TOYOTA Service Bulletin

Section :	Engine
Ref. No. :	EG–1012
Date :	Sep., 2001
Page :	1 of 19

Area Application : Europe
Model Name : CELICA
Model Code : ZZT231

Subject : SUPPLEMENTAL FOR REPAIR MANUAL

This Service Bulletin informs you of the service procedure of the Air Injection System.
For all the other procedures, please refer to following Repair Manual.

Pub. No.	Publication Name
RM733E	1ZZ–FE, 2ZZ–GE ENGINE REPAIR MANUAL

Production Effective:
From Aug., 2001

DIAGNOSTICS

ENGINE DI–1
DIAGNOSTIC TROUBLE CODE CHART DI–1
PARTS LOCATION DI–2
CIRCUIT INSPECTION DI–3

DI12C–29

DIAGNOSTIC TROUBLE CODE CHART

SAE CONTROLLED

HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in check mode, check the circuit for that code listed in the table below. For details of each code, turn to the page referred to under the ”See page ” for the respective ”DTC No.” in the DTC chart.

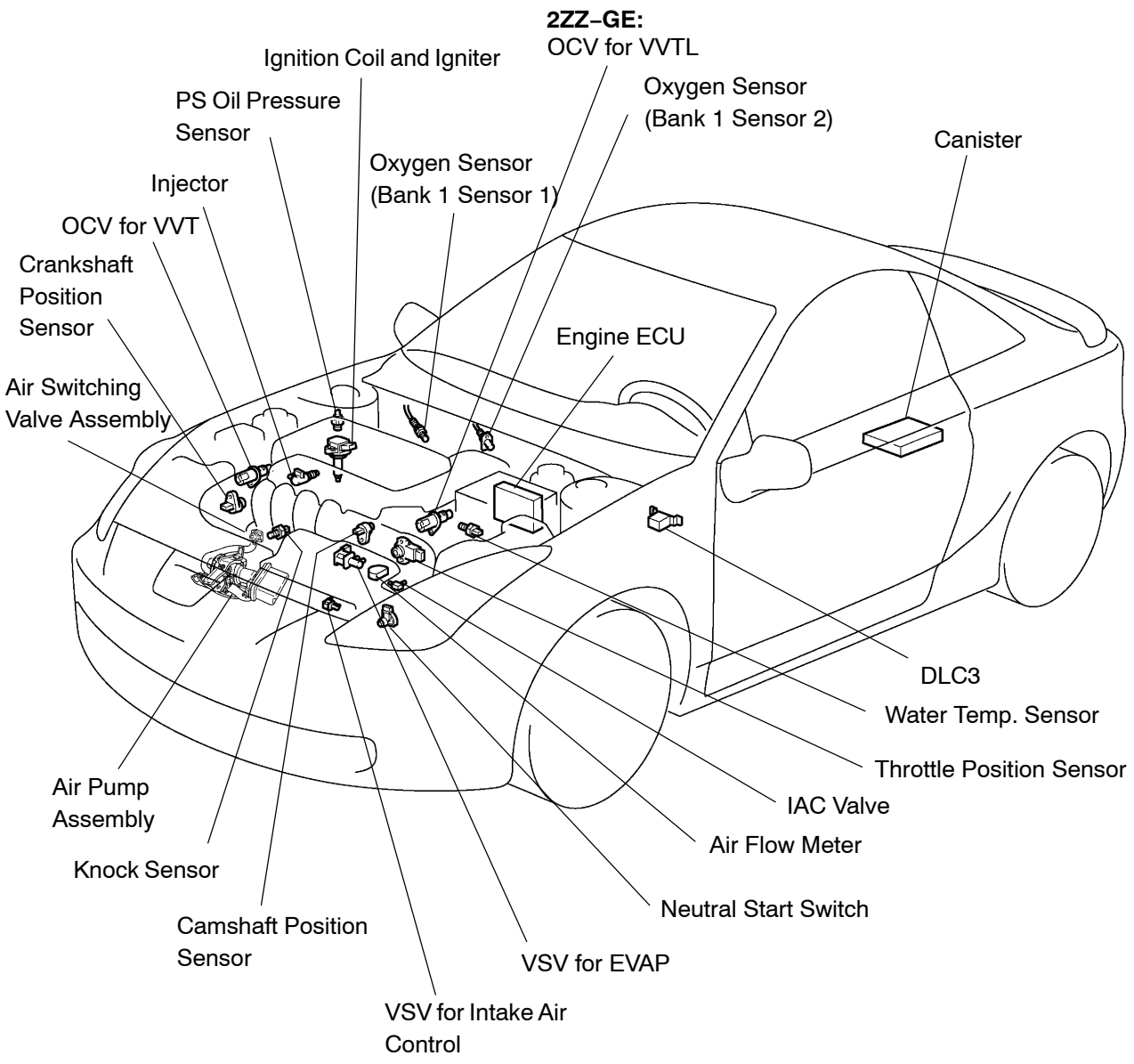
DTC No. (See Page)	Detection Item	Trouble Area	CHK ENG*1	Memory
P0410 (DI–3)	Air Injection System Malfunction	• Gas leak on air injection system • Air pump • Air switching valve • Air pump relay • VSV for air switching valve • Engine ECU	○	○
P0411 (DI–13)	ASCV Open–Fixed Malfunction	• Air switching valve • VSV for air switching valve • Engine ECU	○	○
P1205 (DI–16)	Air Pump On–Fixed Malfunction	• Air pump • Air pump relay • Engine ECU	○	○

*1: – Check engine warning light does not light up.

○ Check engine warning light lights up.

DI68L–17

PARTS LOCATION



Y

A19036

DI9ZR–01

CIRCUIT INSPECTION

DTC	P0410	Air Injection System Malfunction

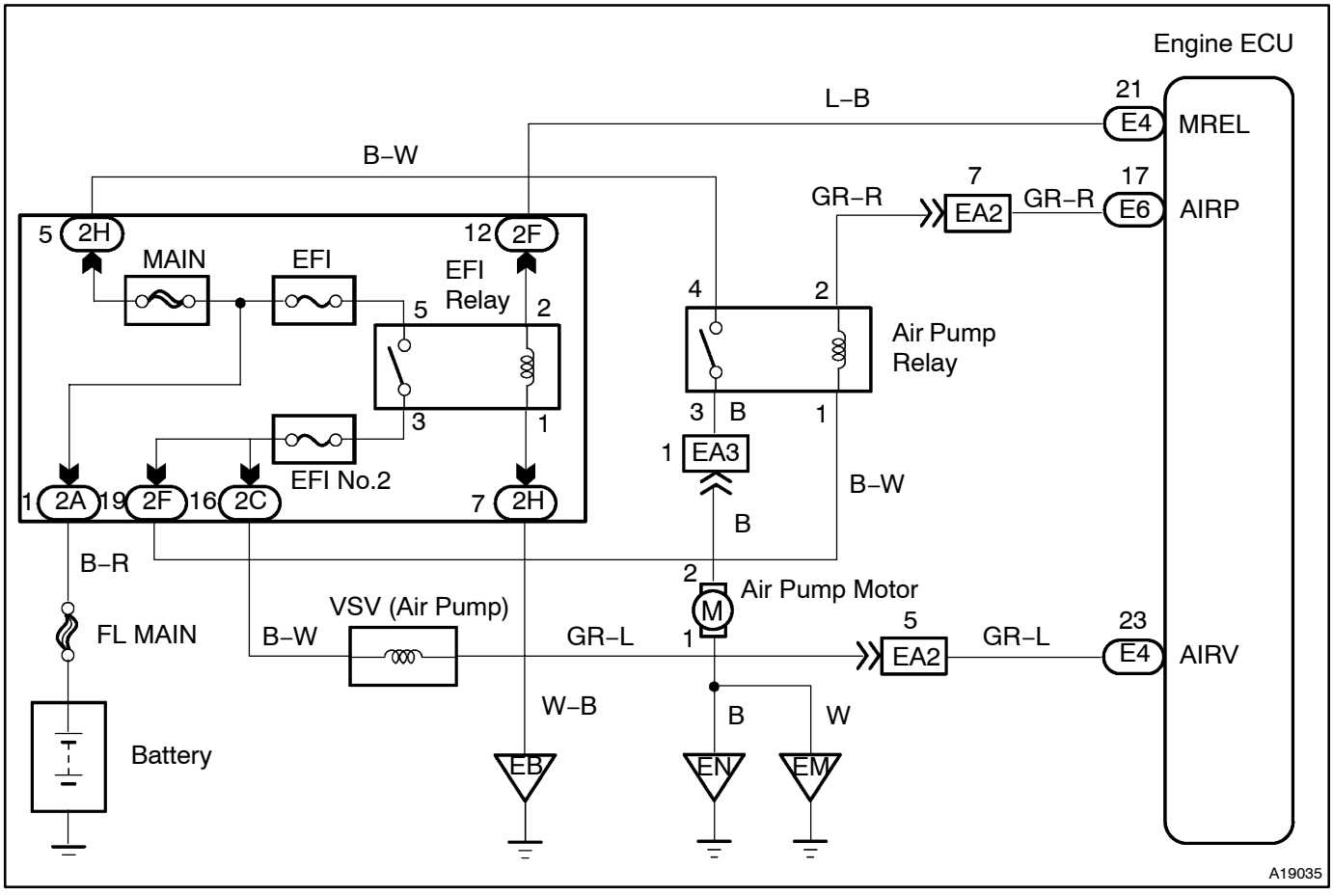
CIRCUIT DESCRIPTION

In the air injection system, air is pumped to the exhaust manifold by the electric air pump in the specified time. Because of this, the catalyst will be warmed up quickly when the engine is cold. This pumped air flows to the exhaust port of each cylinder from the exhaust manifold via the air switching valve. And the air switching valve is controlled to open and close by the VSV.

During the operation of the air injection system, the exhaust A/F shifts to the lean side, because the pumped air flows to the exhaust system. Using this characteristics of the air injection system, the system is judged whether it is malfunctioning or not. And the judgement depends on the feedback condition of the air–fuel ratio and signals from the O2 sensor while the system is operating and also when the pump and the air switching valve is driven forcibly.

DTC No.	DTC Detecting Condition	Trouble Area
P0410	During the operation of the air injection system, after the starting of the engine when engine is cold. (2 trip detection logic)	• Gas leak on exhaust system • Air pump • Air switching valve • Air pump relay • VSV for air switching valve • Engine ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using a hand–held tester. Because freeze frame records the engine conditions when the 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.

When using TOYOTA hand–held tester

1	**Perform ACTIVE TEST by TOYOTA hand–held tester (Check operation of the air pump).**

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch to ON and push the hand–held tester main switch ON.
(c) Select the item ”SECOND AIR VSV” in the ACTIVE TEST and operate the air pump.
OK:
ON: Operated the air pump for 5 seconds.

HINT:
This ACTIVE TEST can be operated only for 5 seconds at a time.

NOTICE:
While performing the test during the engine is starting, it may cause damage to the catalyst. Therefore, be sure to preform the test with the ignition ON.

NG → **Go to step 6.**

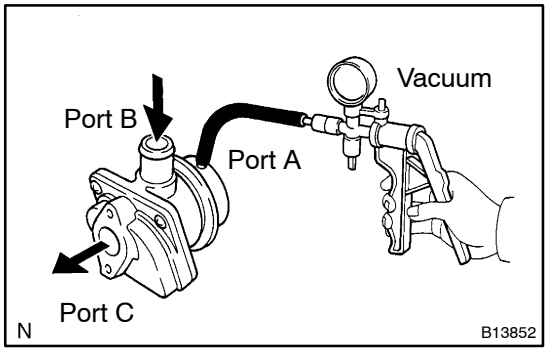
OK

2	**Check leak on air injection system.**

NG → **Repair or replace.**

OK

3	**Inspect air switching valve assembly.**



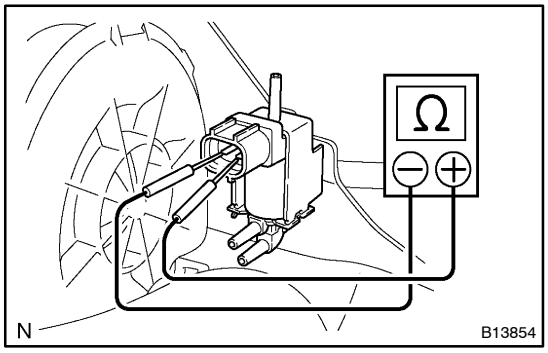
EG–1012

(a) Apply vacuum (45 kPa (459 gf/cm^2, 6.53 psi) to port A, blow air into port B and check that air is discharged from port C.

NG → **Replace air switching valve assembly.**

OK

4	Inspect vacuum switching valve assembly (for Air Switching Valve).

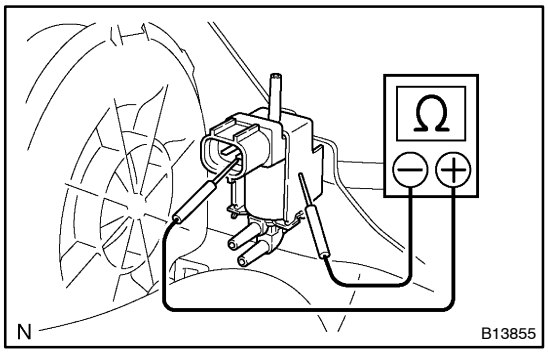


(a) Inspect VSV for open circuit.
(1) Disconnect the 3 hoses.
(2) Remove the screw and VSV for air pump.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 37 – 44 Ω at 20 °C (68 °F)

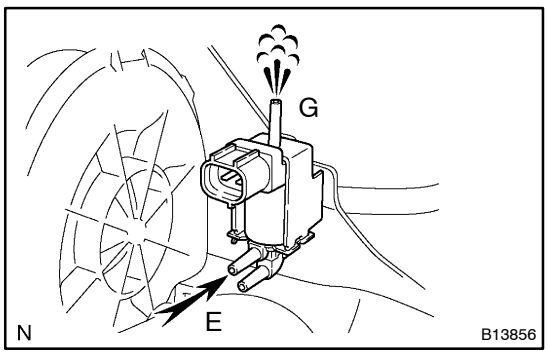
If there is no continuity, replace the VSV.



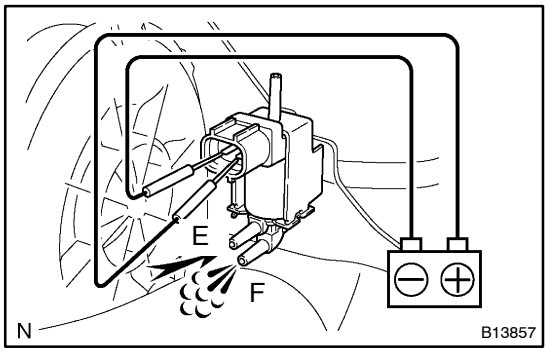
(b) Inspect VSV for ground.

Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect VSV operation.
(1) Check that air flows from ports E to G.



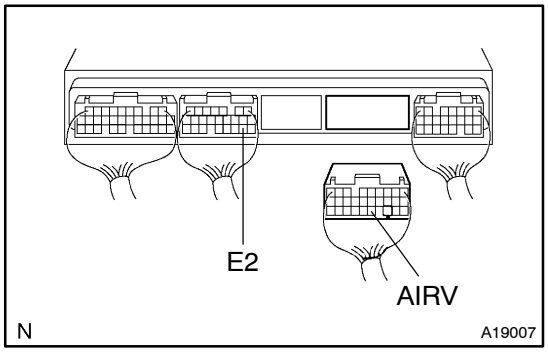
(2) Apply battery positive voltage across the terminals.
(3) Check that air flows from ports E to F.

If operation is not as specified, replace the air cleaner w/ air pump.

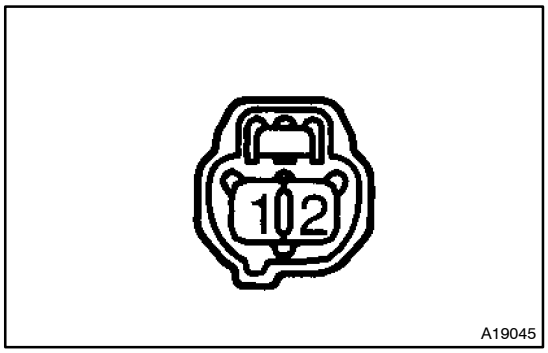
NG	Replace vacuum switching valve assembly.

OK

5	Check harness and connector (VSV – Engine ECU).



(a) Disconnect the VSV for air switching valve connector.
(b) Disconnect the engine ECU E4 connector.
(c) Check continuity between the terminals AIRV of the engine ECU connector and 2 of the VSV for air switching valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals AIRV and E2 of the engine ECU connector
Resistance: 1 MΩ or more

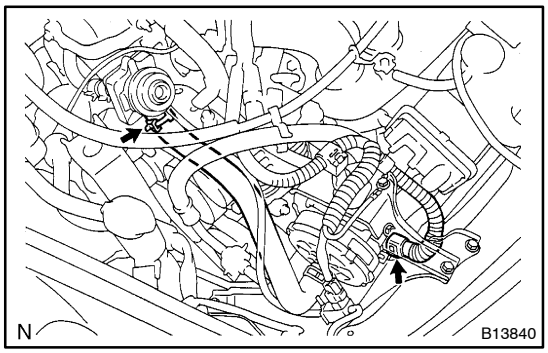


NG → **Repair or replace harness and connector.**

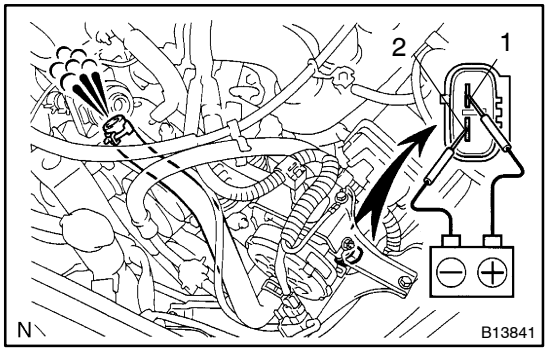
OK

Check and replace engine ECU (See pub. No. RM733E on page IN–20).

6	Inspect air pump assembly.



(a) Check operation air pump assembly.
  (1) Using a plier, grip the claws of the hose clip and slide the clip along the hose.
  (2) Disconnect the hose.
  (3) Disconnect the connector.



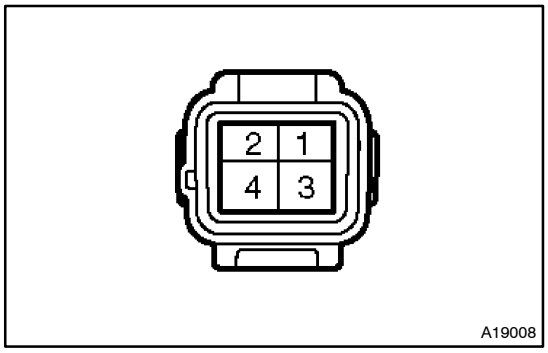
Test conditions:
- Water temperature: –15 – 45 °C (5 °F – 113 °F)
- Engine running: Below 7,100 rpm
- Battery voltage: Above 10.5 V
- DTC: No displayed

(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2 than check that air flow

NG	Replace air pump assembly.

OK

7	Inspect relay (Air Pump Relay).

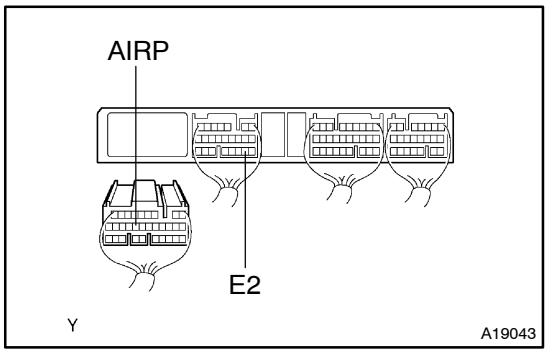


(a) Check operation air pump relay.
  (1) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.
  (2) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2.
  (3) Using an ohmmeter, check that there is continuity between terminals 3 and 4.

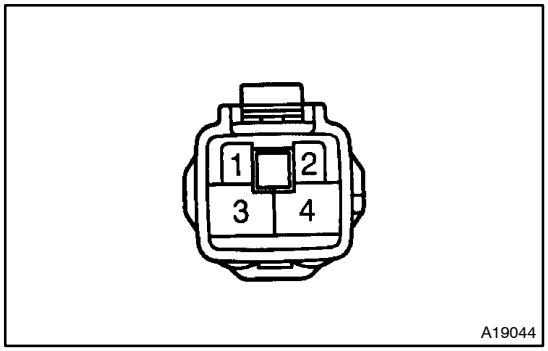
NG	Replace relay.

OK

8	Check harness and connector (Air Pump Relay – Engine ECU).



(a) Disconnect the engine ECU E6 connector.
(b) Disconnect air pump relay connector.
(c) Check continuity between the terminals AIRP of the engine ECU connector and 1 of the air pump relay connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals AIRP and E2 of the engine ECU connector.
Resistance: 1 MΩ or more



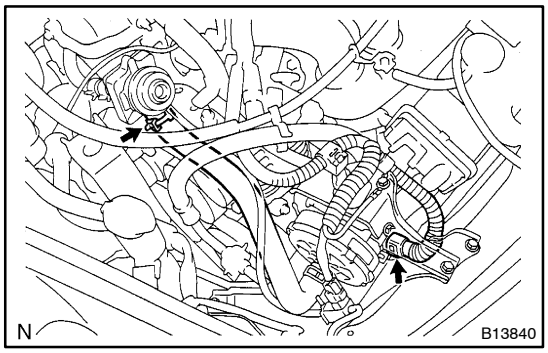
NG → **Repair or replace harness and connector.**

OK

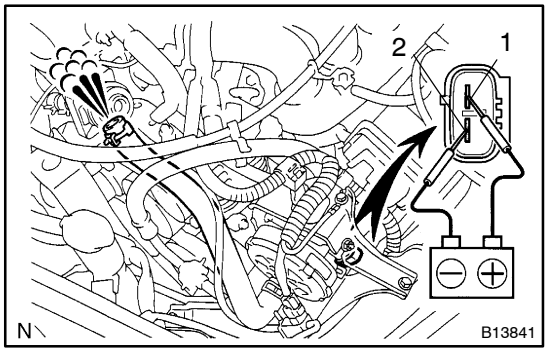
Repair or replace ECU (See pub. No. RM733E on page IN–20).

When not using TOYOTA hand–held tester

1	Inspect air pump assembly.



(a) Check operation air pump assembly.
  (1) Using a plier, grip the claws of the hose clip and slide the clip along the hose.
  (2) Disconnect the hose.
  (3) Disconnect the connector.



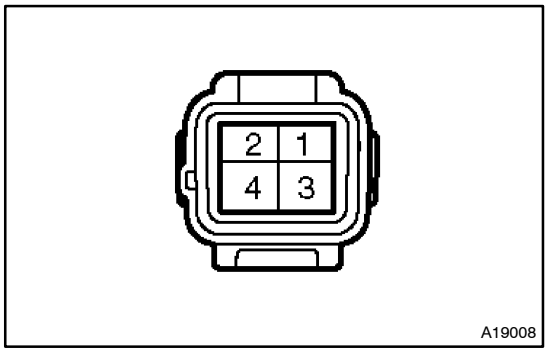
Test conditions:
- Water temperature: –15 – 45 °C (5 °F – 113 °F)
- Engine running: Below 7,100 rpm
- Battery voltage: Above 10.5 V
- DTC: No displayed

(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2 than check that air flow

NG	Replace air pump assembly.

OK

2	Inspect relay (Air Pump Relay).

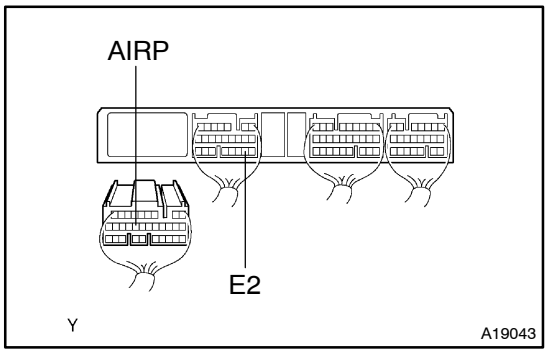


(a) Check operation air pump relay.
  (1) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.
  (2) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2.
  (3) Using an ohmmeter, check that there is continuity between terminals 3 and 4.

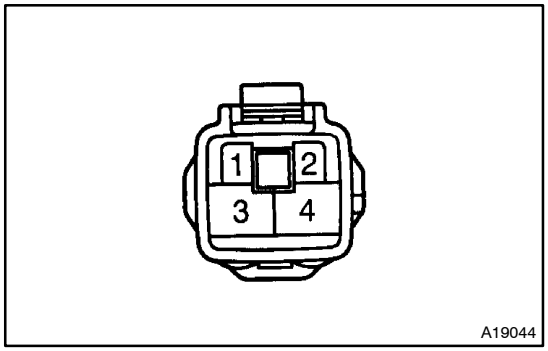
NG	Replace relay.

OK

3	Check harness and connector (Air Pump Relay – Engine ECU).



(a) Disconnect the engine ECU E6 connector.
(b) Disconnect air pump relay connector.
(c) Check continuity between the terminals AIRP of the engine ECU connector and 1 of the air pump relay connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals AIRP and E2 of the engine ECU connector.
Resistance: 1 MΩ or more



NG → **Repair or replace harness and connector.**

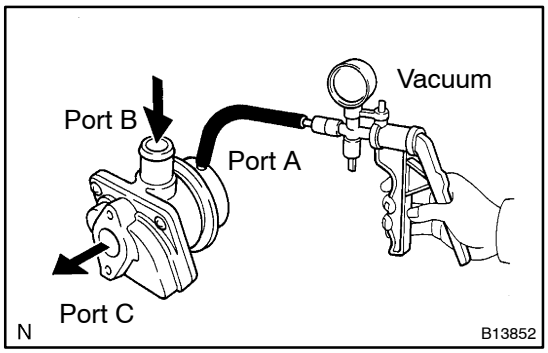
OK

4	Check leak on air injection system.

NG → **Repair or replace.**

OK

5	Inspect air switching valve assembly.

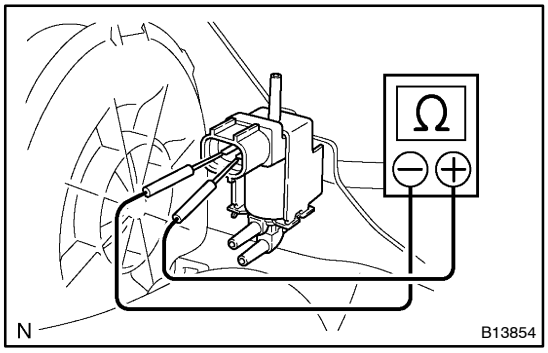


(a) Apply vacuum (45 kPa (459 gf/cm^2, 6.53 psi) to port A, blow air into port B and check that air is discharged from port C.

NG → **Replace air switching valve assembly.**

OK

6	Inspect vacuum switching valve assembly (for Air Switching Valve).

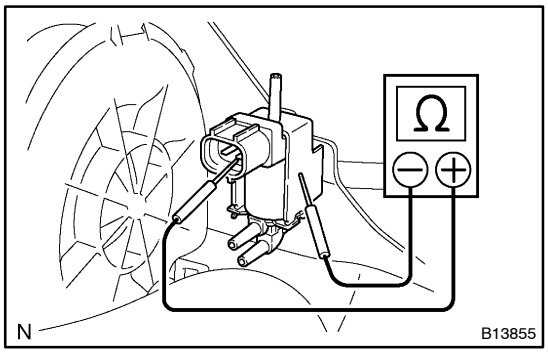


(a) Inspect VSV for open circuit.
(1) Disconnect the 3 hoses.
(2) Remove the screw and VSV for air pump.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 37 – 44 Ω at 20 °C (68 °F)

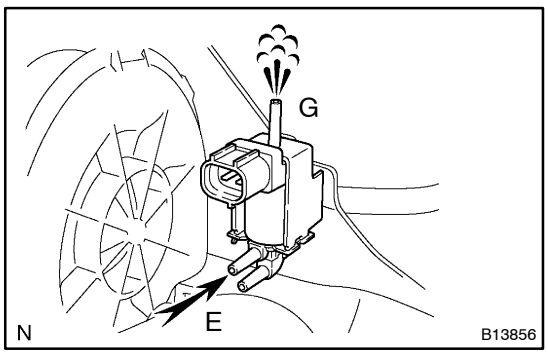
If there is no continuity, replace the VSV.



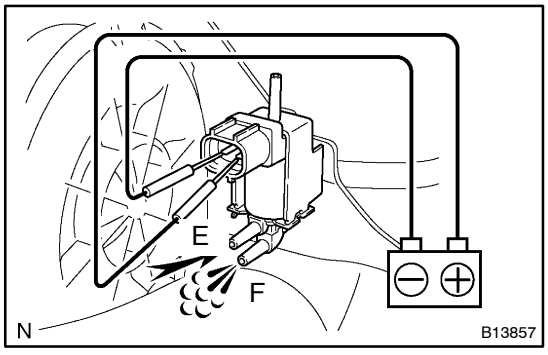
(b) Inspect VSV for ground.

Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect VSV operation.
(1) Check that air flows from ports E to G.



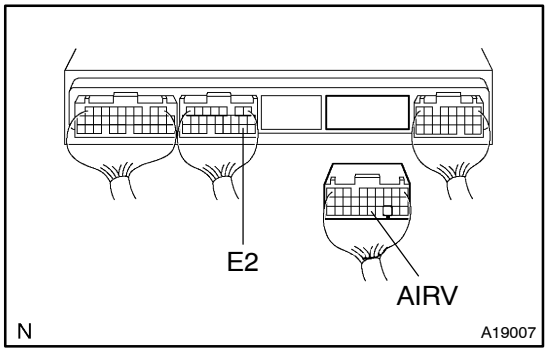
(2) Apply battery positive voltage across the terminals.
(3) Check that air flows from ports E to F.

If operation is not as specified, replace the air cleaner w/ air pump.

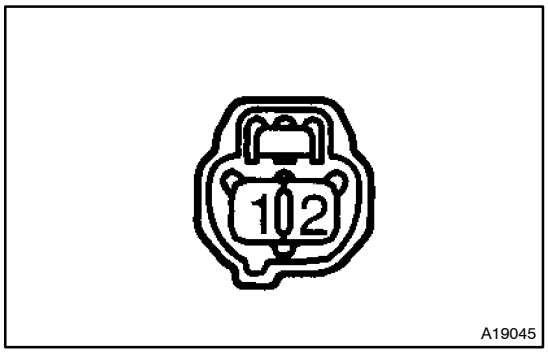
NG → **Replace vacuum switching valve assembly.**

OK

7	**Check harness and connector (VSV – Engine ECU).**



(a) Disconnect the VSV for air switching valve connector.
(b) Disconnect the engine ECU E4 connector.
(c) Check continuity between the terminals AIRV of the engine ECU connector and 2 of the VSV for air switching valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals AIRV and E2 of the engine ECU connector
Resistance: 1 MΩ or more



NG → **Repair or replace harness and connector.**

OK

Check and replace ECU (See pub. No. RM733E on page IN–20).

DI9ZQ–01

DTC	P0411	ASV Open–Fixed Malfunction

CIRCUIT DESCRIPTION

Refer to DTC P0410

DTC No.	DTC Detecting Condition	Trouble Area
P0410	End of the operation of the air injection system, after the engine is warmed up. (2 trip detection logic)	• Air switching valve • VSV for air switching valve • Engine ECU

WIRING DIAGRAM

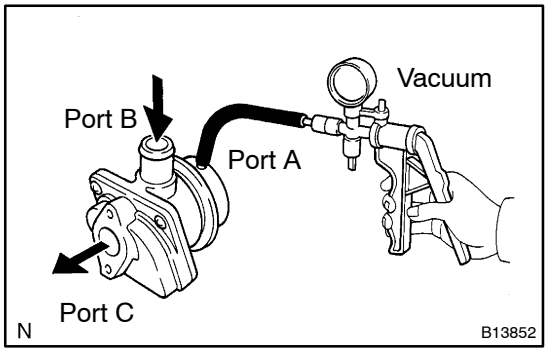
Refer to DTC P0410

INSPECTION PROCEDURE

HINT:

Read freeze frame data using a hand–held tester. Because freeze frame records the engine conditions when the 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.

1	**Inspect air switching valve assembly.**

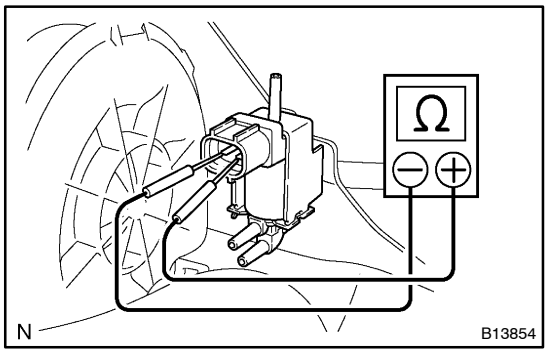


(a) Apply vacuum (45 kPa (459 gf/cm^2, 6.53 psi) to port A, blow air into port B and check that air is discharged from port C.

NG → **Replace air switching valve assembly.**

OK

2	**Inspect vacuum switching valve assembly (for Air Switching Valve).**

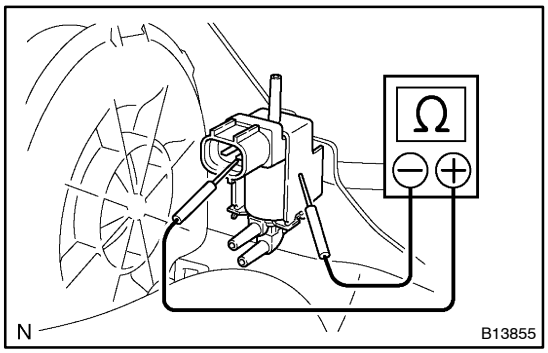


(a) Inspect VSV for open circuit.
  (1) Disconnect the 3 hoses.
  (2) Remove the screw and VSV for air pump.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 37 – 44 Ω at 20 °C (68 °F)

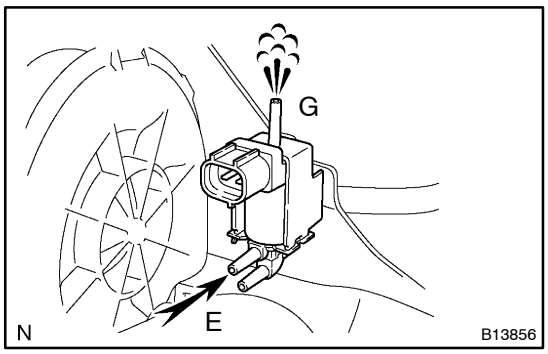
If there is no continuity, replace the VSV.



(b) Inspect VSV for ground.

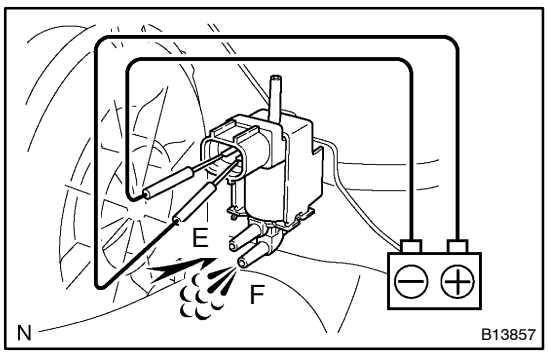
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect VSV operation.

(1) Check that air flows from ports E to G.



(2) Apply battery positive voltage across the terminals.

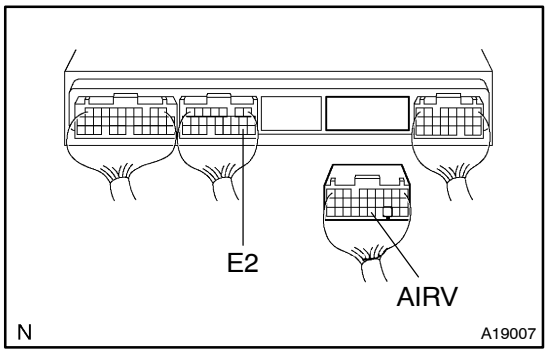
(3) Check that air flows from ports E to F.

If operation is not as specified, replace the air cleaner w/ air pump.

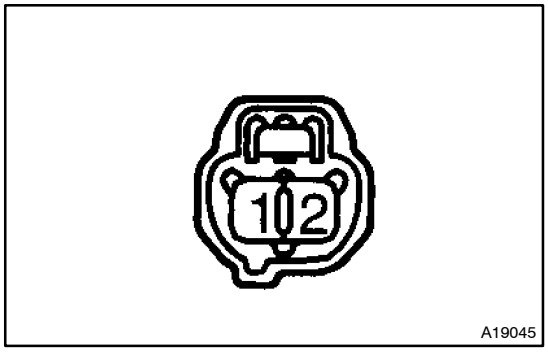
NG → **Replace vacuum switching valve assembly.**

OK

3	Check harness and connector (VSV – Engine ECU).



(a) Disconnect the VSV for air switching valve connector.
(b) Disconnect the engine ECU E4 connector.
(c) Check continuity between the terminals AIRV of the engine ECU connector and 2 of the VSV for air switching valve connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals AIRV and E2 of the engine ECU connector
Resistance: 1 MΩ or more



NG → **Repair or replace harness and connector.**

OK

Check and replace ECU (See pub. No. RM733E on page IN–20).

DI9ZP–01

DTC	P1205	Air Pump On–Fixed Malfunction

CIRCUIT DESCRIPTION

Refer to DTC P0410.

DTC No.	DTC Detecting Condition	Trouble Area
P0125	End of the operation of the air injection system, after the engine is warmed up.(1 trip detection logic)	• Air pump • Air pump relay • Engine ECU

WIRING DIAGRAM

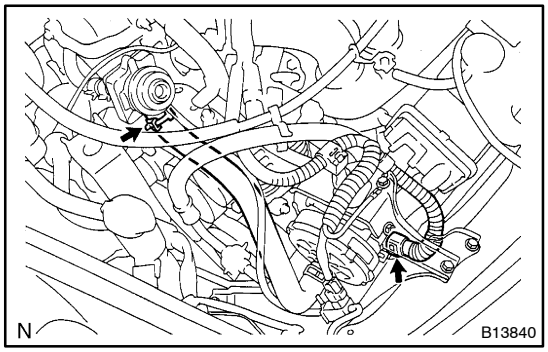
Refer to DTC P0410.

INSPECTION PROCEDURE

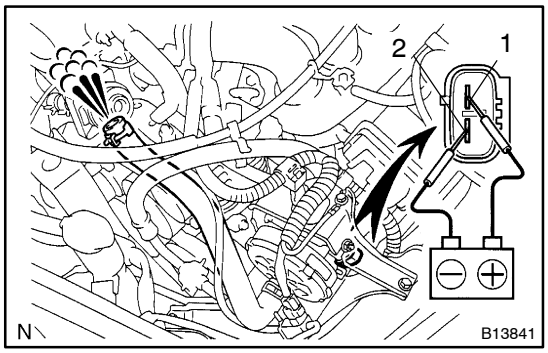
HINT:

Read freeze frame data using the hand–held tester, as freeze frame data records the engine conditions when the 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.

1	**Inspect air pump assembly.**



(a) Check operation air pump assembly.
  (1) Using a plier, grip the claws of the hose clip and slide the clip along the hose.
  (2) Disconnect the hose.
  (3) Disconnect the connector.



Test conditions:

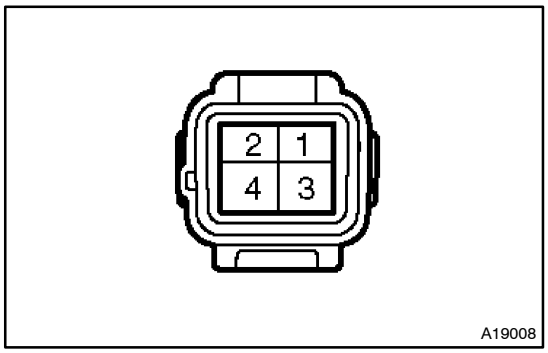
- Water temperature: –15 – 45 °C (5 °F – 113 °F)
- Engine running: Below 7,100 rpm
- Battery voltage: Above 10.5 V
- DTC: No displayed

(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2 than check that air flow

NG	**Replace air pump assembly.**

OK

2	Inspect relay (Air pump relay).

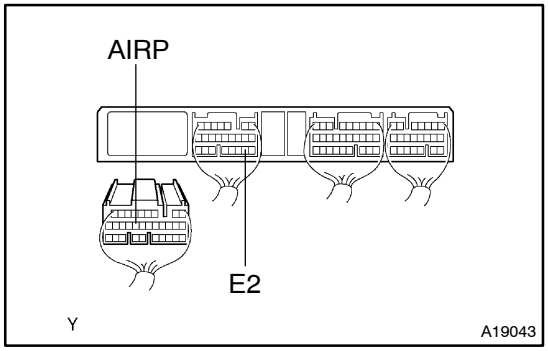


(a) Check operation air pump relay.
  (1) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.
  (2) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2.
  (3) Using an ohmmeter, check that there is continuity between terminals 3 and 4.

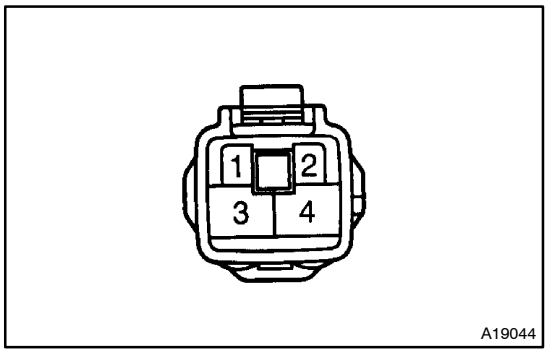
NG → **Replace relay.**

OK

3	Check harness and connector (Air Pump Relay – Engine ECU).



(a) Disconnect the engine ECU E6 connector.
(b) Disconnect air pump relay connector.
(c) Check continuity between the terminals AIRP of the engine ECU connector and 1 of the air pump relay connector.
Resistance: 1 Ω or less
(d) Check for short between the terminals AIRP and E2 of the engine ECU connector.
Resistance: 1 MΩ or more



NG → **Repair or replace harness and connector.**

NG

Check and replace ECU (See pub. No. RM733E on page IN–20).