EGR CONTROL CIRCUIT

CIRCUIT DESCRIPTION

The EGR system recirculates exhaust gas that is controlled to proper quantity in accordance with variable driving conditions, into the intake air in order to moderate combustion, reduce the combustion temperature and reduce NOx emissions,

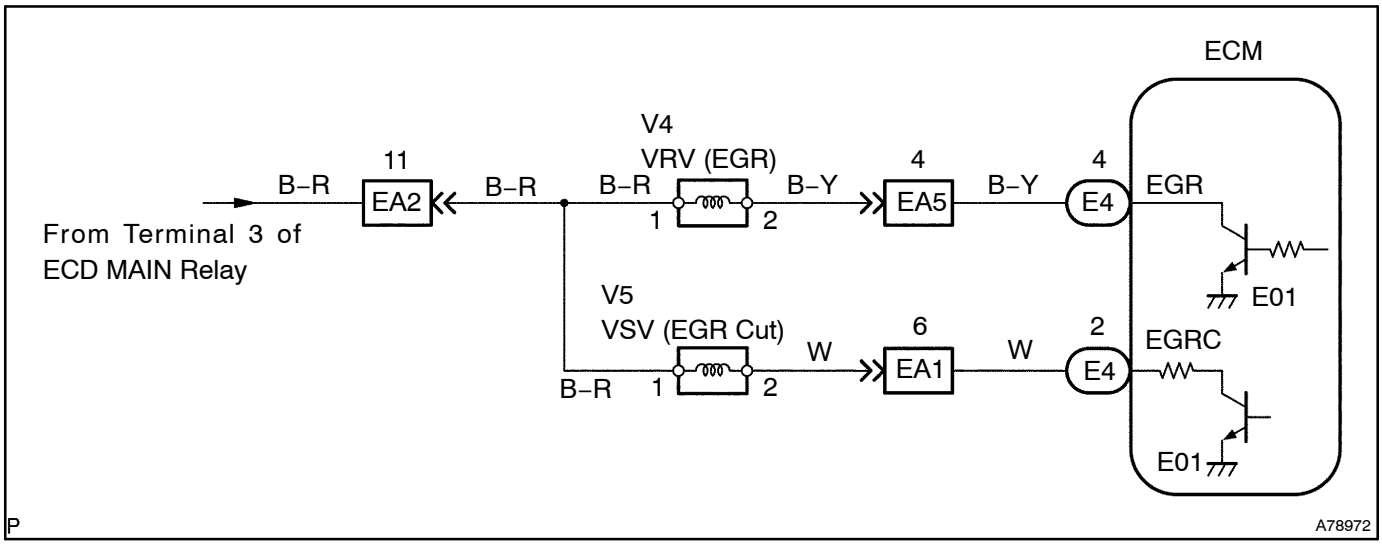
The valve lift amount of the EGR valve is controlled by vacuum regulated by the E–VRV that is operated by the ECM.

If any one of the following conditions occurs, the ECM will turn the VSV ON, and atmospheric air is supplied into the EGR valve. This causes the EGR valve to close and no exhaust gas to recirculate (EGR cut–off).

Under the following conditions, EGR is cut in order to maintain driveability.

- Before the engine is warmed up
- During deceleration
- Engine speed over 3,000 rpm

WIRING DIAGRAM



INSPECTION PROCEDURE

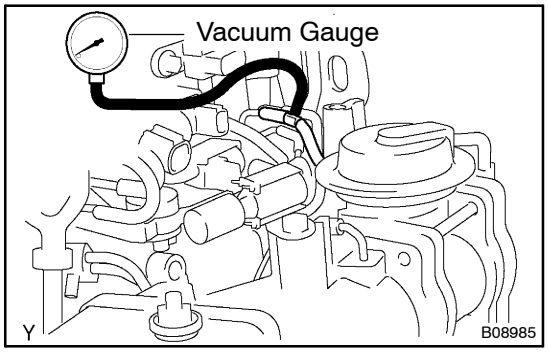
When using hand–held tester:

1	CHECK CONNECTION OF VACUUM HOSE

NG → REPAIR OR REPLACE VACUUM HOSE

OK

2 CHECK VACUUM



(a) Using a 3–way connector, connect a vacuum gauge to the hose between the VSV and EGR valve.
(b) Warm up the engine to above 80˚C (176˚F).
(c) Check the vacuum at 1,600 rpm.
Standard:

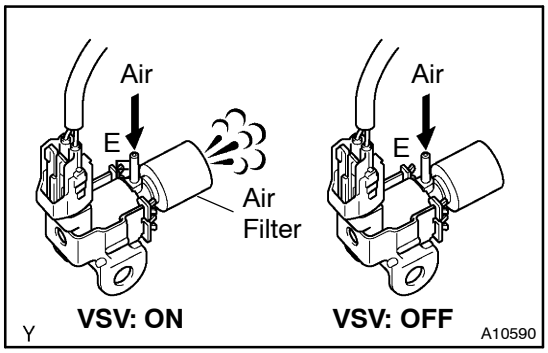
Type	Vacuum
A	0 kPa (0 mmHg, in. Hg) – 18.7 kPa (210 mmHg, 8.3 in. Hg)
B	Above 18.7 kPa (210 mmHg, 8.3 in. Hg)

A → **Go to step 7**

B → **Go to step 10**

OK

3 CHECK VSV FOR EGR



(a) Disconnect the vacuum hose from the VSV.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push the hand–held tester main switch ON.
(d) Select the ACTIVE TEST mode of the hand–held tester.
(e) Check the operation of the VSV when it is operated by the hand–held tester.
Standard:
VSV is ON:
Air from port E flows out through air filter.
VSV is OFF:
Air does not flow from port E to air filter.

OK → **CHECK VACUUM HOSE**

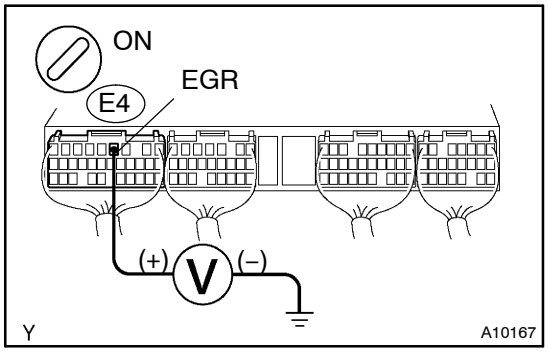
NG

4 CHECK VSV FOR EGR VALVE (See page 10–1)

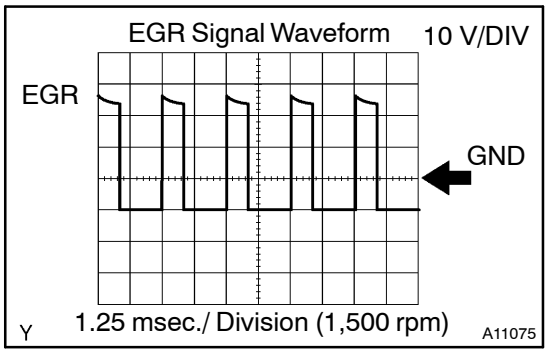
NG → **REPLACE VSV FOR EGR**

OK

5	CHECK ECM



(a) Turn the ignition switch ON.
(b) Measure the voltage between terminal EGR of the E4 ECM and the body ground.
Standard: 18 – 27 V



Reference: Inspection using oscilloscope
(c) Check the waveform between terminals EGR and E1 of the E4 ECM connector while the EGR system is ON (engine speed 1,500 rpm).

HINT:
The correct waveform is as shown in the illustration.

NG	CHECK AND REPLACE ECM

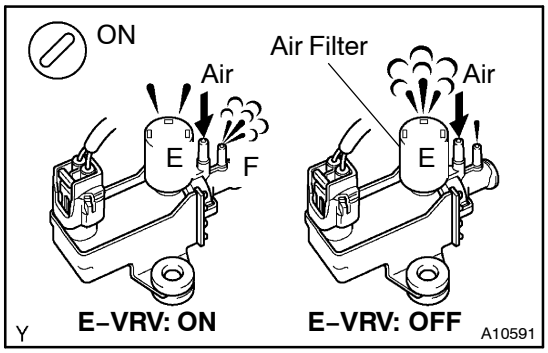
OK

6	CHECK WIRE HARNESS (ECM ⇔ VSV FOR EGR VALVE) (See page 01–27)

NG	REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

7	CHECK OPERATION OF E–VRV FOR EGR



(a) Disconnect the vacuum hose from the E–VRV.
(b) Connect the hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push the hand–held tester main switch ON.
(d) Select the ACTIVE TEST mode of the hand–held tester.
(e) Check operation of the E–VRV when it is operated by the hand–held tester.
Standard:
E–VRV ON:
Air from port E flows out from port F.
E–VRV OFF:
Air from port E flows out from air filter.

OK	Go to step 10

NG

8	CHECK E–VRV FOR EGR (See page 10–1)

NG → REPLACE E–VRV FOR EGR

OK

9	CHECK WIRE HARNESS (E–VRV FOR EGR ⇔ ECM, E–VRV ⇔ ECD RELAY) (See page 01–27)

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

10	CHECK EGR VALVE (See page 10–1)

NG → REPLACE EGR VALVE

OK

CHECK AND REPLACE ECM (See page 01–27)

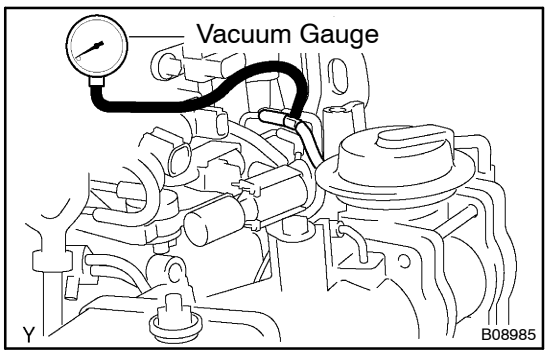
When not using hand–held tester:

1	CHECK CONNECTION OF VACUUM HOSE

NG → REPAIR OR REPLACE VACUUM HOSE

OK

2	CHECK VACUUM



(a) Using a 3–way connector, connect a vacuum gauge to the hose between the VSV and EGR valve.
(b) Warm up the engine to above 80°C (176°F).
(c) Check the vacuum at 1,600 rpm.

Standard:

Type	Vacuum
A	0 kPa (0 mmHg, in. Hg) – 18.7 kPa (210 mmHg, 8.3 in. Hg)
B	Above 18.7 kPa (210 mmHg, 8.3 in. Hg)

A → Go to step 6

B → Go to step 9

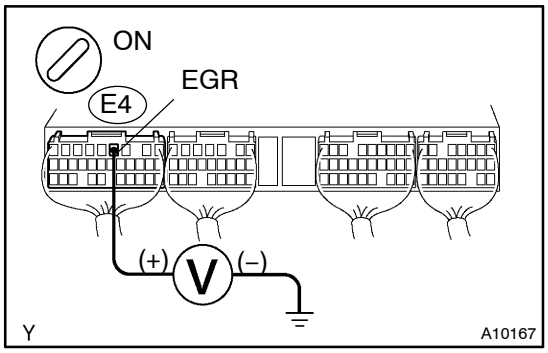
OK

3	CHECK VSV FOR EGR VALVE (See page 10–1)

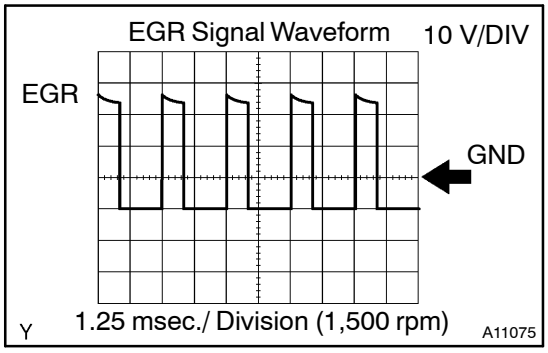
NG → REPLACE VSV FOR EGR VALVE

OK

4	CHECK ECM



(a) Turn the ignition switch ON.
(b) Measure the voltage between terminal EGR of the ECM and the body ground.
Standard: 18 – 27 V



Reference: Inspection using oscilloscope
(c) Check the waveform between terminals EGR and E1 of the ECM connector while the EGR system is ON (engine speed 1,500 rpm).

HINT:
The correct waveform is as shown in the illustration.

NG → CHECK AND REPLACE ECM

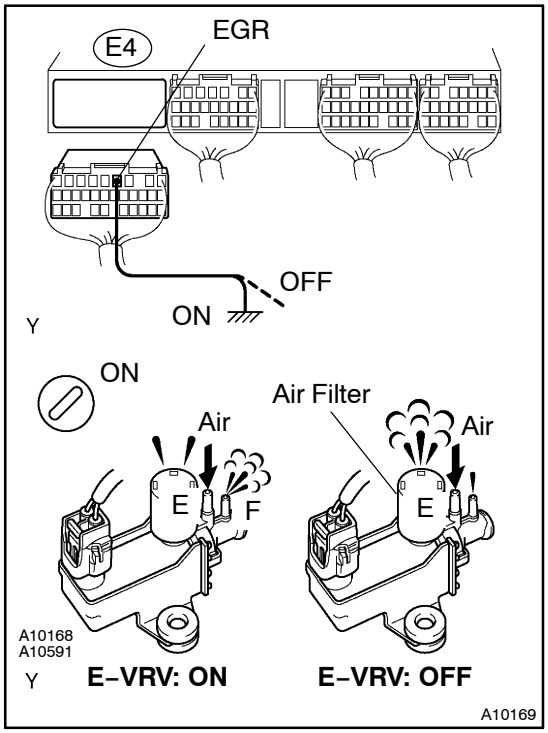
OK

5	CHECK WIRE HARNESS (ECM ⇔ VSV FOR EGR VALVE) (See page 01–27)

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

6	CHECK OPERATION OF E–VRV FOR EGR



(a) Disconnect the E4 connector from the ECM.
(b) Turn the ignition switch ON.
(c) Check the E–VRV operation.
  (1) Connect terminal EGR of the E4 ECM connector and the body ground (ON).
  (2) Disconnect terminal EGR of the E4 ECM connector from the body ground (OFF).

E–VRV ON:
Air from port E flows out through port F.
E–VRV OFF:
Air from port E flows out through air filter.

OK → **Go to step 9**

NG

7	CHECK E–VRV FOR EGR

NG → **REPLACE E–VRV FOR EGR**

OK

8	CHECK WIRE HARNESS (E–VRV FOR EGR ⇔ ECM, E–VRV ⇔ ECD RELAY) (See page 01–27)

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

OK

9	CHECK EGR VALVE (See page 10–1)

NG → **REPLACE EGR VALVE**

OK

CHECK AND REPLACE ECM (See page 01–27)