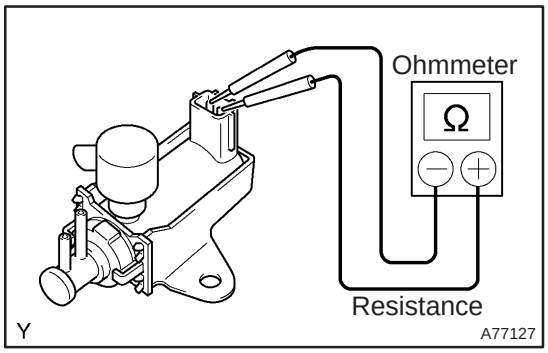
1209J–02

INSPECTION

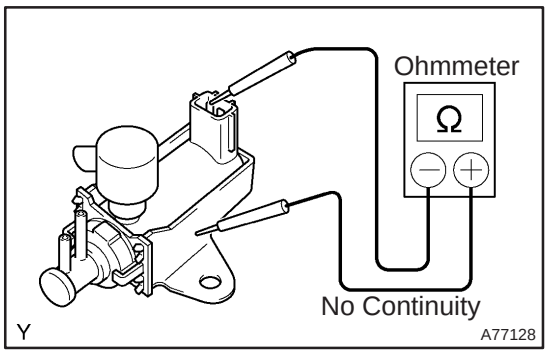


1. INSPECT VACUUM REGULATING VALVE ASSY

(a) Inspect E–VRV for open circuit

(1) Using an ohmmeter, measure resistance between the terminals.

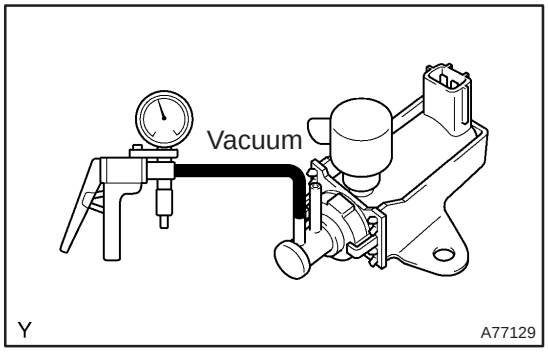
Resistance:
10 to 14 Ω at 20˚C (68˚F)



(b) Inspect E–VRV for ground

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

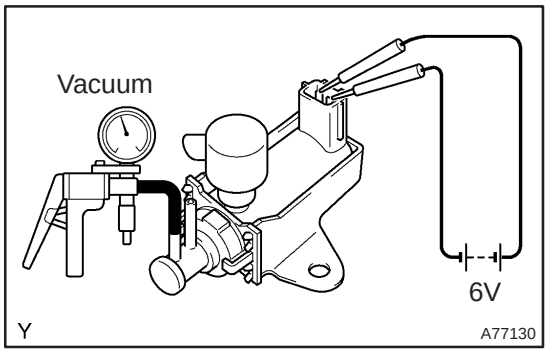
Specified condition : No continuity



(c) Inspect E–VRV for air tightness

(1) Apply vacuum to the vacuum output port. Check that the needle of vacuum pump indicates an increase of 66.7 kPa (500 mmHg, 19.7 in.Hg) or more.

If the air tightness is not as specified, replace the E–VRV.

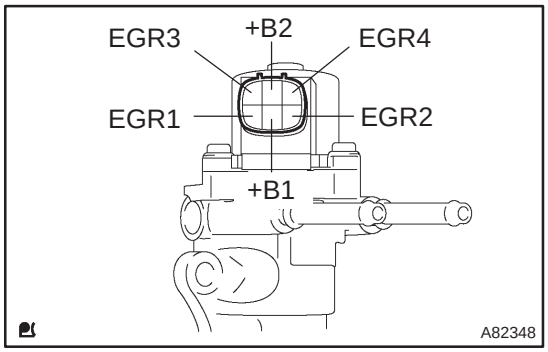


(d) Inspect E–VRV operation

(1) Apply about 4 dry batteries of 1.5V in series.

(2) Check that the need does not move when vacuum is applied to the vacuum outlet port.

If operation is not as specified, replace the E–VRV.



2. INSPECT EGR VALVE ASSY

(a) Using an ohmmeter, measure the resistance between the terminals.

Terminal	Resistance at 20 °C (68 °F)
+B1 – EGR1	19.6 ± 1.4 Ω
+B1 – EGR2	19.6 ± 1.4 Ω
+B2 – EGR3	19.6 ± 1.4 Ω
+B2 – EGR4	19.6 ± 1.4 Ω

EGR SYSTEM (1CD–FTV)

1209I–02

ON–VEHICLE INSPECTION

HINT:

In a malfunction where the EGR system is always on, black smoke or white smoke may be emitted from the exhaust pipe. If this occurs, inspect the EGR system as well.

1. INSPECT SEATING OF EGR VALVE

(a) Start the engine and check that it starts and runs at idle.

2. INSPECT HOT ENGINE CONDITION (WHEN USING HAND–HELD TESTER)

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

(b) Start the engine and run it at idle.

(c) Select the ACTIVE TEST mode on the hand–held tester.

HINT:

Refer to the hand–held tester operator's manual for further details.

(d) Warm up the engine, the coolant temperature should be above 75°C (109°F) and bellow 90°C (194°F).

(e) Check that the AFM reading is 5 ≦ ega ≦ 8 g/s with the engine idling.

(f) Operate the EGR valve with a hand–held tester. Regulate the valve opening angle to 0, and check that the AFM reading is 11 ≦ ega ≦ 17 g/s..

If the AFM reading is out of range in either (e) or (f), replace the EGR valve.

If the AFM is out of range in both (e) and (f), replace the air flow meter (air cleaner) and check the EGR valve operation again.

3. INSPECT HOT ENGINE CONDITION (WHEN NOT USING HAND–HELD TESTER)

(a) Install the vacuum gauge.

(1) Using a 3–way connector, connect a vacuum gauge to the hose between the intake manifold and the turbo pressure sensor.

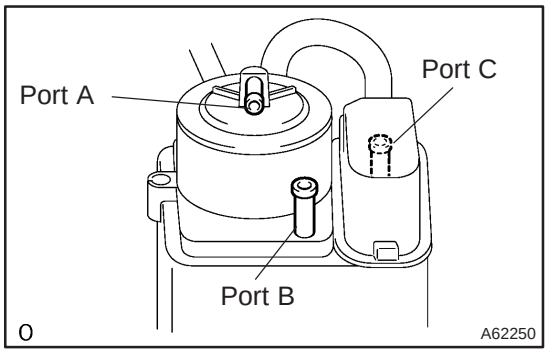
(b) Warm up the engine, the coolant temperature should be above 75°C (109°F) and bellow 90°C (194°F).

(c) Check that the vacuum gauge indicates about more than 2.5 kPa (19 mmHg 0.7 in Hg).

(d) Stop the engine (IG OFF), remove the EGR valve connector, restart the engine, and check that load under idling is less than 2.5 kPa (19 mmHg 0.7 in Hg).

If the load pressure exceeds the above value, replace the EGR valve.

INSPECTION



1. INSPECT CHARCOAL CANISTER ASSY

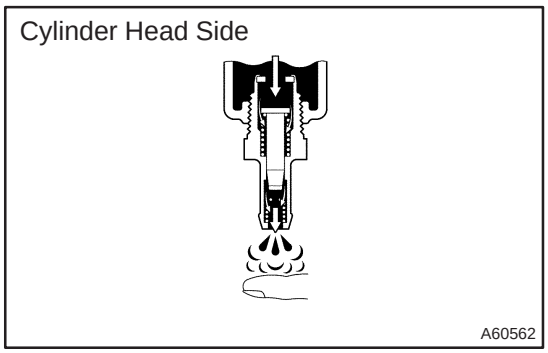
(a) Inspect charcoal canister operation.

(1) Check the charcoal canister operation according to the table below.

SST 09992–00242

Inspection:

Checking method	Result
Close ports B and C, then apply vacuum to port A	No leaks
Close port C, then apply vacuum to port A	Air flows from port B
Close port C, then blow air into port A	Air flows from port B
Blow air into port A	Air flows from ports B and C



2. INSPECT VENTILATION VALVE SUB–ASSY

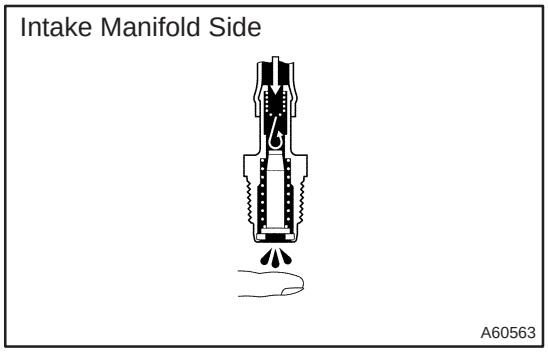
(a) Install clean hose to the PCV valve.

(b) Inspect the PCV valve operation.

(1) Blow air into the cylinder head side, and check that air passes through easily.

CAUTION:

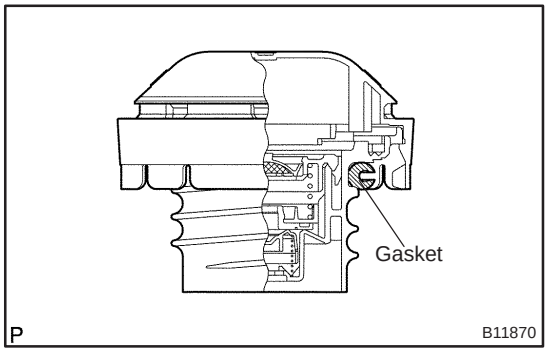
Do not suck air through the valve. If contains petroleum substances and is harmful.



(2) Blow air into the intake manifold side, and check that air passes through with difficulty.

If operation is not as specified, replace the PCV valve.

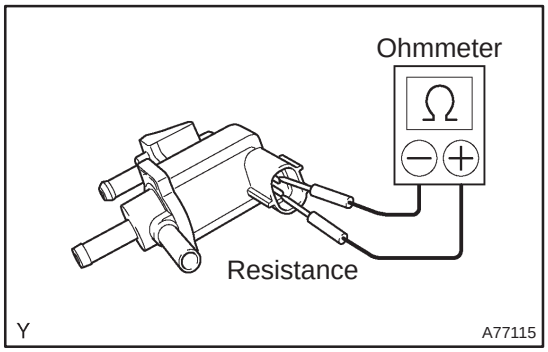
(c) Remove clean hose from the PCV valve.



3. INSPECT FUEL TANK CAP ASSY

(a) Visually check if the cap or gasket is deformed or damaged.

If necessary, repair or replace the cap.



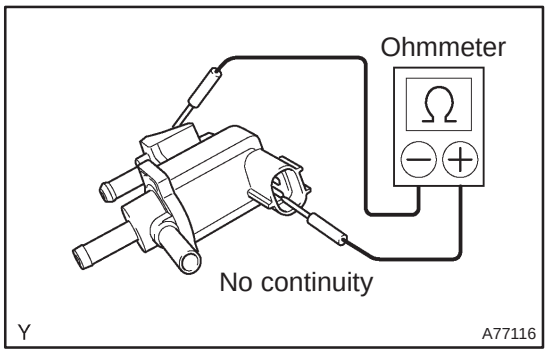
4. INSPECT VACUUM SWITCHING VALVE ASSY NO.1

(a) Inspect VSV for open circuit.

(1) Using an ohmmeter, measure resistance between the terminals.

Resistance: 26 to 30 Ω at 20°C (68°F)

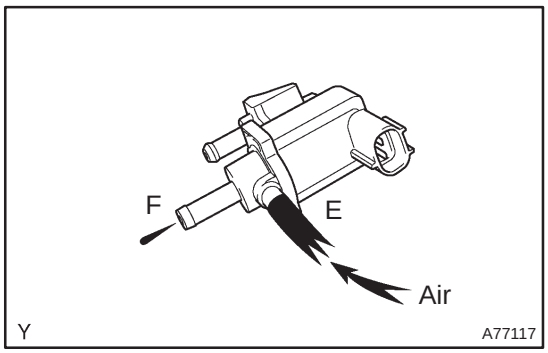
If the resistance is not as specified, replace the VSV.



(b) Inspect the VSV for ground.

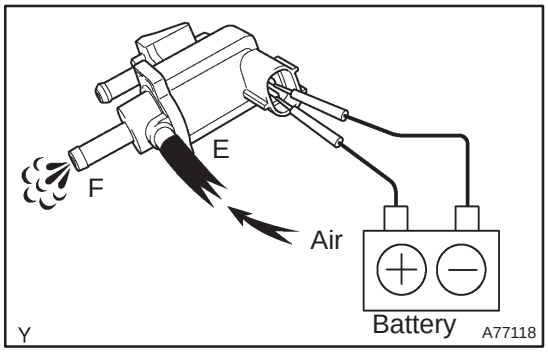
(1) Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.

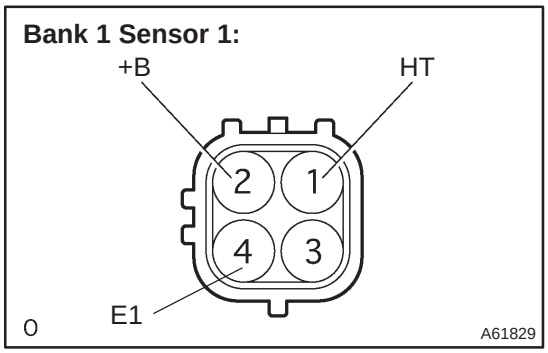
(1) Check that air flows with a little difficulty from port E to port F.



(2) Apply battery voltage across the terminals.

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

If operation is not as specified, replace the VSV.



5. INSPECT AIR FUEL RATIO SENSOR

(a) Bank 1 Sensor 1:

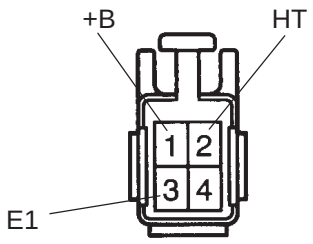
(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Terminal No.	Resistance
1 (HT) – 2 (+B)	1.8 to 3.4 Ω at 20 °C (68 °F)
1 (HT) – (+B)	5.0 to 7.5 Ω at 500 °C (932 °F)
1 (HT) – 4 (E1)	No Continuity

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

Bank 2 Sensor 1:



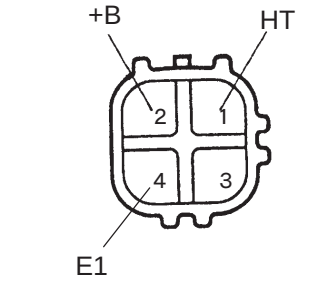
(b) Bank 2 Sensor 1:

(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Terminal No.	Resistance
1 (HT) – 2 (+B)	1.8 to 3.4 Ω at 20 °C (68 °F)
1 (HT) – 2 (+B)	5.0 to 7.5 Ω at 500 °C (932 °F)
1 (HT) – 4 (E1)	No Continuity

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



6. INSPECT HEATED OXYGEN SENSOR

(a) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Terminal No.	Resistance
1 (HT) – 2 (+B)	11 to 16 Ω at 20 °C (68 °F)
1 (HT) – 4 (E1)	No Continuity

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

EMISSION CONTROL SYSTEM (1AZ–FE)

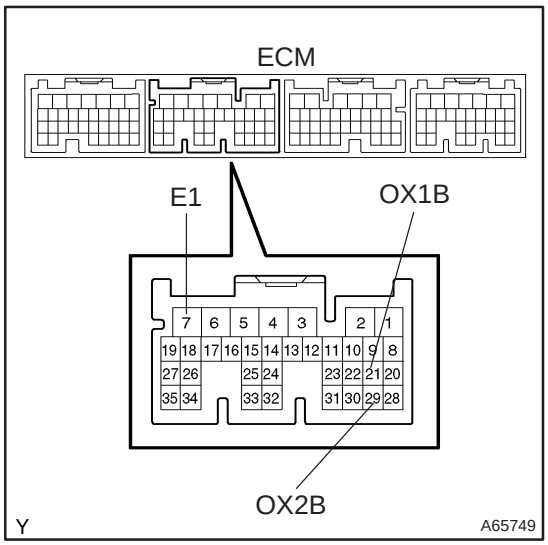
1209E–02

ON–VEHICLE INSPECTION

1. INSPECT AIR–FUEL RATIO COMPENSATION SYSTEM

HINT:

You can also check the system by choosing ”DATA MONITOR/ O_2 SENSOR OUTPUT VOLTAGE” on the monitor of the hand–held tester.



(a) Connect the hand–held tester to terminals 21 (OX1B) and 7 (E1) and to terminals 29 (OX2B) and 7 (E1) of the ECM.

CAUTION:

Connect test leads from the back side of the connector with the ECM connected.

(b) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 2 minutes.

(c) Confirm that the voltage output varies between 0V to 1V with the engine speed at 2,500 rpm.

OK:

The voltage output varies more than 8 times in 10 seconds.

CAUTION:

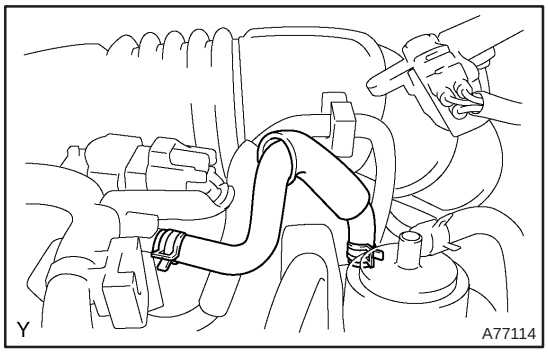
- **Perform the check immediately after the warming up.**
- **If the voltage variation could not be verified, warm up the heated oxygen sensor again.**

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 injector operating sounds stops momentarily and then resumes when the throttle lever is released.



3. INSPECT EVAPORATIVE EMISSION CONTROL SYSTEM

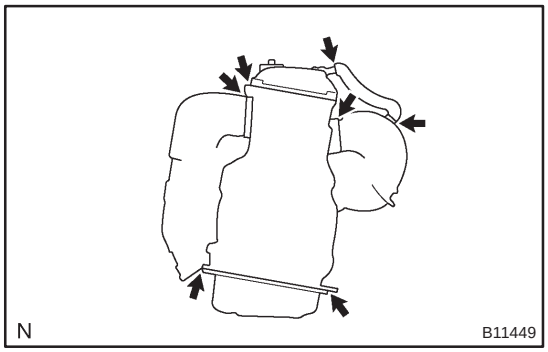
(a) After starting the engine, disconnect the vacuum hose shown in the illustration.

(b) Check if vacuum occurs at the VSV port when choosing ”ACTIVE TEST” and ”PURGE VSV” according to the display on hand–held tester.

(c) Finish ”ACTIVE TEST”, then reconnect the vacuum hose.

(d) After entering to ”ECU DATA MONITOR” on the hand–held tester, choose ”PURGE VSV” to check the operation of the purge VSV.

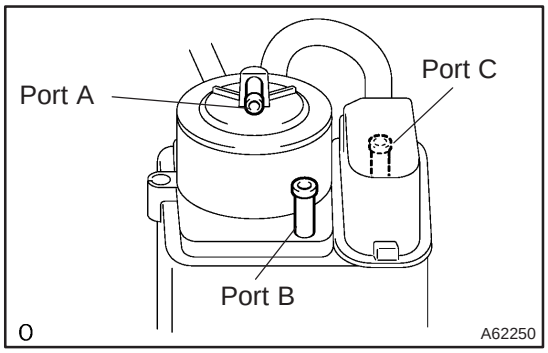
(e) After driving the vehicle with a warm engine, confirm that the VSV turns from off to on.



4. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

(a) Check for cracks, leaks or damage.

INSPECTION



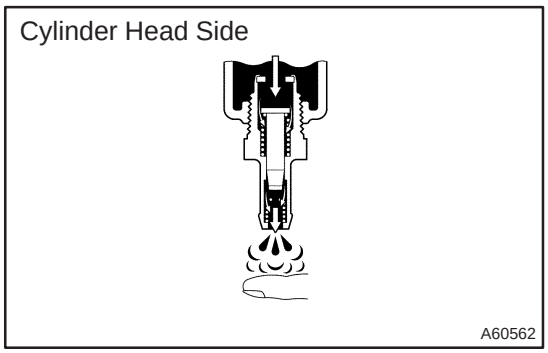
1. INSPECT CHARCOAL CANISTER ASSY

(a) Inspect charcoal canister operation.

(1) Check the charcoal canister operation according to the table below.

SST 09992–00242

Checking method	Result
Close ports B and C, then apply vacuum to port A	No leaks
Close port C, then apply vacuum to port A	Air flows from port B
Close port C, then blow air into port A	Air flows from port B
Blow air into port A	Air flows from ports B and C



2. INSPECT VENTILATION VALVE SUB–ASSY

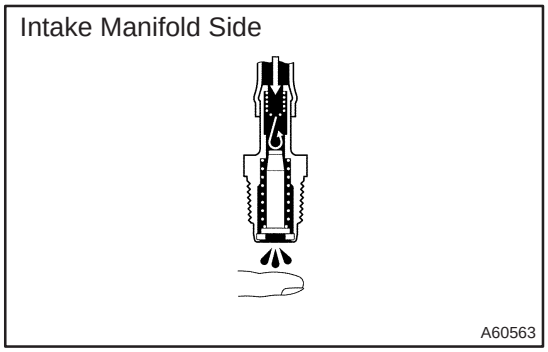
(a) Install clean hose to the PCV valve.

(b) Inspect the PCV valve operation.

(1) Blow air into the cylinder head side, and check that air passes through easily.

CAUTION:

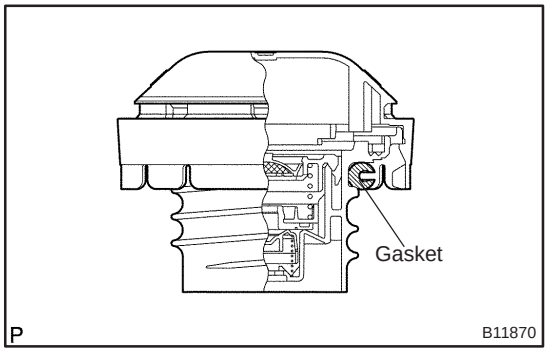
Do not suck air through the valve. If contains petroleum substances and is harmful.



(2) Blow air into the intake manifold side, and check that air passes through with difficulty.

If operation is not as specified, replace the PCV valve.

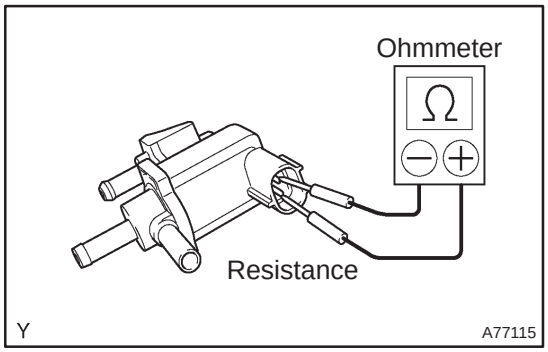
(c) Remove clean hose from the PCV valve.



3. INSPECT FUEL TANK CAP ASSY

(a) Visually check if the cap or gasket is deformed or damaged.

If necessary, repair or replace the cap.



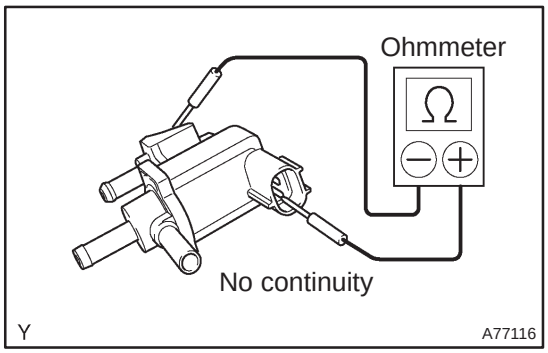
4. INSPECT VACUUM SWITCHING VALVE ASSY NO.1

(a) Inspect VSV for open circuit.

(1) Using an ohmmeter, measure resistance between the terminals.

Resistance: 26 to 30 Ω at 20°C (68°F)

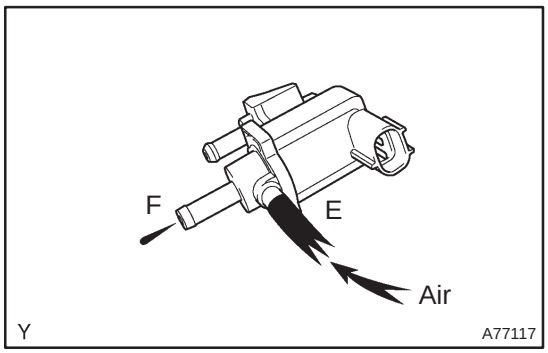
If the resistance is not as specified, replace the VSV.



(b) Inspect the VSV for ground.

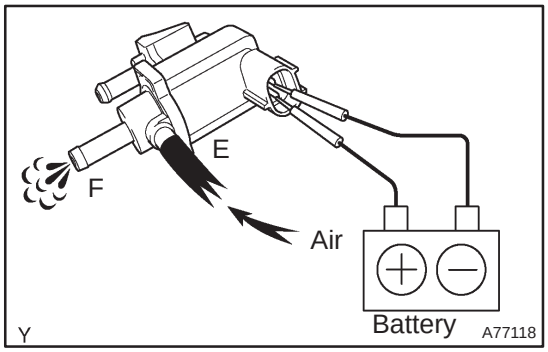
(1) Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.

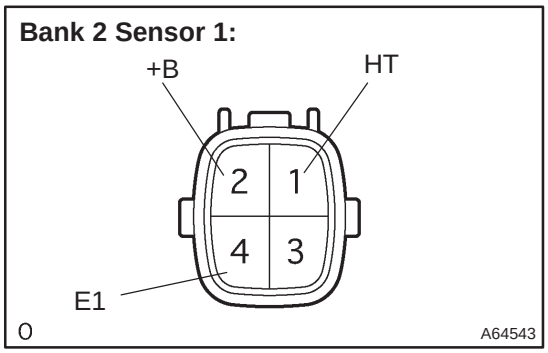
(1) Check that air flows with a little difficulty from port E to port F.



(2) Apply battery voltage across the terminals.

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

If operation is not as specified, replace the VSV.



5. INSPECT HEATED OXYGEN SENSOR

(a) Bank 2 Sensor 1:

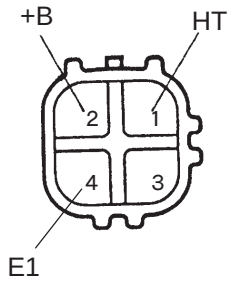
(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Terminal No.	Resistance
1 (HT) – 2 (+B)	11 to 16 Ω at 20 °C (68 °F)
1 (HT) – 4 (E1)	No Continuity

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

Bank 2 Sensor 2:



(b) Bank 2 Sensor 2:

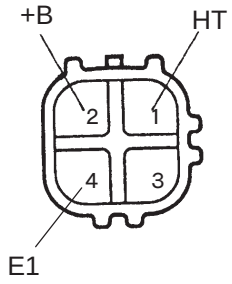
(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Terminal No.	Resistance
1 (HT) – 2 (+B)	11 to 16 Ω at 20 °C (68 °F)
1 (HT) – 4 (E1)	No Continuity

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

Bank 1 Sensor 1, 2:



(c) Bank 1 Sensor 1, 2:

(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

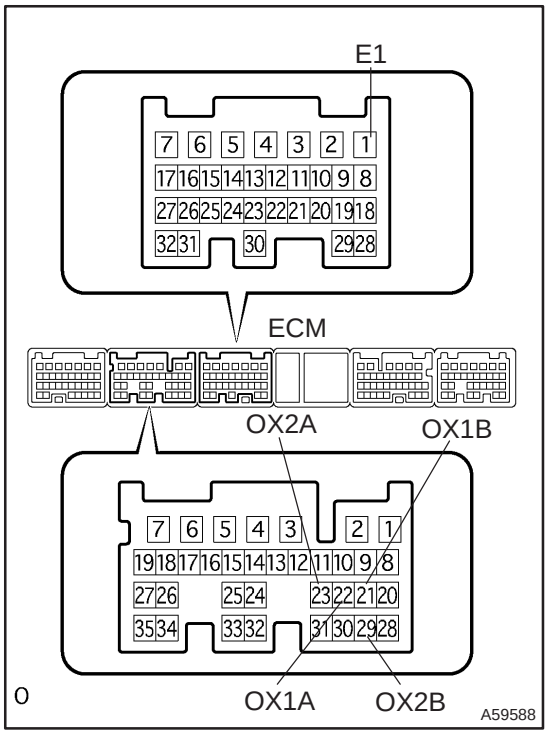
Terminal No.	Resistance
1 (HT) – 2 (+B)	11 to 16 Ω at 20 °C (68 °F)
1 (HT) – 4 (E1)	No Continuity

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

EMISSION CONTROL SYSTEM (1AZ–FSE)

1209G–02

ON–VEHICLE INSPECTION



1. INSPECT AIR–FUEL RATIO COMPENSATION SYSTEM

HINT:

You can also check the system by choosing ”DATA MONITOR/ O_2 SENSOR OUTPUT VOLTAGE” on the monitor of the hand–held tester.

(a) Connect the hand–held tester to the following each pair of the ECM terminals:
  (1) Terminals 21 (OX1B) and 1 (E1)
  (2) Terminals 22 (OX1A) and 1 (E1)
  (3) Terminals 23 (OX2A) and 1 (E1)
  (4) Terminals 29 (OX2B) and 1 (E1)

CAUTION:

Connect test leads from the back side of the connector with the ECU connected.

(b) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 2 minutes.

(c) Confirm that the voltage output varies between 0V to 1V with the engine speed at 2,500 rpm.

OK:

The voltage output varies more than 8 times in 10 seconds.

CAUTION:

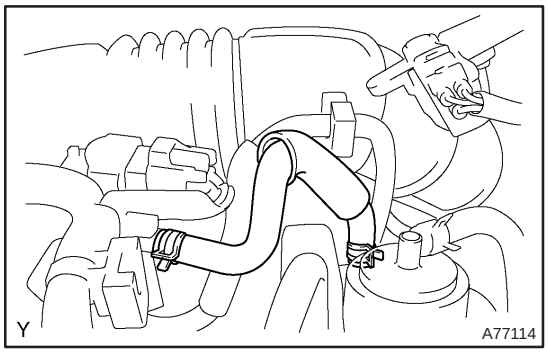
- **Perform the check immediately after the warming up.**
- **If the voltage variation could not be verified, warm up the heated oxygen sensor again.**

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 the injector operating sounds stops momentarily and then resumes that when the throttle lever is released.



3. INSPECT EVAPORATIVE EMISSION CONTROL SYSTEM

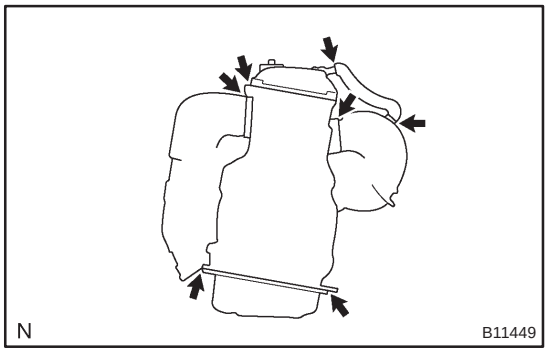
(a) After starting the engine, disconnect the vacuum hose shown in the illustration.

(b) Check if vacuum occurs at the VSV port when choosing ”ACTIVE TEST” and ”PURGE VSV” according to the display on hand–held tester.

(c) Finish ”ACTIVE TEST”, then reconnect the vacuum hose.

(d) After entering to ”ECU DATA MONITOR” on the hand–held tester, choose ”PURGE VSV” to check the operation of the purge VSV.

(e) After driving the vehicle with a warm engine, confirm that the VSV turns from off on to.



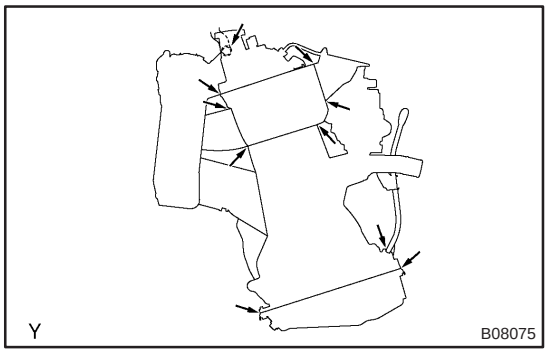
4. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

(a) Check for cracks, leaks or damage.

EMISSION CONTROL SYSTEM (1CD–FTV)

1203V–03

ON–VEHICLE INSPECTION



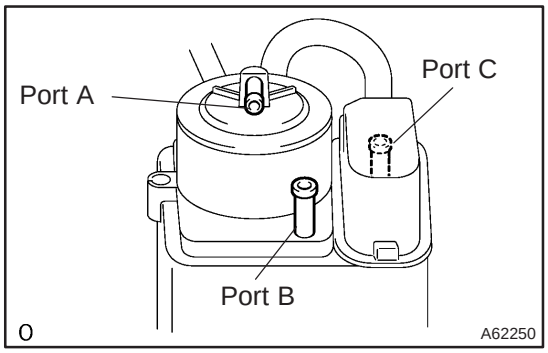
1. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

(a) Check for cracks, leak or damage.

HINT:

Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. 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.

INSPECTION



1. INSPECT CHARCOAL CANISTER ASSY

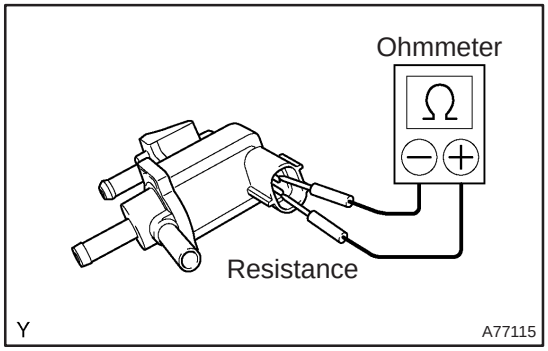
(a) Inspect charcoal canister operation.

(1) Check the charcoal canister operation according to the table below.

SST 09992–00242

Inspection:

Checking method	Result
Close ports B and C, then apply vacuum to port A	No leaks
Close port C, then apply vacuum to port A	Air flows from port B
Close port C, then blow air into port A	Air flows from port B
Blow air into port A	Air flows from ports B and C



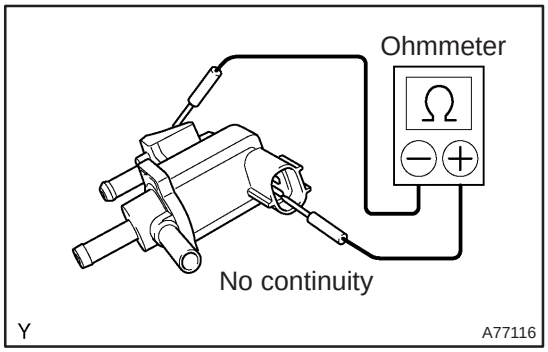
2. INSPECT VACUUM SWITCHING VALVE ASSY NO.1

(a) Inspect VSV for open circuit.

(1) Using an ohmmeter, measure resistance between the terminals.

Resistance: 26 to 30 Ω at 20°C (68°F)

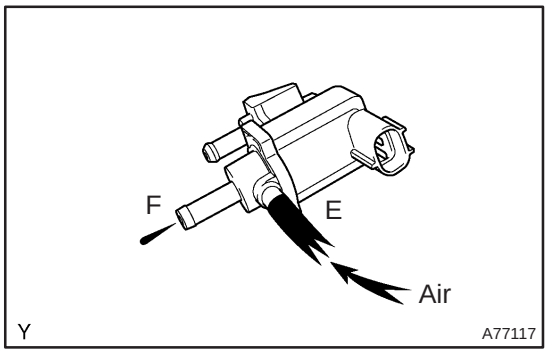
If the resistance is not as specified, replace the VSV.



(b) Inspect the VSV for ground.

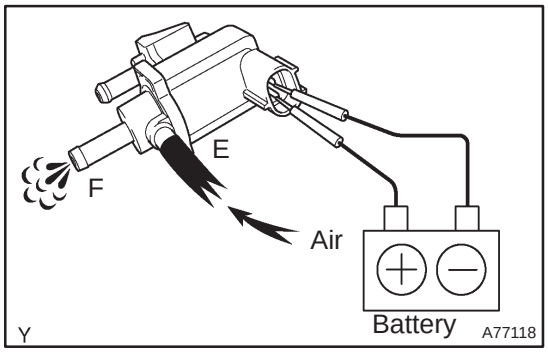
(1) Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



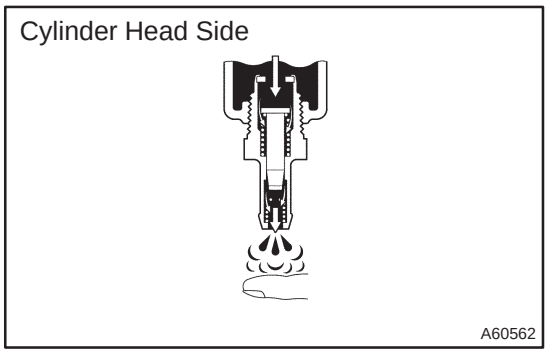
(c) Inspect the VSV operation.

(1) Check that air flows with a little difficulty from port E to port F.



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

If operation is not as specified, replace the VSV.

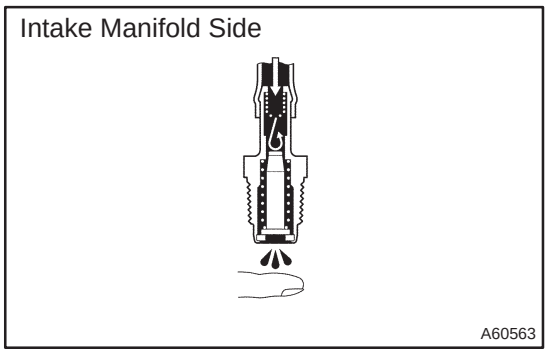


3. INSPECT VENTILATION VALVE SUB–ASSY

(a) Blow air into the cylinder head side, and check that air passes through easily.

CAUTION:

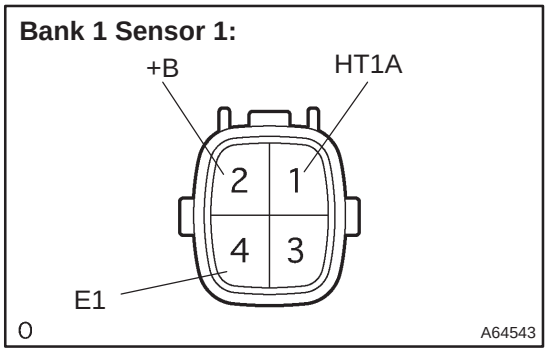
Do not suck air through the valve. If contains petroleum substances and is harmful.



(b) Blow air into the intake manifold side, and check that air passes through with difficulty.

HINT:

If operation is not as specified, replace the PCV valve.



4. IINSPECT HEATED OXYGEN SENSOR

(a) Bank 1 Sensor 1:

(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

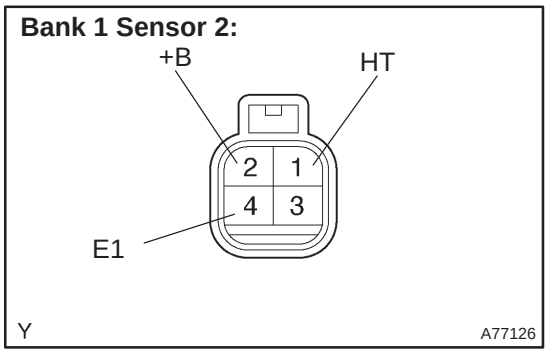
Terminal No.	Resistance
1 (HT1A) – 2 (+B)	5 to 10 Ω at 20 °C (68 °F)
1 (HT1A) – 4 (E1)	No Continuity

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

(b) Bank 1 Sensor 2:

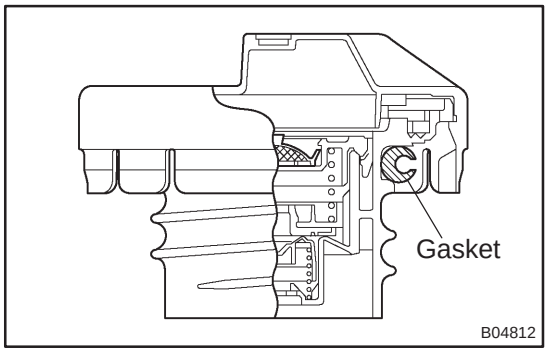
(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance:



Terminal No.	Resistance
1 (HT) – 2 (+B)	11 to 16 Ω at 20 °C (68 °F)
1 (HT) – 4 (E1)	No Continuity

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



5. INSPECT FUEL TANK CAP ASSY

(a) Visually check if the cap or gasket is deformed or damaged.

EMISSION CONTROL SYSTEM (1ZZ–FE/3ZZ–FE)

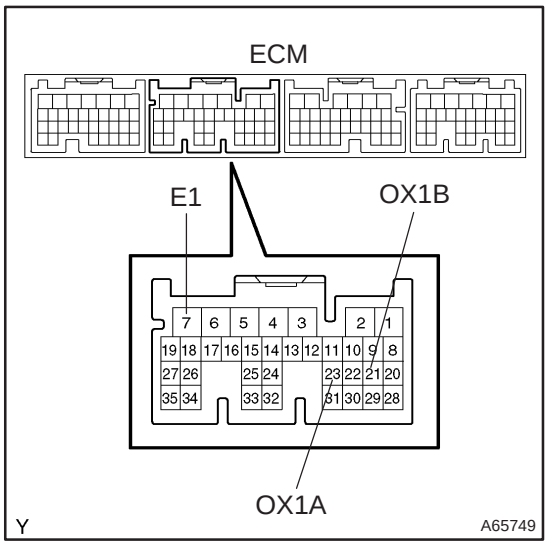
1209C–02

ON–VEHICLE INSPECTION

1. INSPECT AIR–FUEL RATIO COMPENSATION SYSTEM

HINT:

You can also check the system by choosing ”DATA MONITOR/ O_2 SENSOR OUTPUT VOLTAGE” on the monitor of the hand–held tester.



(a) Connect the hand–held tester to the terminals 21 (OX1B) and 7 (E1) and to terminals 23 (OX1A) and 7 (E1) of the ECM.

CAUTION:

Connect test leads from the back side of the connector with the ECM connected.

(b) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 2 minutes.

(c) Confirm that the voltage varies output between 0V to 1V with the engine speed at 2,500 rpm.

OK:

The voltage output varies more than 8 times in 10 seconds.

CAUTION:

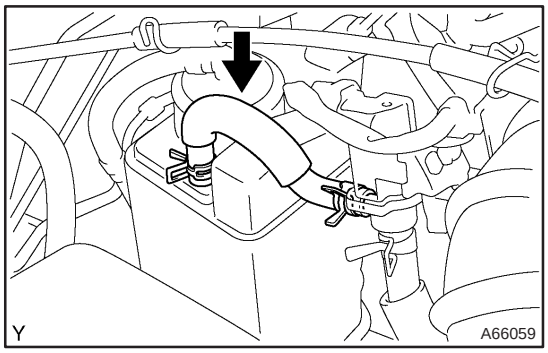
- **Perform the check immediately after the warming up.**
- **If the voltage variation could not be verified, warm up the heated oxygen sensor again.**

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 injector operating sounds stops momentarily and then resumes when the throttle lever is released.



3. INSPECT EVAPORATIVE EMISSION CONTROL SYSTEM

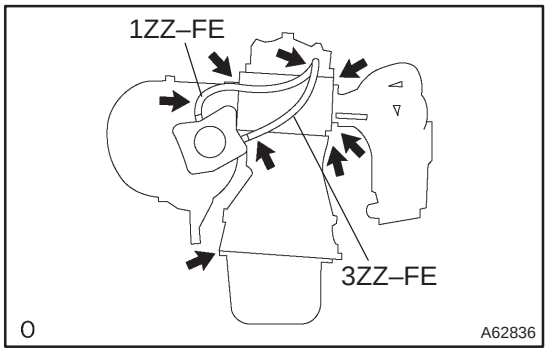
(a) After starting the engine, disconnect the vacuum hose shown in the illustration.

(b) Check if vacuum occurs at the VSV port when choosing ”ACTIVE TEST” and ”PURGE VSV” according to the display on hand–held tester.

(c) Finish ”ACTIVE TEST”, then reconnect the vacuum.

(d) After entering to ”ECU DATA MONITOR” on the hand–held tester, choose ”PURGE VSV” to check the operation of the purge VSV.

(e) After driving the vehicle with a warm engine, confirm that the VSV turns from off to on.



4. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

(a) Check for cracks, leaks or damage.

HINT:

Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. 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.