EGR CONTROL CIRCUIT

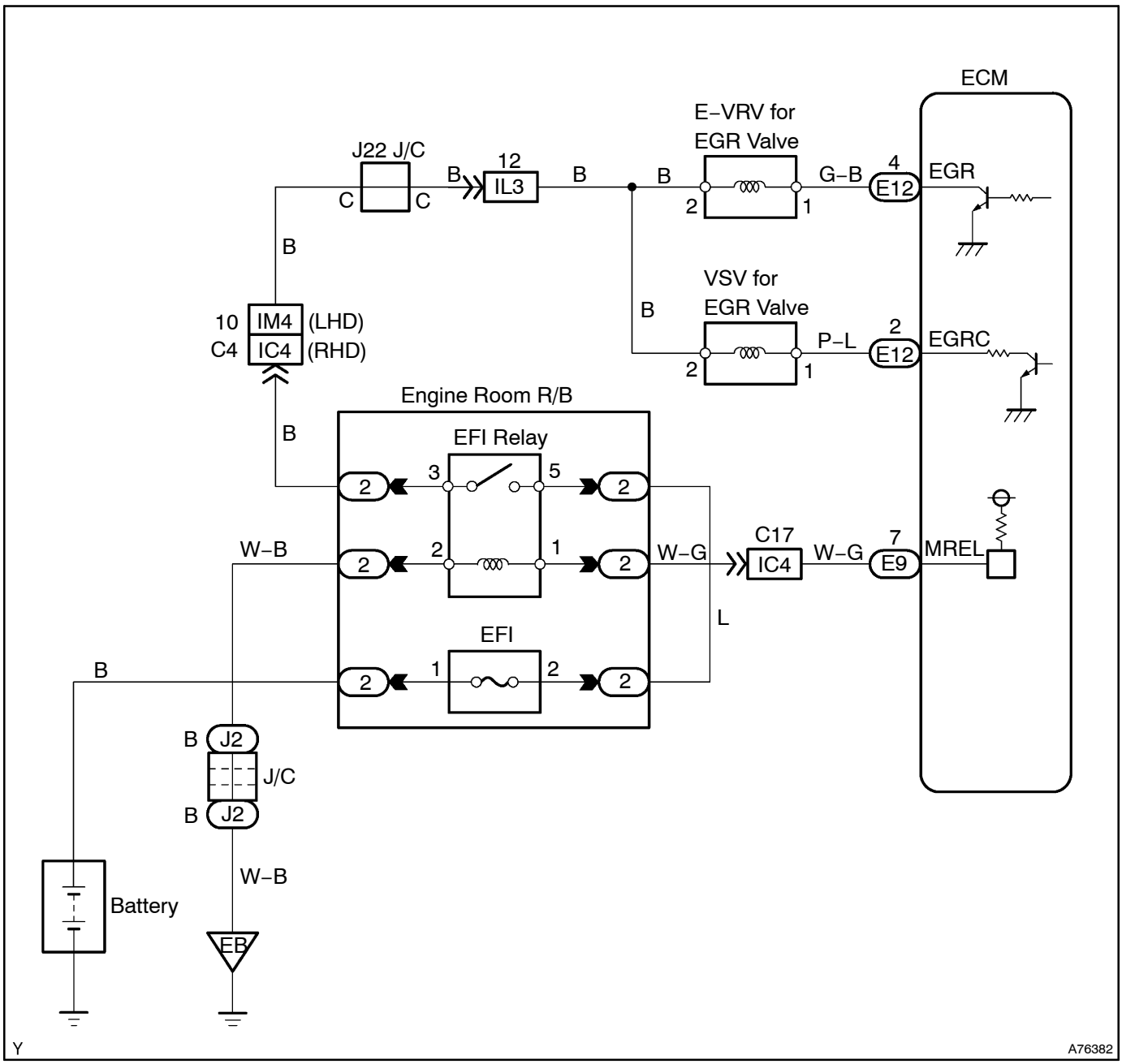
CIRCUIT DESCRIPTION

(a) The EGR system recirculates exhaust gas, which is controlled to the proper quantity to suit the driving conditions into the intake air mixture to slow down combustion, reduce the combustion temperature and reduce NOx emissions,
The lift amount of EGR valve is controlled by the vacuum which is regulated by the E–VRV operated by the ECM.

If even one of the following conditions is fulfilled, the VSV is turned ON by a signal from the ECM. This results in atmospheric air acting on the EGR valve, closing the EGR valve and shutting off the exhaust gas (EGR cut–off).

(b) Under the following conditions, EGR is cut to maintain driveability.
- Before the engine is warmed up
- Engine speed over 4,000 rpm

WIRING DIAGRAM



INSPECTION PROCEDURE

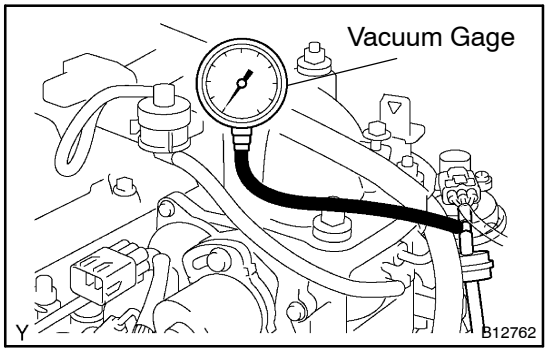
When using hand–held tester:

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 engine speed 1,500 rpm.
Result:

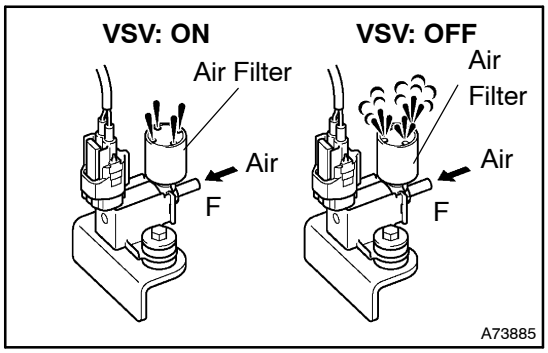
Type	Vacuum
A	0 kPa (0 mmHg, 0 in. Hg)
B	0 kPa (0 mmHg, 0 in. Hg) – 28 kPa (210 mmHg, 8.3 in. Hg)
C	Above 28 kPa (210 mmHg, 8.3 in. Hg)

A → **Go to step 6**

C → **Go to step 10**

B

3	PERFORM ACTIVE TEST BY HAND–HELD TESTER(CHECK VSV CIRCUIT FOR ELECTRIC EGR CONTROL VALVE ASSY)



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

OK → **Go to step 10**

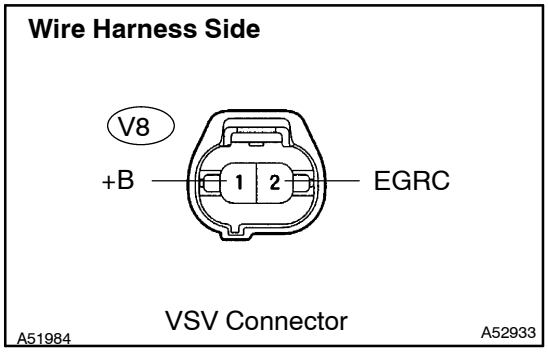
NG

4	CHECK VACUUM SWITCHING VALVE (See page 12–19)

NG → **REPLACE VACUUM SWITCHING VALVE**

OK

5	CHECK HARNESS AND CONNECTOR(ECM – VACUUM SWITCHING VALVE ASSY NO.1, VACUUM SWITCHING VALVE ASSY NO.1 – EFI RELAY)



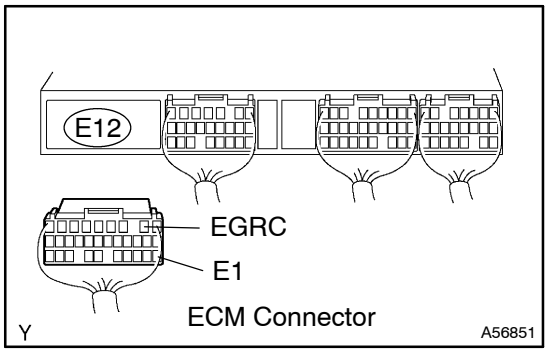
(a) Disconnect the VSV connector.
(b) Disconnect the ECM E12 connector.
(c) Remove the EFI relay from the engine room R/B.
(d) Check the continuity between the wire harness side connector.

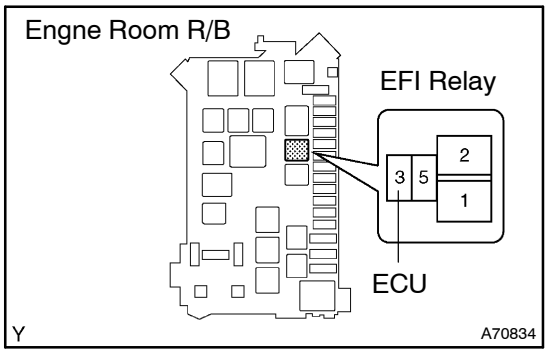
Standard (Check for open):

Symbols (Terminal No.)	Specified condition
EGRC (V8 – 2) ⇔ EGRC (E12 – 2)	Continuity
+B (V8 – 1) ⇔ ECU (EFI relay terminal 3 of R/B)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
EGRC (E12 – 2) ⇔ E1 (E12 – 22)	No continuity
+B (V8 – 1) ⇔ Body ground	

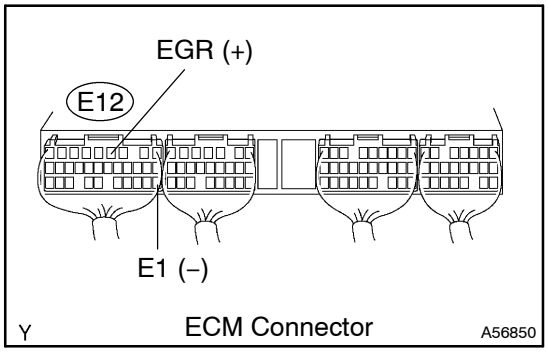




NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6 INSPECT ECM(CHECK VOLTAGE)



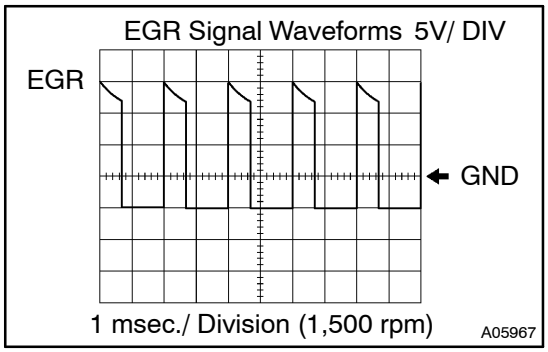
(a) Turn the ignition switch ON.
(b) Measure the voltage between the terminals of the ECM E12 connector.
Voltage:

Symbols (Terminal No.)	Specified condition
EGR (E12 – 4) ⇔ E1 (E12 – 22)	9 – 14 V

(c) Reference
(1) Check the output wave form.

Item	Contents
Terminal	EGR ⇔ E1
Equipment Set	5V/DIV, 1ms/DIV
Condition	Engine speed at 1,500 rpm

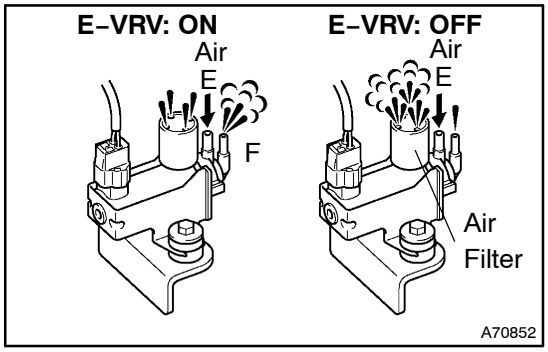
HINT:
The correct waveforms are as shown.



NG → **Go to step 8**

OK

7 CHECK OPERATION OF E–VRV



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

OK → **Go to step 10**

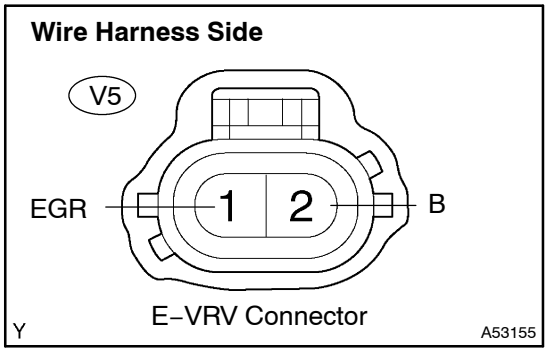
NG

8 INSPECT E–VRV (See page 12–19)

NG → **REPLACE E–VRV**

OK

9 CHECK HARNESS AND CONNECTOR(ECM – E–VRV, E–VRV – EFI RELAY)



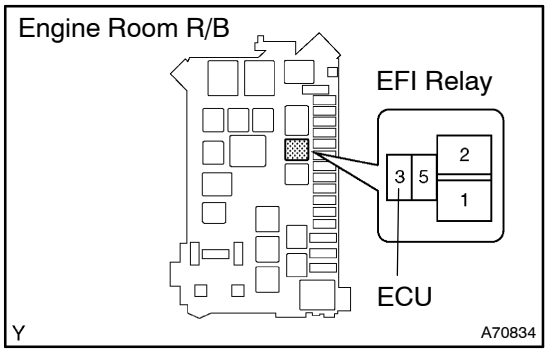
(a) Disconnect the E–VRV connector.
(b) Remove the EFI relay from the engine room R/B.
(c) Disconnect the ECM E12 connector.
(d) Check the continuity between the wire harness side connector.

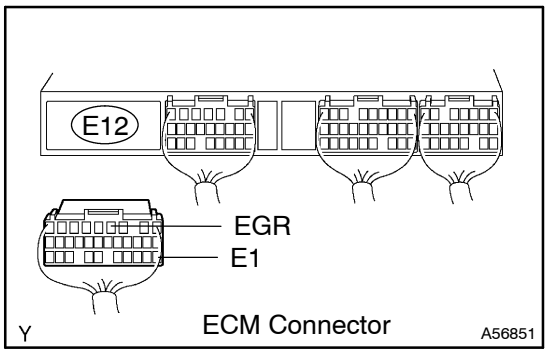
Standard (Check for open):

Symbols (Terminal No.)	Specified condition
EGR (V5 – 1) ⇔ EGR (E12 – 4)	Continuity
ECU (EFI relay terminal 3 of R/B) ⇔ B (V8 – 2)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
EGR (E12 – 4) ⇔ E1 (E12 – 22)	No continuity
B (V5 – 2) ⇔ Body ground	





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

OK

10 INSPECT ELECTRIC EGR CONTROL VALVE ASSY (See page 12–19)

NG → **REPLACE ELECTRIC EGR CONTROL VALVE ASSY**

OK

CHECK AND REPLACE ECM

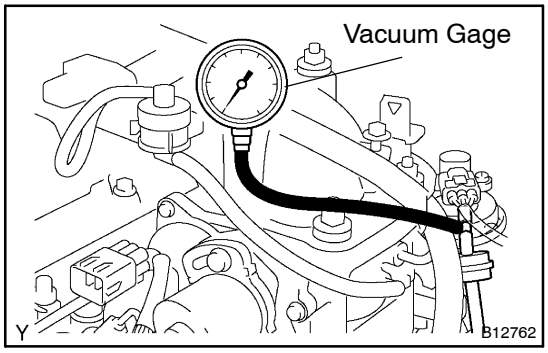
When not using hand–held tester:

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 gage 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 engine speed 1,500 rpm.
Result:

Type	Vacuum
A	0 kPa (0 mmHg, 0 in. Hg)
B	0 kPa (0 mmHg, 0 in. Hg) – 28 kPa (210 mmHg, 8.3 in. Hg)
C	Above 28 kPa (210 mmHg, 8.3 in. Hg)

A → Go to step 5

C → Go to step 8

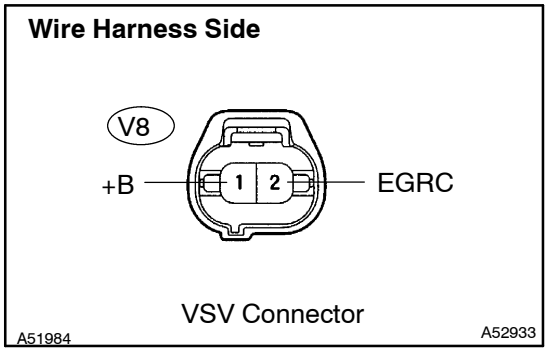
B

3	CHECK VACUUM SWITCHING VALVE (See page 12–19)

NG → REPLACE VACUUM SWITCHING VALVE

OK

4	CHECK HARNESS AND CONNECTOR(ECM – VACUUM SWITCHING VALVE ASSY NO.1, VACUUM SWITCHING VALVE ASSY NO.1 – EFI RELAY)



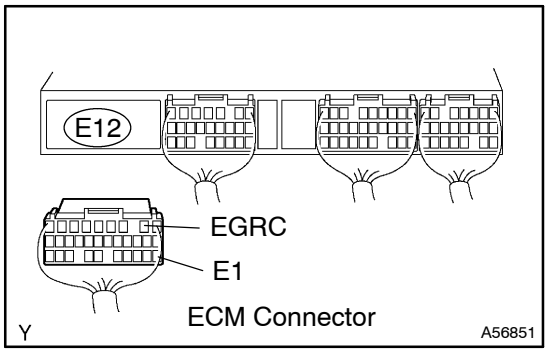
(a) Disconnect the VSV connector.
(b) Disconnect the ECM E12 connector.
(c) Remove the EFI relay from the engine room R/B.
(d) Check the continuity between the wire harness side connector.

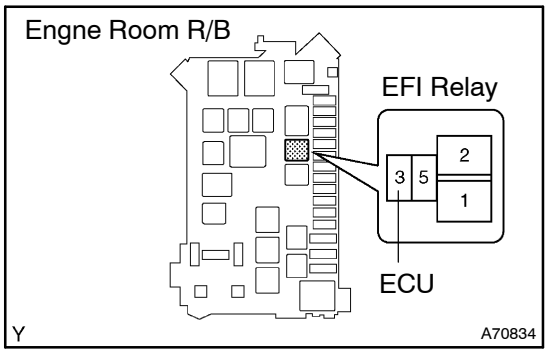
Standard (Check for open):

Symbols (Terminal No.)	Specified condition
EGRC (V8 – 2) ⇔ EGRC (E12 – 2)	Continuity
+B (V8 – 1) ⇔ ECU (EFI relay terminal 3 of R/B)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
EGRC (E12 – 2) ⇔ E1 (E12 – 22)	No continuity
+B (V8 – 1) ⇔ Body ground	

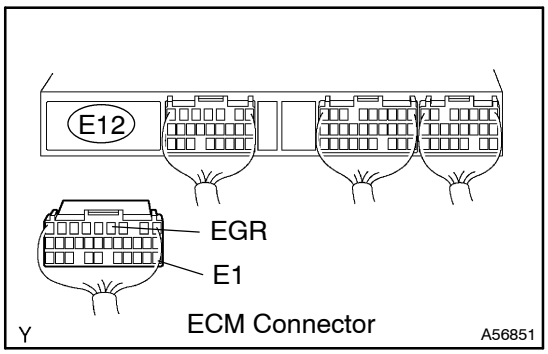




NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

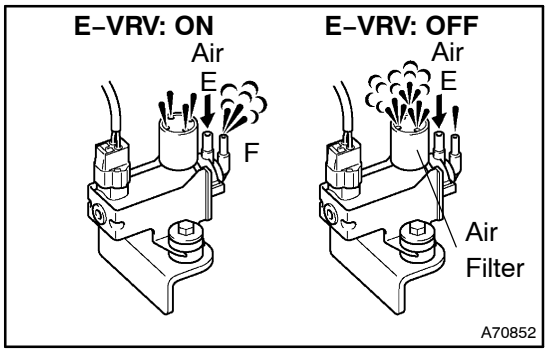
OK

5	CHECK OPERATION OF E–VRV



(a) Disconnect the ECM E12 connector.
(b) Turn the ignition switch ON.
(c) Check the E–VRV operation.
  (1) Connect between terminal EGR and E1 of the ECM E12 connector (ON).
  (2) Disconnect between terminal EGR and E1 of the ECM E12 connector (OFF).

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



OK → **Go to step 8**

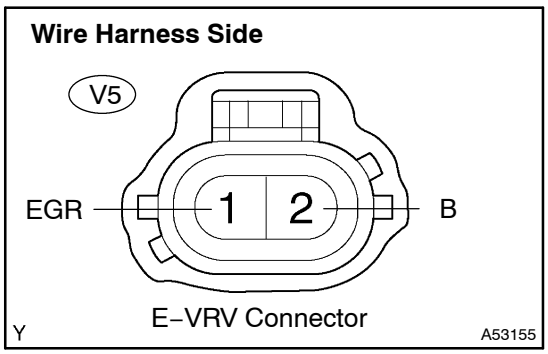
NG

6	INSPECT E–VRV (See page 12–19)

NG → **REPLACE E–VRV**

OK

7	CHECK HARNESS AND CONNECTOR(ECM – E–VRV, E–VRV – EFI RELAY)



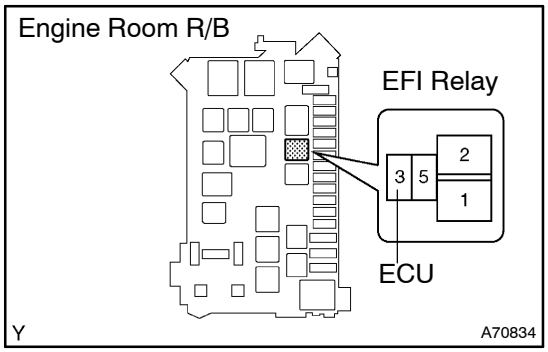
(a) Disconnect the E–VRV connector.
(b) Remove the EFI relay from the engine room R/B.
(c) Disconnect the ECM E12 connector.
(d) Check the continuity between the wire harness side connector.

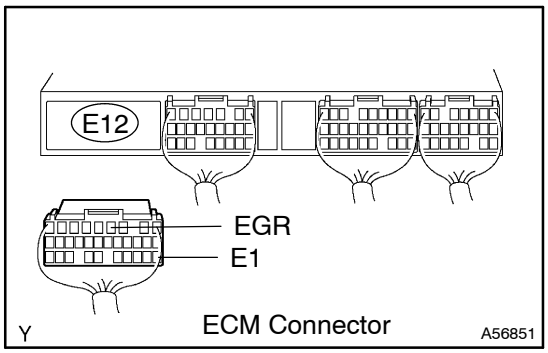
Standard (Check for open):

Symbols (Terminal No.)	Specified condition
EGR (V5 – 1) ⇔ EGR (E12 – 4)	Continuity
ECU (EFI relay terminal 3 of R/B) ⇔ B (V8 – 2)	

Standard (Check for short):

Symbols (Terminal No.)	Specified condition
EGR (E12 – 4) ⇔ E1 (E12 – 22)	No continuity
B (V5 – 2) ⇔ Body ground	





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

OK

8	INSPECT ELECTRIC EGR CONTROL VALVE ASSY (See page 12–19)

NG → **REPLACE ELECTRIC EGR CONTROL VALVE ASSY**

OK

CHECK AND REPLACE ECM