DTC	P0418	SECONDARY AIR INJECTION SYSTEM RELAY ”A” CIRCUIT

CIRCUIT DESCRIPTION

Refer to DTC P0412 on page 05–107.

DTC No.	DTC Detection Condition	Trouble Area
P0418	After cold engine starts, all of following conditions are met (1 trip detection logic): (a) Air Injection (AI) system not operate (air pump OFF, Air Switch Valve (ASV) OFF) (b) Diagnostic signal from Air Injection Control Driver (AID) 20 % (c) Battery voltage 8 V or more	• Open in air pump drive circuit • Short between air pump circuit and +B circuit • Air pump • AID • ECM
P0418	After cold engine starts, all of following conditions are met (1 trip detection logic): (a) While Air Injection (AI) system operating (air pump ON, Air Switching Valve (ASV) ON) (b) Diagnostic signal from Air Injection Control Driver (AID) 20 % (c) Battery voltage 8 V or more	• Short between air pump circuit and body ground • Air pump • AID • ECM

MONITOR DESCRIPTION

Air Injection Control Driver (AID) detects an open or short in the air pump and Air Switching Valve (ASV) circuit according to the terminal voltage and sends a signal as the diagnostic information to the ECM.
After the cold engine starts and it is in the short time, the ECM transmits command signals to the AID to the drive the air pump and ASV.
The AID outputs the ASV malfunction signal to the ECM if: 1) the voltage of AID terminal for air pump is low despite the AID receives the command signal from ECM to drive the ASV or 2) VP terminal voltage is high despite the AID does not receive the command signal from ECM
The ECM sets the DTC based on the diagnostic signal from the AID.

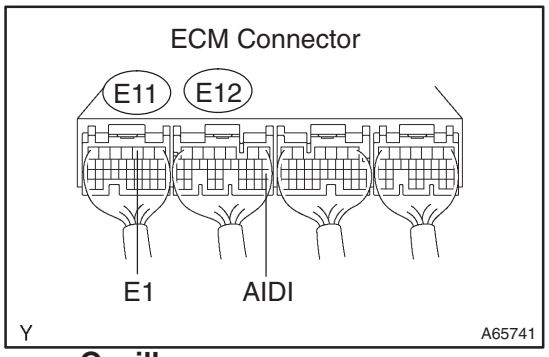
WIRING DIAGRAM

Refer to DTC P0412 on page 05–107.

INSPECTION PROCEDURE

HINT:

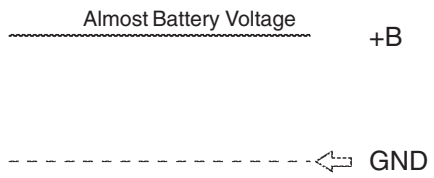
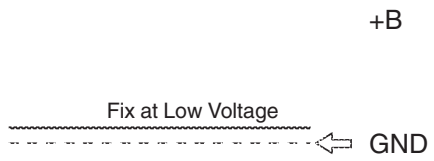
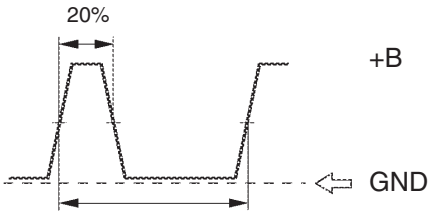
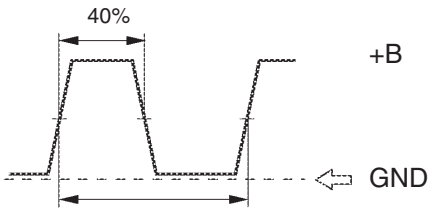
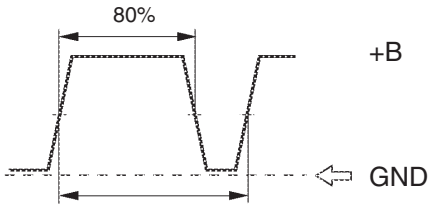
The diagnostic information output from AID can be confirmed by connecting an oscilloscope to the diagnostic information terminal of the AID.



(1) Connect the intelligent tester ll to the DLC3.
(2) Connect an oscilloscope probe to the AIDI terminal of the ECM.
(3) Start the engine and turn the tester ON.
(4) Monitor the voltage output of the AID (duty ratio signal).

Oscilloscope range:

Items	Contents
Terminals	CH1: AIDI (E12–20) – E1 (E11–3)
Equipment Settings	5 V/Division, 20 to 40 ms/Division
Conditions	Idling

AID Diagnostic Signal Waveforms	ECM Commands	DTCs (ECM Output)	Suspected Trouble Area
100% Duty ratio 	Any Air Injection (AI) System operation	**P1613**	● Open in diagnostic signal circuit ● Air Injection Control Driver (AID) ● Open in AID +B circuit (AID power source) ● Short between +B circuit and diagnostic signal circuit
0% Duty ratio 	AI System: ON (Air pump ON, ASV ON)	**P1613**	● Open or short in air pump or Air Switching Valve (ASV) command signal circuit (ECM – AID) ● Open in AID ground circuit ● Short between diagnostic signal circuit and body ground ● AID ● ECM
	AI System: OFF (Air pump OFF, ASV OFF)	–	Normal
20% Duty ratio 	Air Pump: ON	**P0418**	Short between air pump drive circuit and body ground ● Harness & connector (AID – Pump) ● Air Pump ● AID ● ECM
	Air Pump: OFF	**P0418**	Open in air pump drive circuit (AID – Pump), or short between air pump drive circuit and +B ● Harness & connector (AID – Pump) ● Air Pump ● AID ● ECM
40% Duty ratio 	ASV: ON	**P0412**	Short between ASV drive circuit and body ground ● Harness & connector (AID – ASV) ● Air Pump ● AID ● ECM
	ASV: OFF	**P0412**	Open in ASV drive circuit (AID – ASV), or short between ASV drive circuit and +B ● Harness & connector (AID – ASV) ● Air Pump ● AID ● ECM
80% Duty ratio 	AI System: OFF (Air pump OFF, ASV OFF)	**P1613**	● AID ● ECM
	AI System: ON (Air pump ON, ASV ON)	–	Normal
Excluding above (excluding 0, 20, 40, 80, 100% duty)	–	**P1613**	● AID ● Open in AID ground circuit

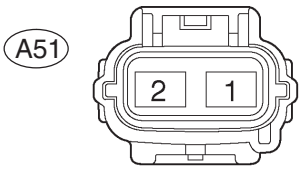
G37132

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 INSPECT AIR PUMP ASSY

Component Side:

Air Pump Connector



Front View

Y G37120

(a) Disconnect the A51 air pump connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
Air pump (A51–1) – Air pump (A51–2)	0.4 to 1.0 Ω

(c) Reconnect the air pump connector.

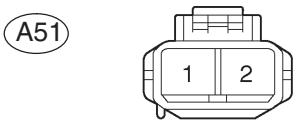
NG → **REPLACE AIR PUMP ASSY(See page 12–14)**

OK

2 CHECK HARNESS AND CONNECTOR(AIR PUMP – BODY GROUND)

Wire Harness Side:

Air Pump Connector



Front View

Y G37119

(a) Disconnect the A51 air pump connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard:

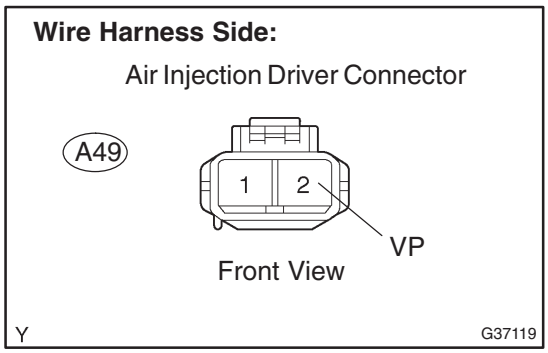
Tester Connection	Specified Condition
Air pump (A51–1) – Body ground	Below 1 Ω

(c) Reconnect the air pump connector.

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

OK

3	CHECK HARNESS AND CONNECTOR(AIR INJECTION CONTROL DRIVER – AIR PUMP)

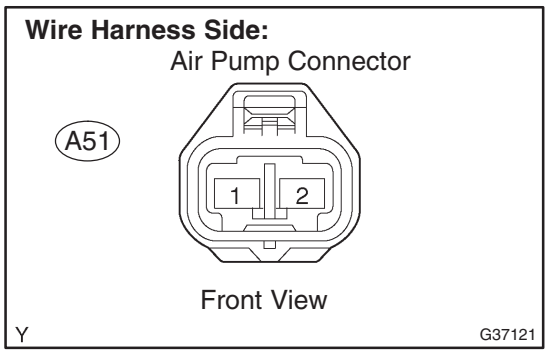


(a) Disconnect the A49 AID connector.
(b) Disconnect the A51 air pump connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard:

Tester Connection	Specified Condition
Air pump (A51–2) – VP (A49–2)	Below 1 Ω

(d) Reconnect the air pump connector.
(e) Reconnect the AID connector.



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

OK

REPLACE AIR INJECTION CONTROL DRIVER