
P0122	• Throttle position sensor • VTA circuit open • VC circuit open (when the VC circuit is open, DTCs P0222 and P2135 are also output simultaneously)
P0123	• Throttle position sensor • E2 circuit open
P0222	• Throttle position sensor • VTA2 circuit open • VC circuit open (when the VC circuit is open, DTCs P0122 and P2135 are also output simultaneously))
P0223	• Throttle position sensor
P2135	• VTA and VTA2 circuit are short–circuited • VC circuit open • Throttle position sensor

HINT:

- After confirming DTC P0120, P0122, P0123, P0220, P0222, P0223 and P2135 use the OBD II scan tool or the hand–held tester to confirm the throttle valve opening percentage and closed throttle position switch condition.
- The THROTTLE POS means VTA signal as well as the THROTTLE POS #2 for the VTA2 signal

Throttle valve opening position expressed as percentage and voltage				Trouble area
Accelerator pedal released		Accelerator pedal depressed		
THROTTLE POS	THROTTLE POS #2	THROTTLE POS	THROTTLE POS #2	
0 %	0 V	0 %	0 V	VC circuit open
0 %	2.0 – 2.9 V	0 %	4.7 – 5.1 V	VTA circuit open or ground short
8 – 20 %	0 V	64 – 96 %	0 V	VTA2 circuit open or ground short
100 %	5 V	100 %	5 V	E2 circuit open

WIRING DIAGRAM



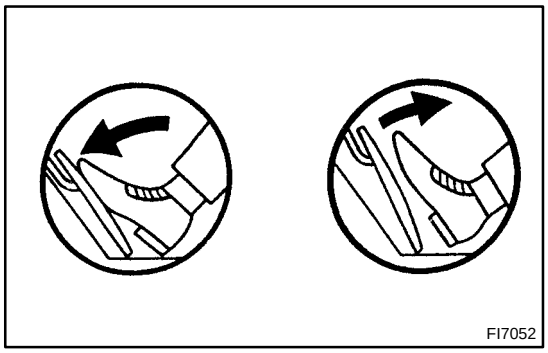
INSPECTION PROCEDURE

HINT:

- If different DTCs that are related to different systems are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand–held tester or the OBD II scan tool, freeze frame 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	**Connect hand–held tester, and read throttle valve opening percentage.**



PREPARATION:

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

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

CHECK:

Read the throttle valve opening percentage for the VTA circuit and read the voltage for the VTA2 circuit.

OK:

Accelerator pedal	Throttle valve opening position expressed as percentage (VTA)	Voltage (VTA2)
Released	8 – 20 %	2.0 – 2.9 V
Depressed	64 – 96 %	4.7 – 5.1 V

OK → **Check and replace ECM (See page IN–28).**

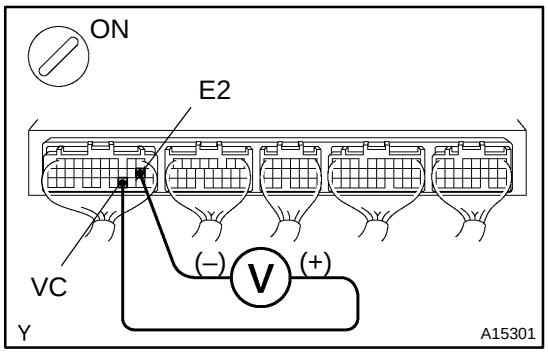
NG

2	**Check throttle position sensor (See page SF–28).**

NG → **Replace throttle position sensor (See page SF–30).**

OK

3	Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment (See page SF–63).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

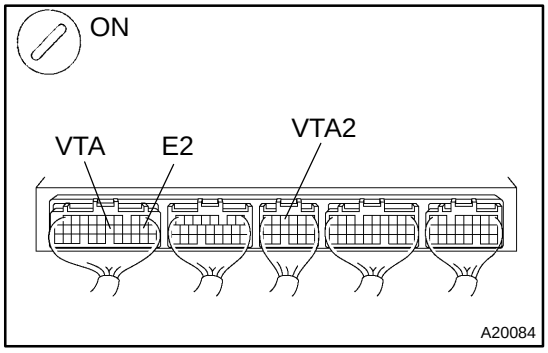
OK:

Voltage: 4.5 – 5.5 V

NG	Check and replace ECM (See page IN–28).

OK

4	Check voltage between terminals VTA and E2, and VTA2 and E2 of ECM connector.



PREPARATION:

(a) Remove the glove compartment (See page SF–63).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VTA and E2, and VTA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VTA – E2	VTA2 – E2
Released	0.4 – 1.0 V	2.0 – 2.9 V
Depressed	3.2 – 4.8 V	4.7 – 5.1 V

OK	Check and replace ECM (See page IN–28).

NG

Check for open and short in harness and connector in VC, VTA, VTA and E2 circuits between ECM and throttle position sensor (See page IN–28).

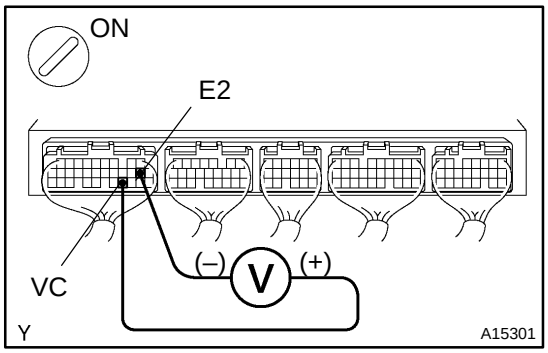
OBD II scan tool (excluding hand–held tester):

1	**Check throttle position sensor (See page SF–28).**

NG → **Replace throttle position sensor (See page SF–30).**

OK

2	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:
(a) Remove the glove compartment (See page SF–63).
(b) Turn the ignition switch ON.

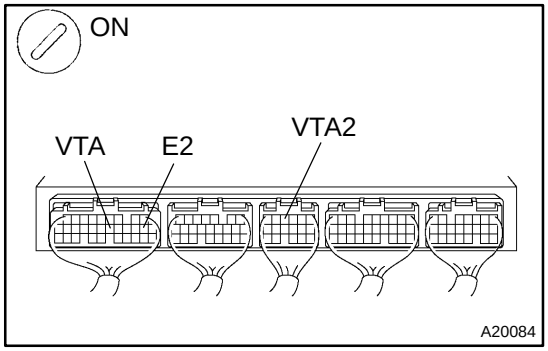
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.

OK:
Voltage: 4.5 – 5.5 V

NG → **Check and replace ECM (See page IN–28).**

OK

3	**Check voltage between terminals VTA and E2, and VTA2 and E2 of ECM connector.**



PREPARATION:
(a) Remove the glove compartment (See page SF–63).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals VTA and E2, and VTA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VTA – E2	VTA2 – E2
Released	0.4 – 1.0 V	2.0 – 2.9 V
Depressed	3.2 – 4.8 V	4.7 – 5.1 V

OK → **Check and replace ECM (See page IN–28).**

NG

Check for open and short in harness and connector in VC, VTA, VTA and E2 circuits between ECM and throttle position sensor (See page IN–28).