DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0705	(A) Any 2 or more signals of the following are ON simultaneously (2-trip detection logic) • P input signal is ON. • N input signal is ON. • R input signal is ON. • D input signal is ON. (B) Any 2 ore more signals of the following are ON simultaneously (2-trip detection logic) • NSW input signal is ON. • R input signal is ON. • D input signal is ON. (C) Any of following conditions is met for 2.0 sec. or more in the S position (2-trip detection logic). • NSW input signal is ON. • P input signal is ON. • N input signal is ON. • R input signal is ON. (D) All switches are OFF simultaneously for NSW, P, R, N and D.	• Open or short in park/neutral position switch circuit • Park/neutral position switch • ECM

HINT:
After confirming DTC P0705, use the intelligent tester to confirm the PNP switch signal in the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

WIRING DIAGRAM

Refer to DTC P0705 for 2WD model (See page AX-40) or 4WD model (See page AX-40).

INSPECTION PROCEDURE

Refer to DTC P0705 for 2WD model (See page AX-41) or 4WD model (See page AX-41).
HINT:
Read freeze frame data using the intelligent tester or OBD II scan tool. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. 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.

DTC	P2102	Throttle Actuator Control Motor Circuit Low

DTC	P2103	Throttle Actuator Control Motor Circuit High

DESCRIPTION

The throttle actuator is operated by the ECM and opens and closes the throttle valve using gears.
The opening angle of the throttle valve is detected by the Throttle Position (TP) sensor, which is mounted on the throttle body. The TP sensor provides feedback to the ECM. This feedback allows the ECM to appropriately control the throttle actuator and monitor the throttle opening angle as the ECM responds to driver inputs.
HINT:
This ETCS (Electronic Throttle Control System) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2102	Conditions (a) and (b) continue for 2.0 seconds (1 trip detection logic): (a) Throttle actuator duty ratio exceeds 80% or more (b) Throttle actuator current is 0.5 A or less	• Open in throttle actuator circuit • Throttle actuator • ECM
P2103	Either of the following conditions is met: • Hybrid IC diagnosis signal fails • Hybrid IC current limiter port fails	• Short in throttle actuator circuit • Throttle actuator • Throttle valve • Throttle body • ECM

MONITOR DESCRIPTION

The ECM monitors the electrical current through the electronic actuator, and detects malfunctions and open circuits in the throttle actuator based on this value. If the current is outside the standard range, the ECM determines that there is a malfunction in the throttle actuator. In addition, if the throttle valve does not function properly (for example, stuck on), the ECM determines that there is a malfunction. The ECM then illuminates the MIL and sets a DTC.

Example:

When the electrical current is more than 10 A, or less than 0.5 A and the throttle actuator duty ratio exceeds 80%, the ECM interprets this as the current being outside the standard range, and illuminates the MIL and sets a DTC.
If the malfunction is not repaired successfully, a DTC is set when the engine is quickly revved up to a high rpm several times after the engine has idled for 5 seconds after engine start.

MONITOR STRATEGY

Related DTCs	P2102: Throttle actuator current (low current) P2103: Throttle actuator current (high current)
Required Sensors / Components (Main)	Throttle actuator (throttle body)
Required Sensors / Components (Related)	None
Frequency of Operation	Continuous
Duration	P2102: 2 seconds P2103: 25 times or 0.6 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever these DTCs are not present	None

P2102:

Throttle motor	ON
Duty-cycle ratio to open throttle actuator	80% or more
Throttle actuator power supply	8 V or more
Motor current change during latest 0.016 sec	Less than 0.2 A

P2103:

Throttle motor	ON
Either of the following conditions is met:	Condition 1 or 2
1. Throttle actuator power supply	8 V or more
2. Throttle actuator power	ON
Battery voltage	8 V or more
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P2102:

Throttle actuator current	Less than 0.5 A

P2103:

Either of the following conditions is met	Condition 1 or 2
1. Hybrid IC diagnosis signal	Fail
2. Hybrid IC current limiter port	Fail

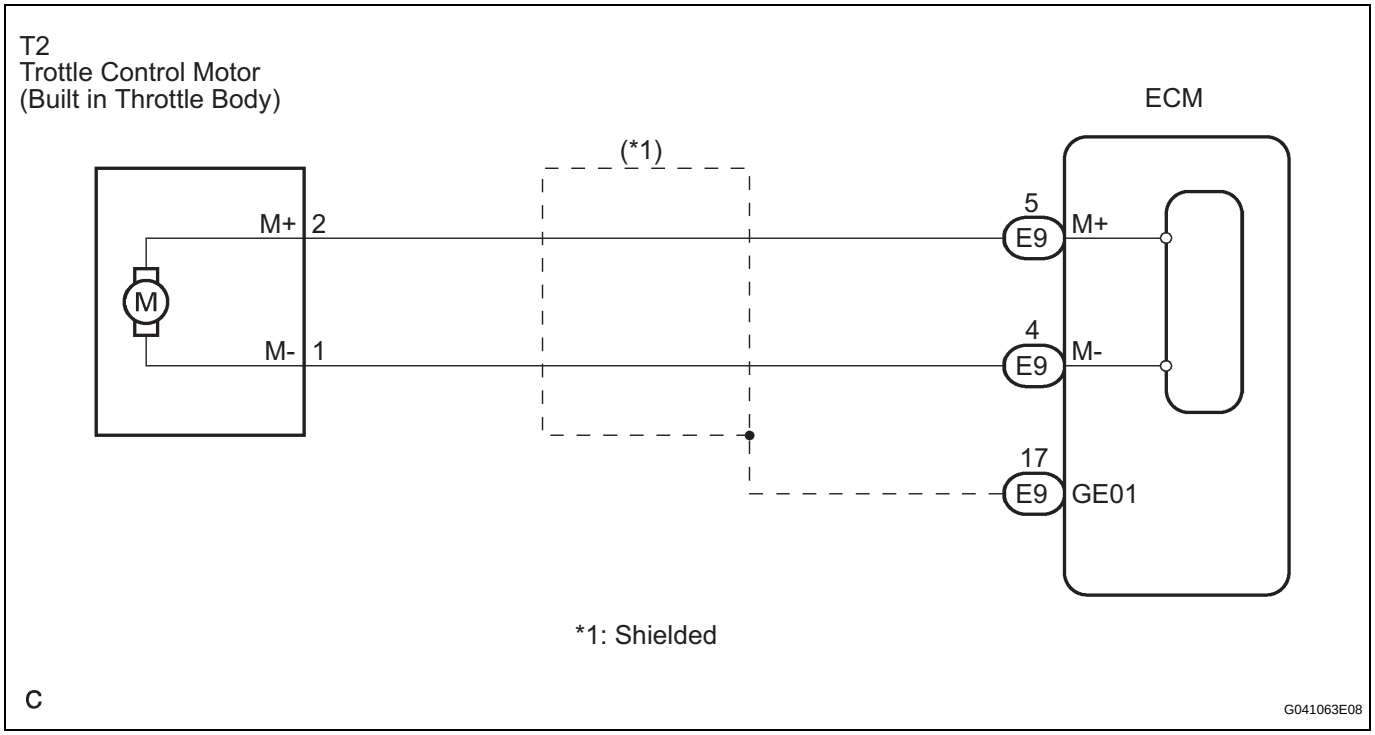
FAIL-SAFE

When either of these DTCs, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, is set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed.

If the accelerator pedal is depressed gently, the vehicle can be driven slowly.

Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

WIRING DIAGRAM



ES

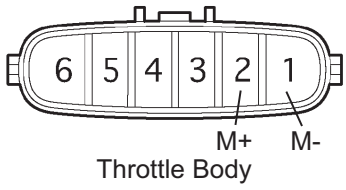
INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.
- The throttle actuator current (THROTTLE MOT) and the throttle actuator duty ratio (THROTTLE OPN / THROTTLE CLS) can be read using the intelligent tester. However, the ECM shuts off the throttle actuator current when the ETCS malfunctions.

1	INSPECT THROTTLE BODY (RESISTANCE OF THROTTLE CONTROL MOTOR)

Component Side Front View:



(a) Disconnect the T2 throttle body connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

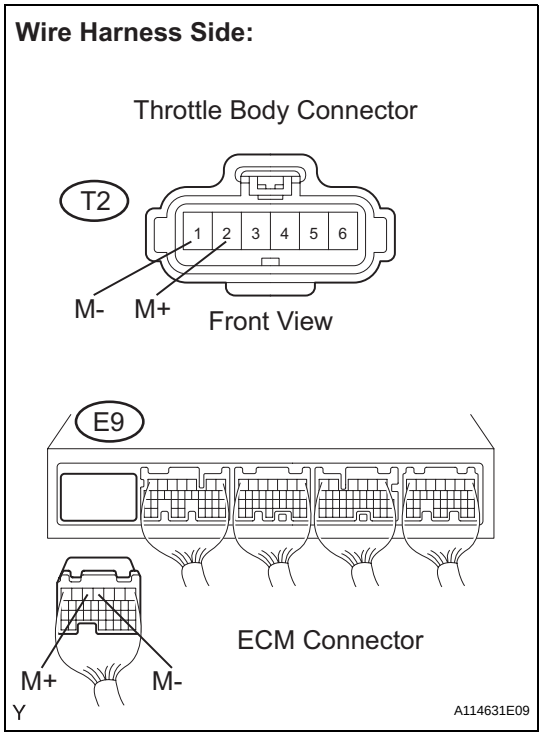
Tester Connection	Condition	Specified Condition
M+ (T2-2) - M- (T2-1)	20°C (68°F)	0.3 to 100 Ω

(c) Reconnect the throttle body connector.

NG → **REPLACE THROTTLE BODY (See page ES-493)**

OK

2	CHECK HARNESS AND CONNECTOR (THROTTLE CONTROL MOTOR - ECM)



(a) Disconnect the T2 throttle body connector.
(b) Disconnect the E9 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance :

Check for open

Tester Connection	Specified Condition
M+ (T2-2) - M+ (E9-5)	Below 1 Ω
M- (T2-1) - M- (E9-4)	Below 1 Ω

Check for short

Tester Connection	Specified Condition
M+ (T2-2) or M+ (E9-5) - Body ground	10 kΩ or higher
M- (T2-1) or M- (E9-4) - Body ground	10 kΩ or higher

(d) Reconnect the throttle body connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (THROTTLE CONTROL MOTOR - ECM)**

OK

3	INSPECT THROTTLE BODY

(a) Check for foreign objects between the throttle valve and the housing.

OK:

Normal

NG → **REMOVE FOREIGN OBJECT AND CLEAN THROTTLE BODY**

OK

4	INSPECT THROTTLE VALVE

(a) Check if the throttle valve opens and closes smoothly.

OK:

The throttle valve opens and closes smoothly.

NG → **REPLACE THROTTLE BODY (See page ES-493)**

OK

REPLACE ECM (See page ES-498)