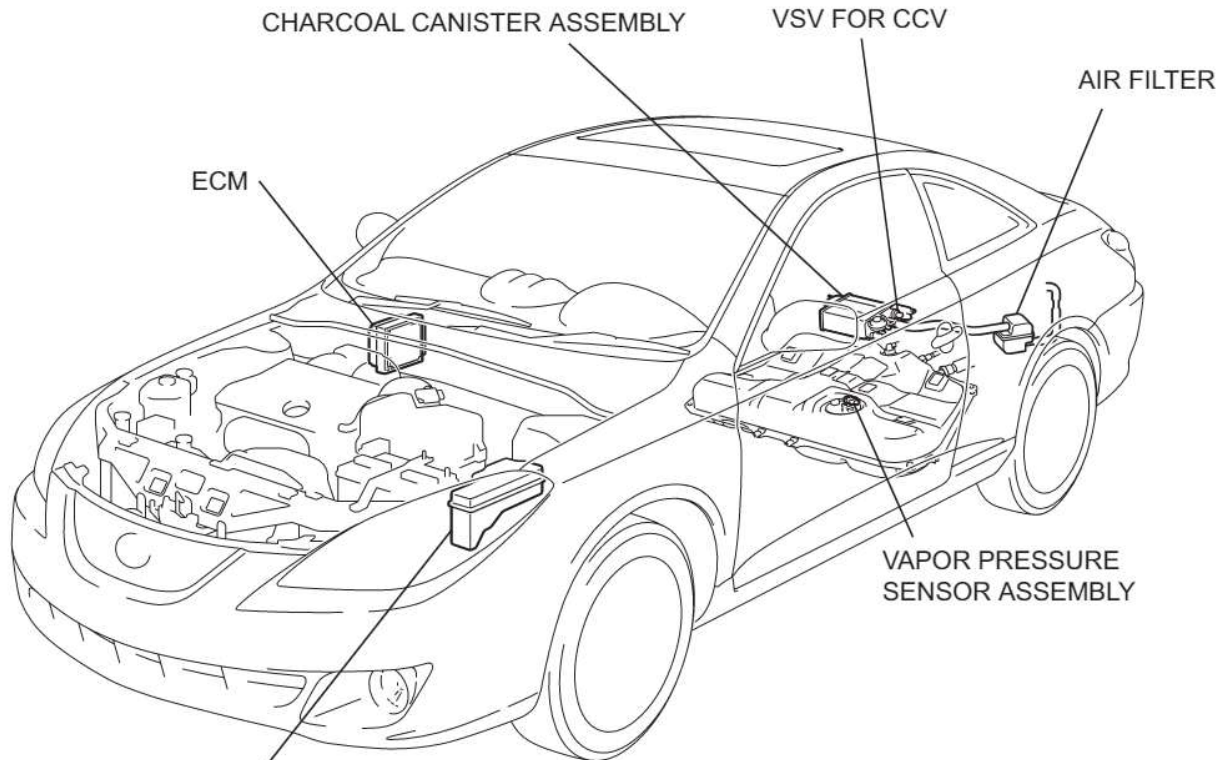


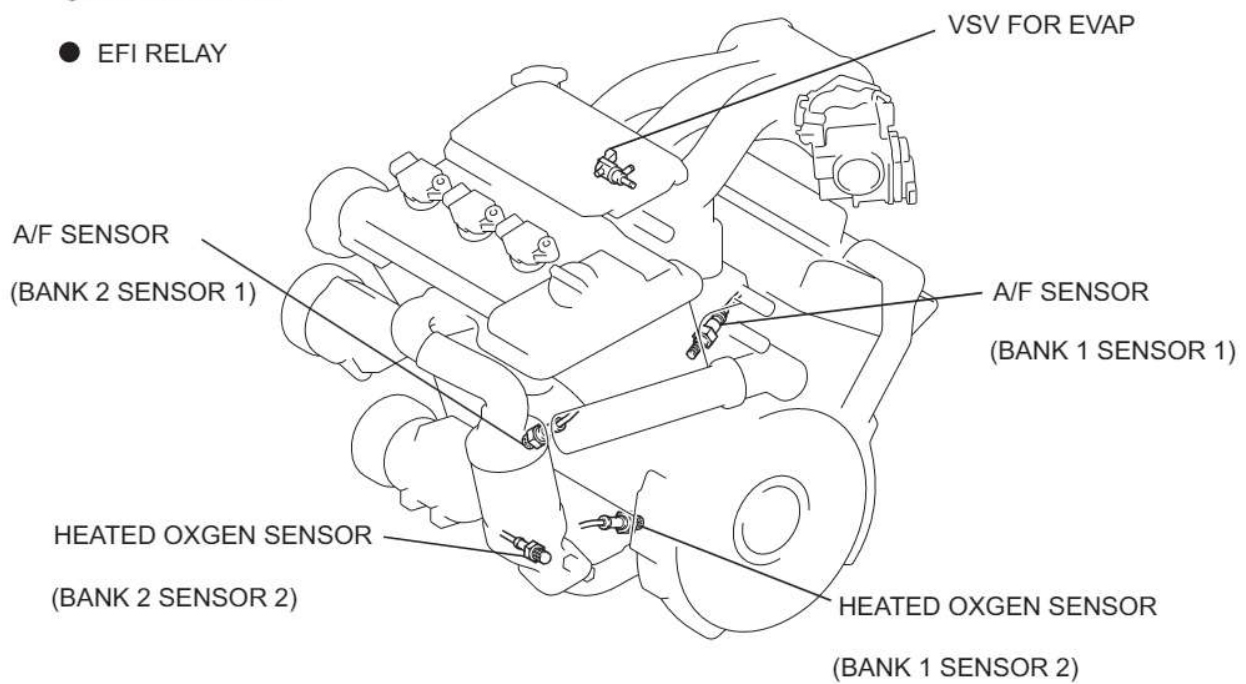
EMISSION CONTROL SYSTEM

PARTS LOCATION



ENGINE ROOM R/B AND J/B

- A/F HTR RELAY
- EFI RELAY

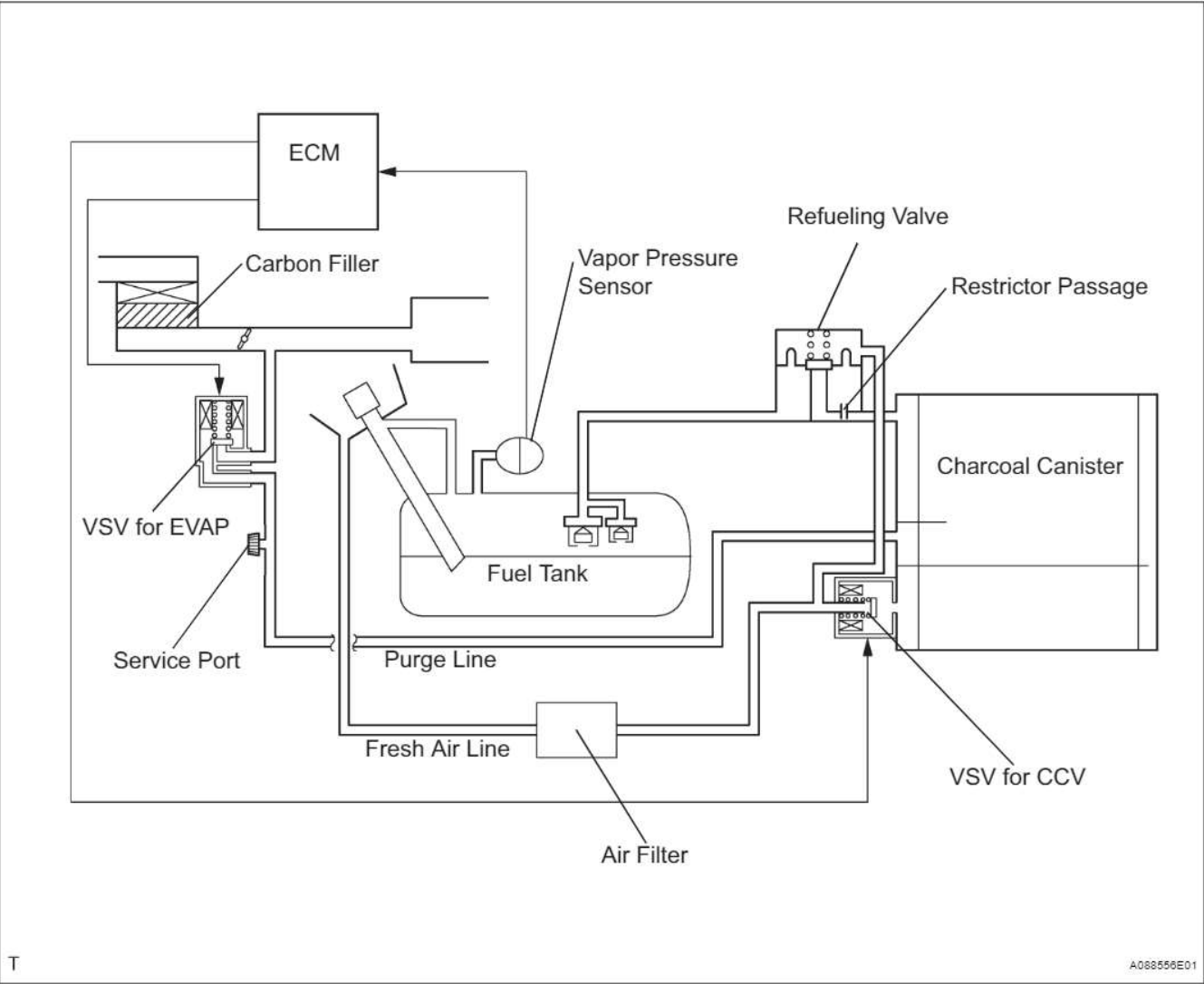


P

A109047E01

EC

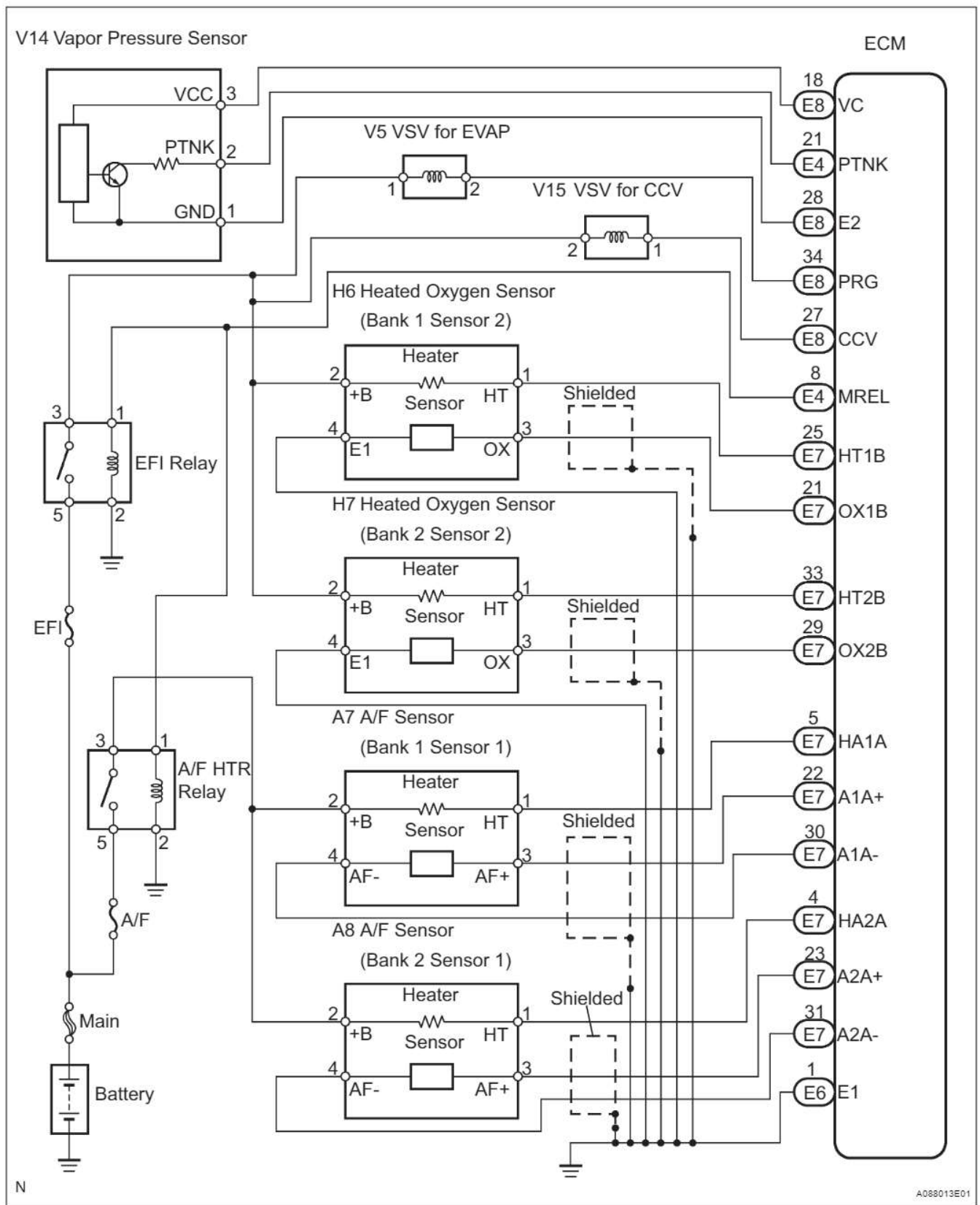
SYSTEM DIAGRAM

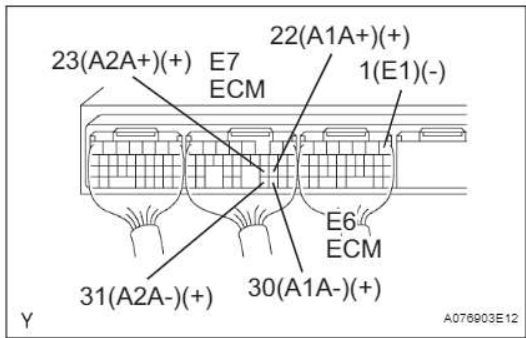


The emission control system is determined by the ECM based on signals from various sensors.

3MZ-FE EMISSION CONTROL – EMISSION CONTROL SYSTEM

EC-3





ON-VEHICLE INSPECTION

1. INSPECT AIR-FUEL RATIO COMPENSATION SYSTEM

- (a) Measure the voltage of the ECM connectors.
Voltage

Tester Connection	Condition	Specified Condition
E7-22 (A1A+) - E6-1(E1)	Ignition switch ON	3.3 V
E7-30 (A1A-) - E6-1(E1)	Ignition switch ON	3.0 V
E7-23 (A2A+) - E6-1(E1)	Ignition switch ON	3.3 V
E7-31 (A2A-) - E6-1(E1)	Ignition switch ON	3.0 V

HINT:

Voltage of the ECM is kept constant regardless of the voltage of the A/F sensor.

NOTICE:

Connect test leads to the connector's backside. The connectors should not be disconnected from the ECM.

- (b) Connect the intelligent tester to the DLC3.
(c) Select "DATA MONITOR". Then select "A/FS B1 S1", "A/FS B2 S1" and "O2S B1 S2" to display the monitors.
(d) Warm up the A/F sensor with the engine speed at 2,500 rpm for approximately 2 minutes.
(e) Maintain the engine speed at 2,500 rpm and confirm that the displays of "A/FS B1 S1" and "A/FS B2 S1" are as shown in the illustration.

HINT:

- The illustration may differ slightly from the display on the intelligent tester.
- Only the intelligent tester displays the waveform of the A/F sensor.

- (f) Confirm that the display of "O2S B1 S2" changes between 0 to 1 V with the engine speed at 2,500 rpm.

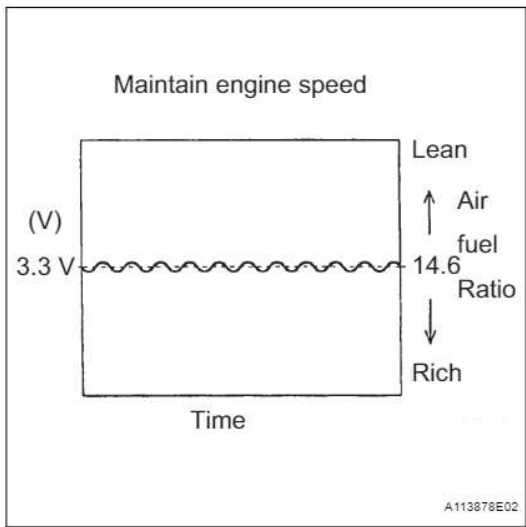
2. INSPECT FUEL CUT-OFF RPM

- (a) Increase the engine speed to at least 3,500 rpm.
(b) Use a sound scope to check for injector operating sounds.
(c) Check that when the throttle lever is released, injector operation sounds stop momentarily (at 2,500 rpm) and then resume (at 1,400 rpm).

Standard

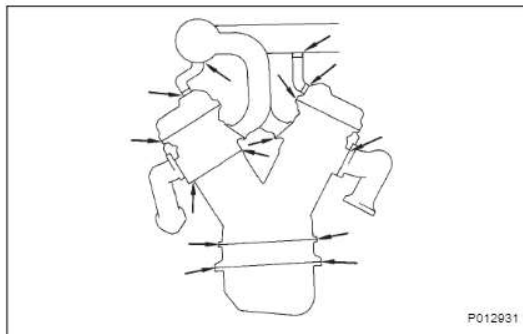
Item	Specified Condition
Fuel cut off rpm	2,500 rpm
Fuel return rpm	1,400 rpm

EC



3MZ-FE EMISSION CONTROL – EMISSION CONTROL SYSTEM

EC-5



3. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

- (a) Check for cracks, leaks or damage.

HINT:

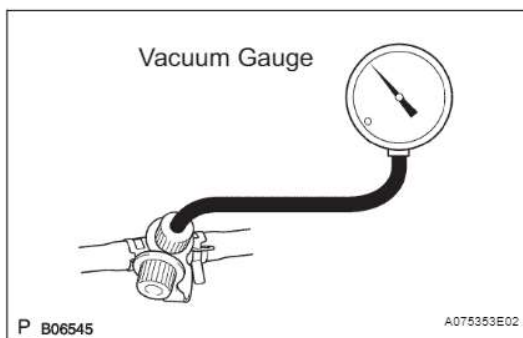
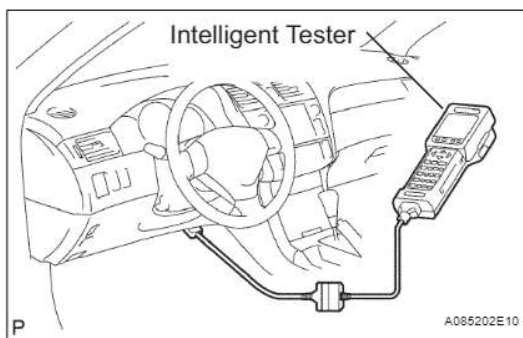
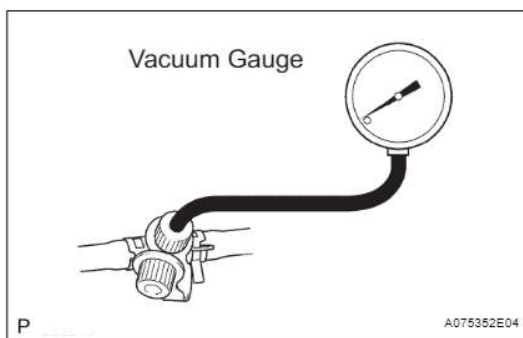
Removal or problems with the engine oil dipstick, oil filler cap, PCV hose and other components may cause the engine to run improperly. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run improperly.

If necessary, replace any damaged parts.

4. INSPECT EVAP SYSTEM LINE

- (a) When using intelligent tester:

- (1) Warm up and stop the engine.
 1. Warm up the engine to normal operating temperature.
- (2) Install a vacuum gauge (EVAP control system test equipment vacuum gauge) to the EVAP service port on the purge line.



- (3) Connect the intelligent tester to the DLC3.
- (4) Start the engine.
- (5) Turn the intelligent tester main switch ON.
- (6) Use the ACTIVE TEST mode on the intelligent tester to operate the VSV for EVAP.

- (7) Check the vacuum while the engine is idling.

Standard:

Maintain at 0.368 to 19.713 in.Hg (5 to 268 in.Aq) for over 5 seconds.

HINT:

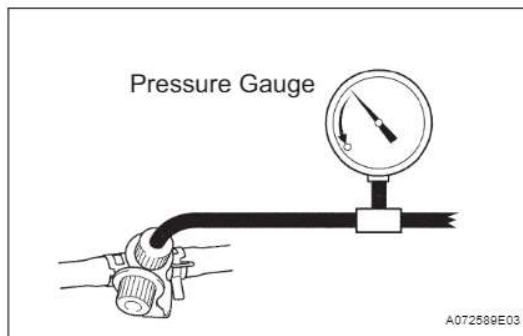
If the vacuum does not change, the hose connecting the VSV to the service port has come loose or is blocked, or the VSV is malfunctioning.

- (8) Stop the engine.
- (9) Disconnect the intelligent tester from the DLC3.
- (10) Disconnect the vacuum gauge from the EVAP service port on the purge line.

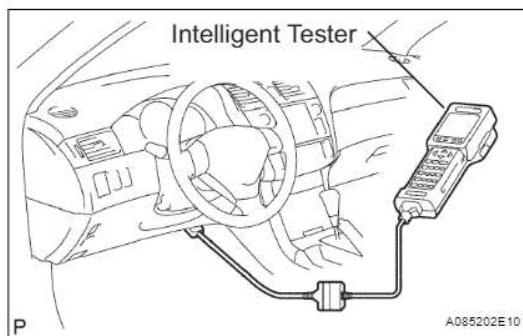
EC

EC-6

3MZ-FE EMISSION CONTROL – EMISSION CONTROL SYSTEM



- (11) Connect a pressure gauge to the EVAP service port on the purge line.



- (12) Connect the intelligent tester to the DLC3.
 (13) Turn the ignition switch ON. (Procedure 1)
 (14) Turn the intelligent tester main switch ON.
 (15) Use the ACTIVE TEST mode on the intelligent tester to operate the VSV for CCV.

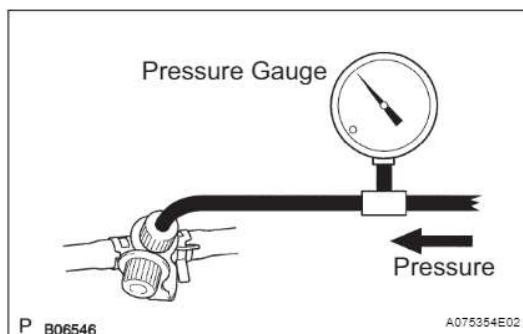
NOTICE:

In procedure 1, the ignition switch should be ON, but the engine should not be running.

HINT:

If the check is not completed within 10 minutes, the VSV for CCV will be reset and close automatically.

EC



- (16) Check the pressure.
 1. Add 13.5 to 15.5 in.Aq of pressure from the EVAP service port.

Standard:

2 minutes after the pressure is added, the gauge should still read over 7.7 to 8.8 in.Aq.

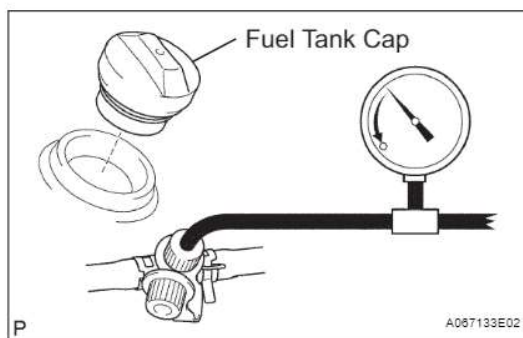
HINT:

If you cannot add pressure, the hose connecting the VSV for EVAP canister fuel tank has become disconnected or the VSV is open.

2. Check if the pressure decreases when the fuel tank cap is removed while adding pressure.

HINT:

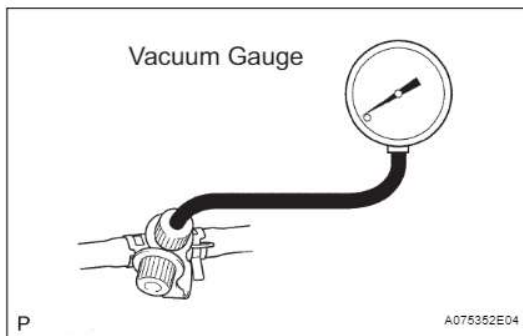
If the pressure does not decrease when the fuel tank cap is removed, the hose connecting the service port to the fuel tank is blocked.



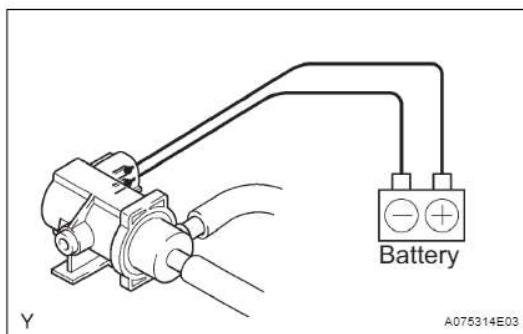
- (17) Turn the ignition switch OFF.
 (18) Disconnect the intelligent tester from the DLC3.
 (b) When not using intelligent tester:
 (1) Warm up and stop the engine.
 1. Warm up the engine to normal operating temperature.

3MZ-FE EMISSION CONTROL – EMISSION CONTROL SYSTEM

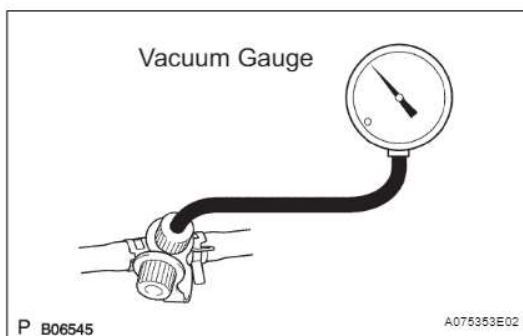
EC-7



- (2) Install a vacuum gauge (EVAP control system test equipment vacuum gauge) to the EVAP service port on the purge line.



- (3) Disconnect the VSV connector for EVAP.
 (4) Connect the battery's positive (+) and negative (-) leads to the VSV for EVAP terminals.
 (5) Start the engine.

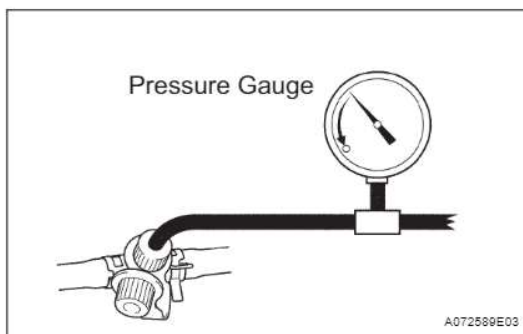


- (6) Check the vacuum while the engine is idling.
Standard:
 Maintain at 0.368 to 19.713 in.Hg (5 to 268 in.Aq) for over 5 seconds.

HINT:

If the vacuum does not change, the hose connecting the VSV to the service port has come loose or is blocked, or the VSV is malfunctioning.

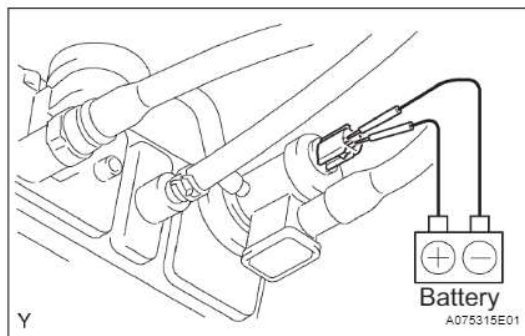
- (7) Stop the engine.
 (8) Disconnect the battery's positive (+) and negative (-) leads from the VSV for EVAP terminals.
 (9) Reconnect the VSV for EVAP connector.
 (10) Disconnect the vacuum gauge from the EVAP service port on the purge line.
 (11) Connect a pressure gauge to the EVAP service port on the purge line.



EC

EC-8

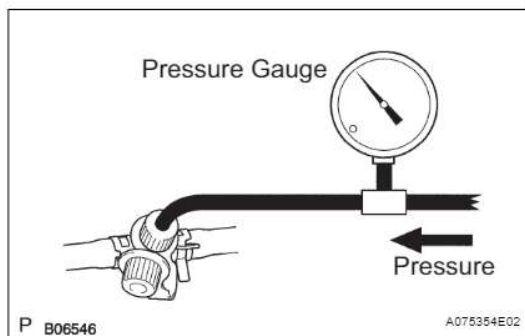
3MZ-FE EMISSION CONTROL – EMISSION CONTROL SYSTEM



- (12) Disconnect the VSV connector for CCV.
- (13) Connect the battery's positive (+) and negative (-) leads to the VSV terminals for CCV.

NOTICE:

Incorrect electrode connection causes damage to the VSV. Pay due attention when connecting the lead wire.



- (14) Check the pressure.
 1. Add 13.5 to 15.5 in.Aq of pressure from the EVAP service port.

Standard:

2 minutes after the pressure is added, the gauge should still read over 7.7 to 8.8 in.Aq.

HINT:

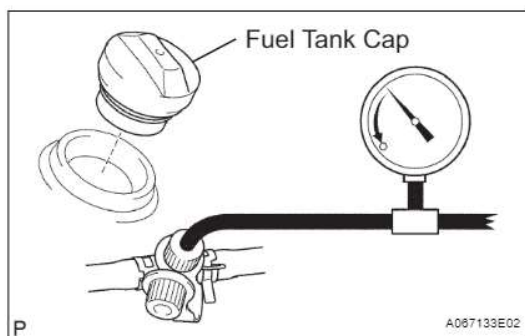
If you cannot add pressure, the hose connecting the VSV for EVAP canister fuel tank has become disconnected or the VSV is open.

2. Check if the pressure decreases when the fuel tank cap is removed while adding pressure.

HINT:

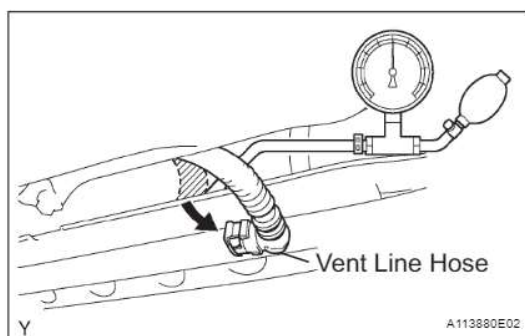
If the pressure does not decrease when the fuel tank cap is removed, the hose connecting the service port to the fuel tank is blocked.

- (15) Disconnect the battery's positive (+) and negative (-) leads from the VSV terminals for CCV.
- (16) Reconnect the VSV connector for CCV.
- (17) Disconnect the pressure gauge from the EVAP service port on the purge line.



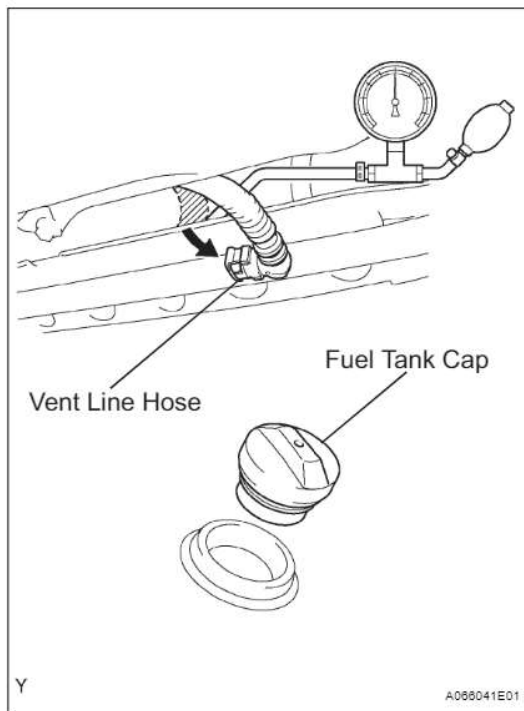
5. CHECK AIR TIGHTNESS IN FUEL TANK AND FILLER PIPE

- (a) Disconnect the vent line hose from the fuel tank (See page [EC-15](#)).
- (b) Connect the pressure gauge to the fuel tank.
- (c) Apply pressure to the fuel tank to create an internal pressure of 4 kPa (41 gf/cm², 0.58 psi).
- (d) Check that the internal pressure of the fuel tank is maintained for 1 minute.
- (e) Check the connected portions of each hose and pipe.
- (f) Check the installed parts on the fuel tank. If malfunctions, damage or other problems are found, replace the fuel tank and filler pipe.
- (g) Reconnect the vent line hose to the fuel tank.

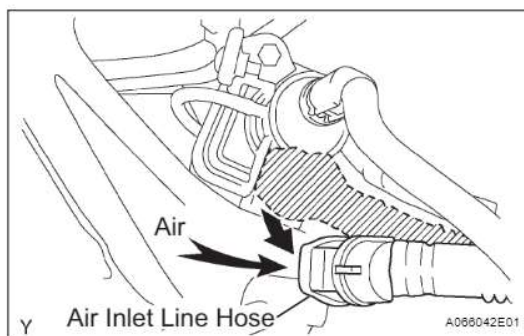


3MZ-FE EMISSION CONTROL – EMISSION CONTROL SYSTEM

EC-9

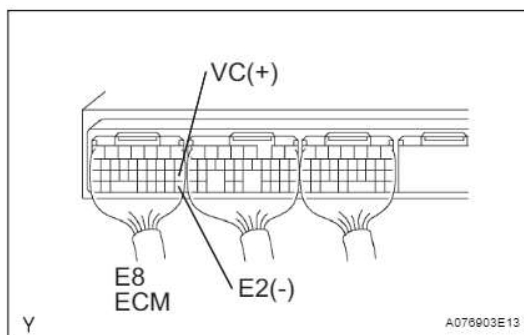
**6. INSPECT FUEL CUTOFF VALVE AND FILL CHECK VALVE**

- Disconnect the vent line hose from the fuel tank (See page EC-15).
- Connect the pressure gauge to the fuel tank.
- Fill the fuel tank with fuel until full.
HINT:
When the fuel tank is full, the float valve of the fill check valve is closed and no air can pass through.
- Apply pressure of 4 kPa (41 gf/cm², 0.58 psi) to the vent port of the fuel tank.
- Remove the fuel tank cap, and check that pressure drops.
If pressure does not drop, replace the fuel tank assembly.
- Reconnect the vent line hose to the fuel tank.

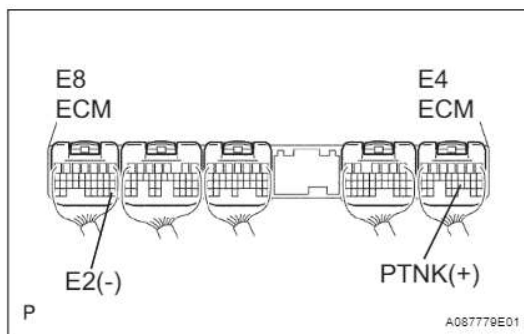
**7. CHECK AIR INLET LINE**

- Disconnect the air inlet line hose from the charcoal canister.
- Check that air can flow freely into the air inlet line. If air cannot flow freely into the air inlet line, repair or replace it.
- Reconnect the air inlet line hose to the charcoal canister.

EC

**8. INSPECT VAPOR PRESSURE SENSOR**

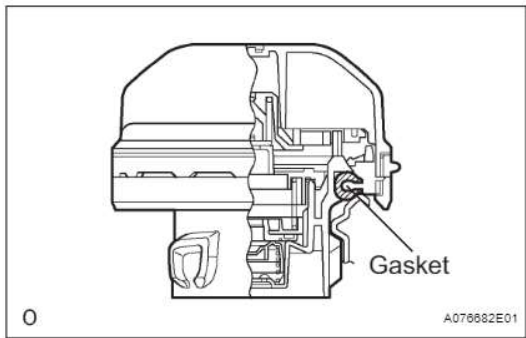
- Check the power source voltage of the vapor pressure sensor.
 - Turn the ignition switch ON.
 - Measure the voltage between terminals E8-18 (VC) and E8-28 (E2) of the ECM connector.
Voltage:
4.5 to 5.5 V
 - Turn the ignition switch OFF.



- Check the power output of the vapor pressure sensor.
 - Turn the ignition switch ON.
 - Remove the fuel tank cap.
 - Measure the voltage between terminals E4-21 (PTNK) and E8-28 (E2) of the ECM connectors.
Voltage:
3.0 to 3.6 V
 - Reinstall the fuel tank cap.

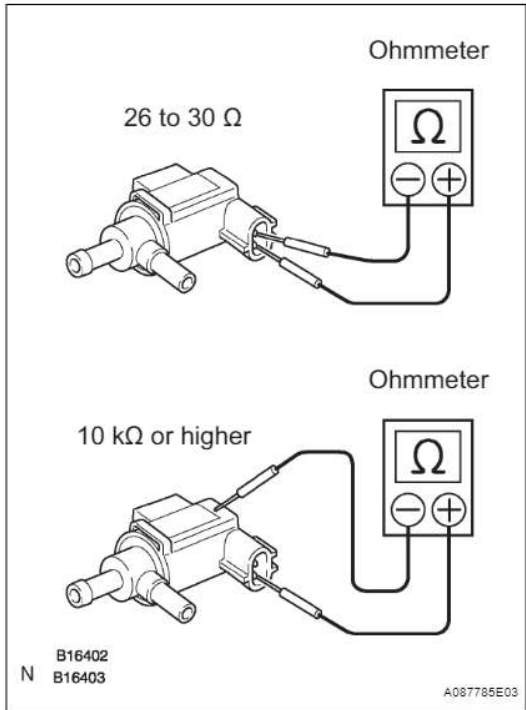
EC-10

3MZ-FE EMISSION CONTROL – EMISSION CONTROL SYSTEM



INSPECTION

1. INSPECT FUEL TANK CAP ASSEMBLY
- (a) Visually check if the cap and gasket are deformed or damaged.



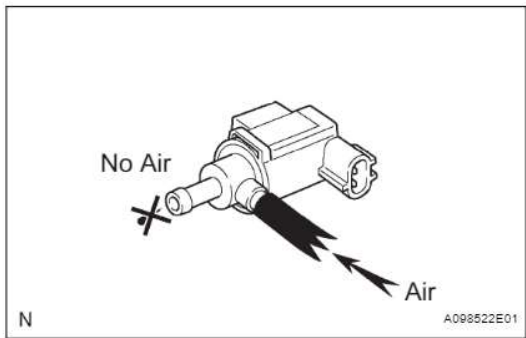
2. INSPECT NO.1 VACUUM SWITCHING VALVE ASSEMBLY

- (a) Check the VSV for open circuit.
- (1) Measure the resistance.

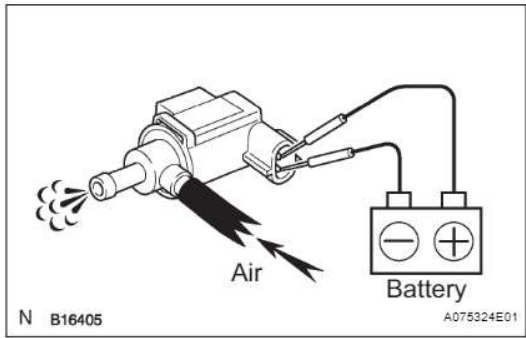
Resistance

Tester Connection	Specified Condition
1 - 2	26 to 30 Ω at 20°C (68°F)
1 - Body ground 2 - Body ground	10 k Ω or higher

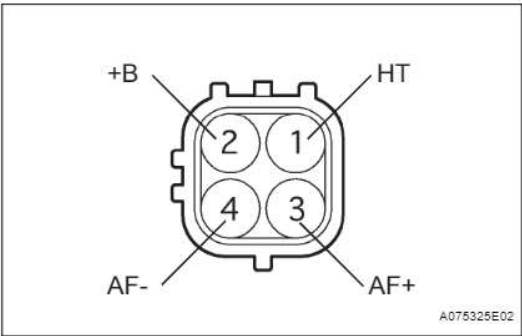
If the resistance is not as specified, replace the VSV assembly.



- (b) Check VSV operation.
- (1) Check that air does not flow from the port as shown in the illustration.



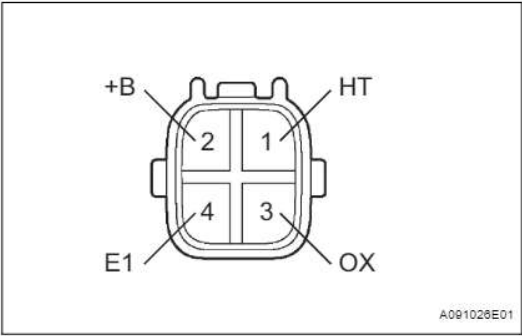
- (2) Apply battery positive voltage across the terminals.
- (3) Check that air flows from the port as shown in the illustration.
- If the result is not as specified, replace the VSV assembly.



- 3. INSPECT AIR FUEL RATIO SENSOR**
(a) Measure the resistance between terminals 1 (HT) and 2 (+B).
Resistance

Condition	Specified Condition
20°C (68°F)	0.8 to 1.4 Ω
800°C (1,472°F)	1.8 to 3.2 Ω

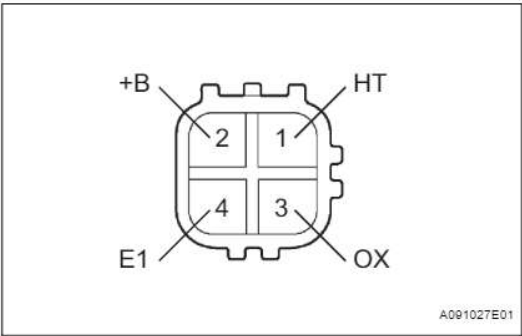
If the result is not as specified, replace the sensor.



- 4. INSPECT HEATED OXYGEN SENSOR (for Bank 1 Sensor 2)**
(a) Measure the resistance between terminals 1 (HT) and 2 (+B).
Resistance

Condition	Specified Condition
20°C (68°F)	11 to 16 Ω
800°C (1,472°F)	23 to 32 Ω

If the result is not as specified, replace the sensor.



- 5. INSPECT HEATED OXYGEN SENSOR (for Bank 2 Sensor 2)**
(a) Measure the resistance between terminals 1 (HT) and 2 (+B).
Resistance

Condition	Specified Condition
20°C (68°F)	11 to 16 Ω
800°C (1,472°F)	23 to 32 Ω

If the result is not as specified, replace the sensor.

EC-12

3MZ-FE EMISSION CONTROL – CANISTER

CANISTER

REMOVAL

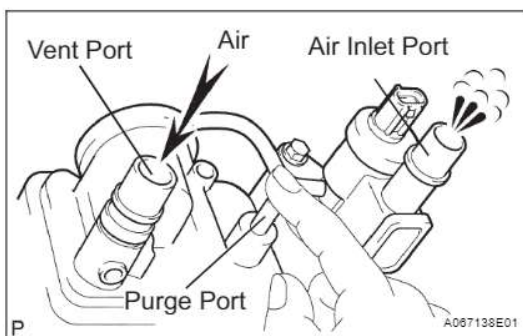
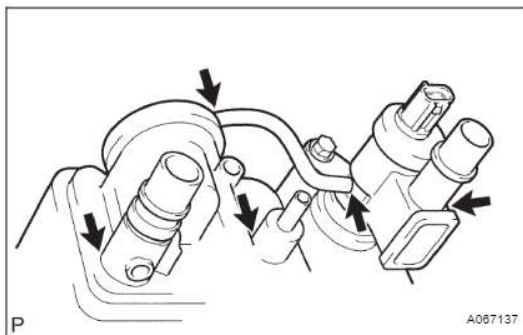
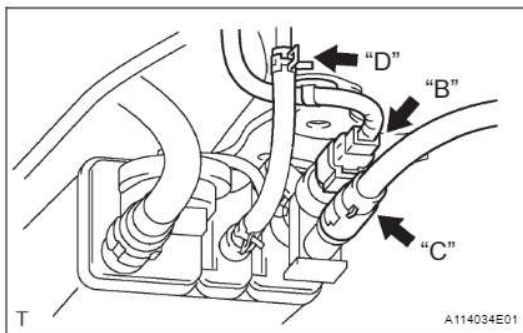
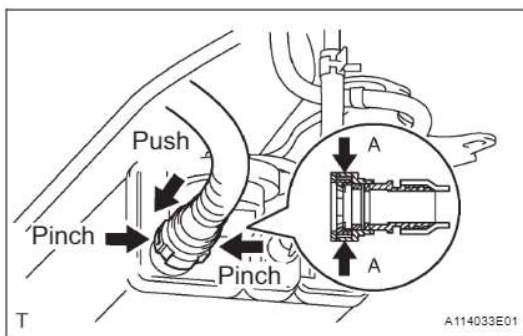
1. REMOVE FUEL TANK ASSEMBLY

HINT:

FU-28

2. REMOVE CHARCOAL CANISTER ASSEMBLY

- (a) Disconnect the fuel tank vent hose.
 - (1) Push the connector deep into the charcoal canister assembly to release the locking tab.
 - (2) Pinch portion A.
 - (3) Pull out the connector.
- (b) Disconnect the VSV connector for CCV (procedure "B").
- (c) Disconnect the fuel emission hose (procedure "C").
- (d) Disconnect the air inlet line hose (procedure "D").
- (e) Remove the 2 bolts and charcoal canister.



INSPECTION

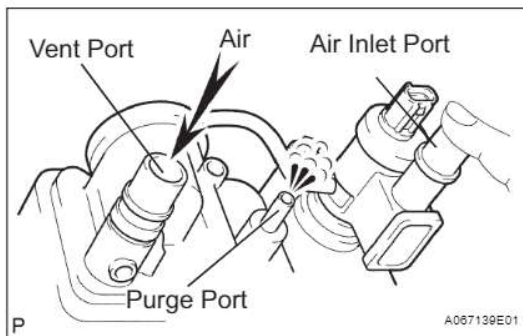
1. INSPECT CHARCOAL CANISTER ASSEMBLY

- (a) Visually check the charcoal canister for cracking or damage.
If cracking or damage is found, replace the charcoal canister assembly.
- (b) Check charcoal canister operation.
 - (1) While holding the purge port closed, blow air (0.39 kPa (4.0 gf/cm², 0.06 psi)) into the vent port, and check that air flows from the air inlet port.
If the result is not as specified, replace the charcoal canister.

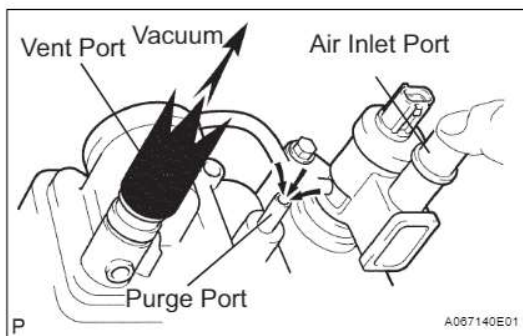
EC

3MZ-FE EMISSION CONTROL – CANISTER

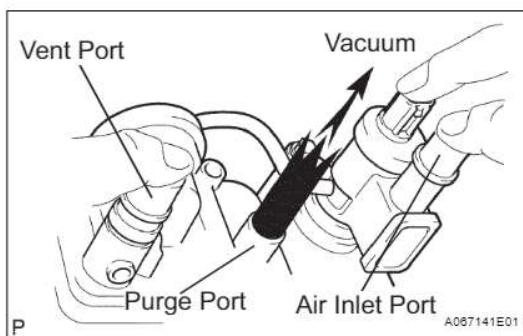
EC-13



- (2) While holding the air inlet port closed, blow air (0.39 kPa (4.0 gf/cm², 0.06 psi)) into the vent port, and check that air flows from the purge port.
If the result is not as specified, replace the charcoal canister.

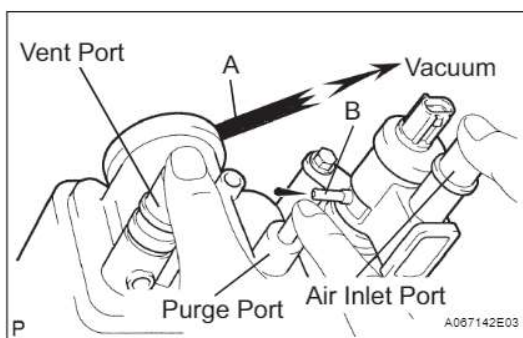


- (3) While holding the air inlet port closed, apply vacuum (3.43 kPa (25.7 gf/cm², 1.01 psi)) to the vent port, and check that air is sucked into the purge port.
If the result is not as specified, replace the charcoal canister.

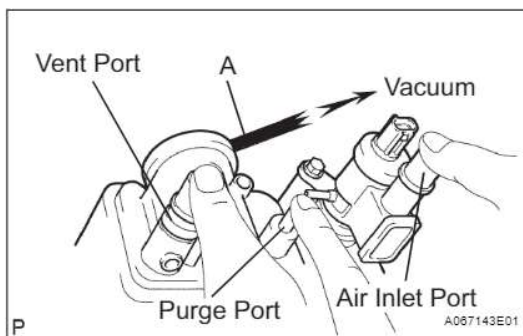


- (c) Check the air tightness.
(1) While holding the vent and air inlet ports closed, apply vacuum (3.43 kPa (25.7 gf/cm², 1.01 psi)) to the purge port, and check that the vacuum is maintained for 1 minute.
HINT:
In order to maintain air tightness, the check should be performed while holding the VSV terminal port closed.
If the result is not as specified, replace the charcoal canister.

EC



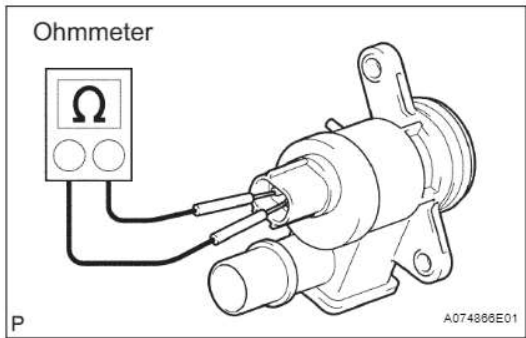
- (d) Check the diaphragm.
(1) Remove the air hose between ports A and B.
(2) While holding the vent, purge and air inlet ports closed, apply vacuum (1.42 kPa (11 mmHg, 0.42 in.Hg)) into port A, and check that air is sucked in from port B.



- (3) While holding the vent, purge and air inlet ports closed, apply vacuum (1.42 kPa (11 mmHg, 0.42 in.Hg)) into port A, and measure how long it takes for the vacuum pressure to decrease.
Vacuum pressure decrease time:
10 seconds or more
If the result is not as specified, replace the charcoal canister.
(4) Reinstall the air hose between ports A and B.

EC-14

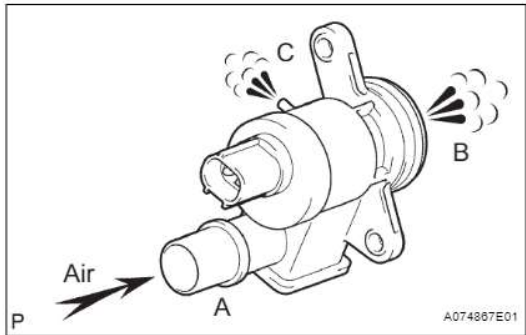
3MZ-FE EMISSION CONTROL – CANISTER



- (e) Check if the VSV has an open circuit.
(1) Measure the resistance between the terminals.
Resistance

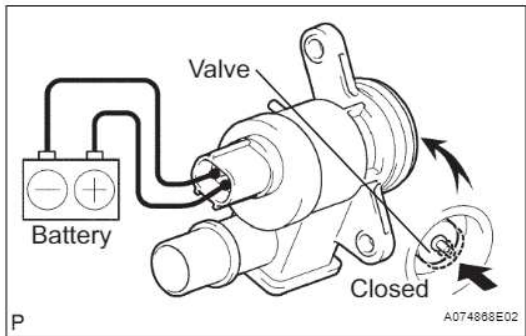
Condition	Specified Condition
20°C (68°F)	25 to 30 Ω
100°C (212°F)	32 to 40 Ω

If the result is not as specified, replace the charcoal canister.

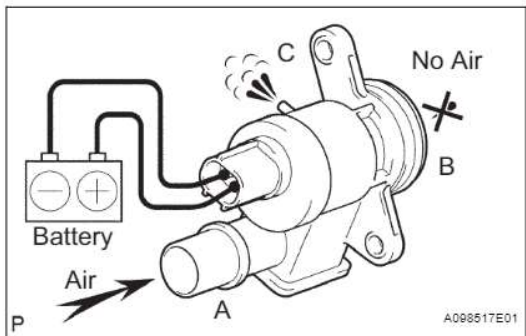


- (f) Check VSV operation.
(1) Check that air flows from port A to ports B and C.
If the result is not as specified, replace the charcoal canister.

EC



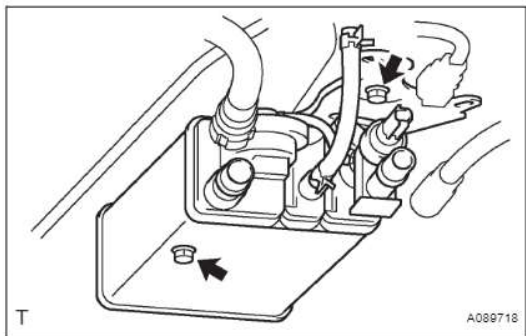
- (2) Apply battery positive voltage across the terminals.
(3) Check that the valve closes.
If the result is not as specified, replace the charcoal canister.



- (4) Check that air does not flow from port A to port B.
(5) Check that air flows from port A to port C.
If the result is not as specified, replace the charcoal canister.

INSTALLATION

1. **INSTALL CHARCOAL CANISTER ASSEMBLY**
(a) Install the charcoal canister assembly with the 2 nuts.
Torque: 39.2 N*m (400 kgf*cm, 29 ft.*lbf)
2. **INSTALL FUEL TANK ASSEMBLY**
HINT:
FU-28



VENTILATION VALVE

REMOVAL

1. REMOVE VENTILATION VALVE SUB-ASSEMBLY

- Disconnect the ventilation valve hose from the ventilation valve.
- Remove the ventilation valve.

INSPECTION

1. INSPECT VENTILATION VALVE SUB-ASSEMBLY

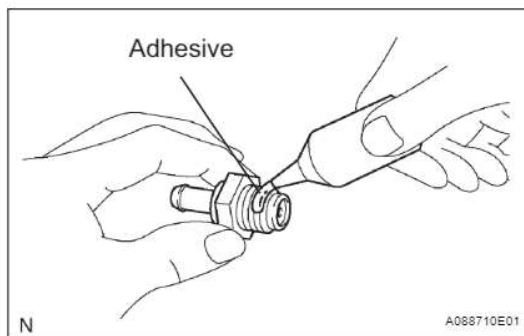
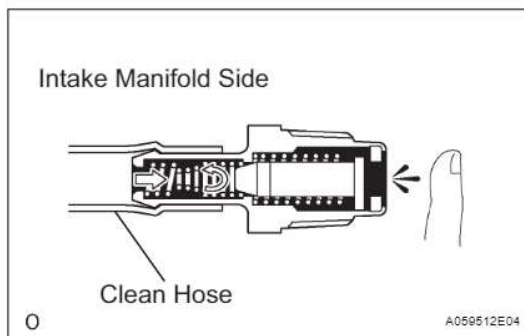
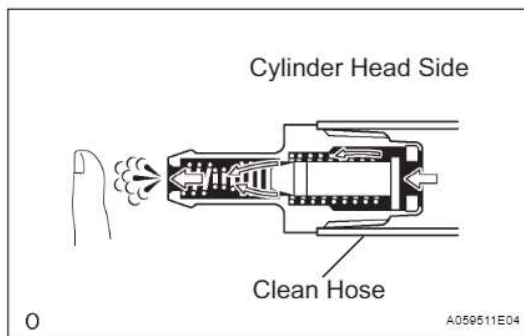
- Install a clean hose to the ventilation valve.
- Check ventilation valve operation.
 - Blow air into the cylinder head side, and check that air passes through easily.

CAUTION:

Do not suck air through the valve.

Petroleum substances inside the valve are dangerous to your health.

- Blow air into the intake manifold side, and check that air passes through with difficulty. If the result is not as specified, replace the ventilation valve.
- Remove the clean hose from the ventilation valve.

EC


INSTALLATION

1. INSTALL VENTILATION VALVE SUB-ASSEMBLY

- Reinstall the ventilation valve.
 - Apply adhesive to 2 or 3 threads.

Adhesive:

Part No. 08833-00070, THREE BOND 1324 or equivalent

- Reinstall the ventilation valve.

Torque: 19 N*m (193 kgf*cm, 14 ft.*lbf)

- Connect the ventilation valve hose to the ventilation valve.