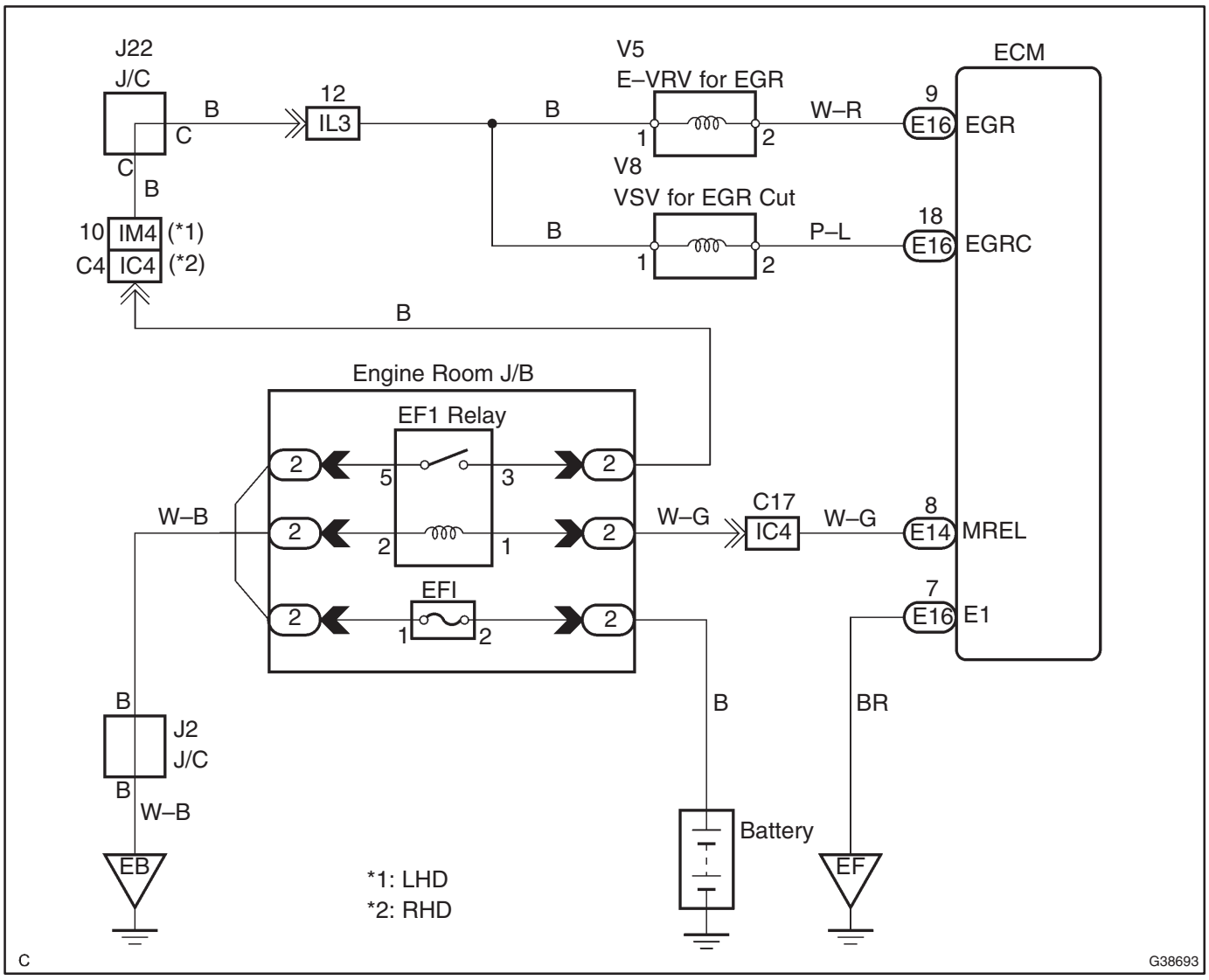
EGR CONTROL CIRCUIT

CIRCUIT DESCRIPTION

The EGR system recirculates exhaust gases, and is controlled to the proper volume to be suitable for all driving conditions. The recirculated gas mingles with the intake air, allowing the EGR system to slow down engine combustion and lower the combustion temperature. This helps reduce NOx emissions.
In order to increase circulatory efficiency, the ECM adjusts the lift amount of the EGR valve and throttle valve. The VSV is turned ON by a signal from the ECM. This results in atmospheric air closing the EGR valve, which shuts off the exhaust gas (EGR cut–off).

WIRING DIAGRAM



INSPECTION PROCEDURE

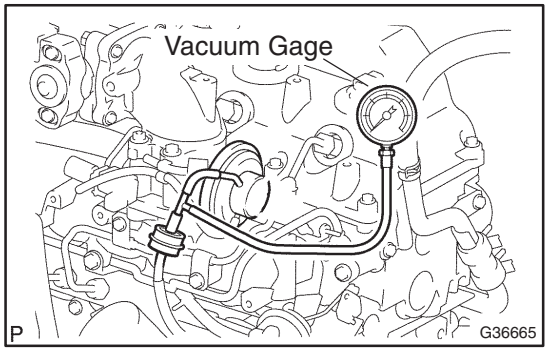
When using intelligent tester II:

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 VRV for EGR and EGR valve.
(b) Warm up the engine to above 80°C (176°F).
(c) Check the vacuum at 1,500 rpm.
Result:

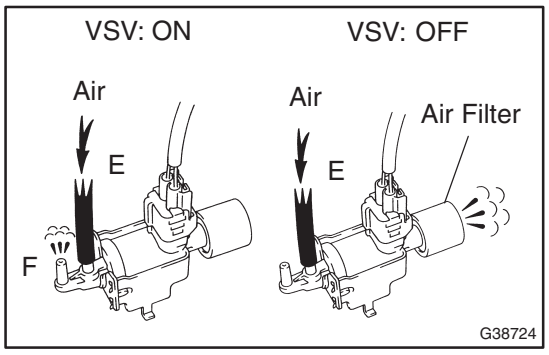
Type	Vacuum
A	0 kPa (0 mmHg, 0 in. Hg)
B	0 kPa (0 mmHg, 0 in. Hg) to 28 kPa (210 mmHg, 8.3 in. Hg)
C	Above 28 kPa (210 mmHg, 8.3 in. Hg)

B → **Go to step 7**

C → **Go to step 12**

A

3	PERFORM ACTIVE TEST (VACUUM SWITCHING VALVE FOR EGR CUT)

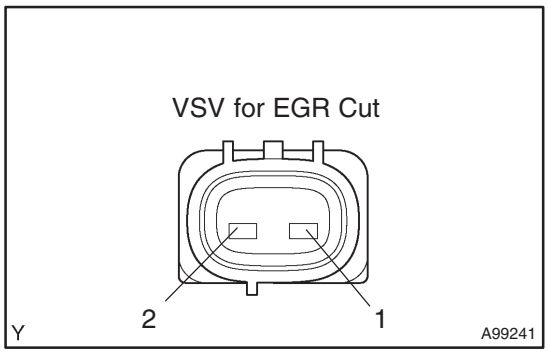


(a) Disconnect the vacuum hose from the VSV.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the ignition switch ON and turn the intelligent tester II ON.
(d) Enter the following menus: Powertrain / Engine / Active Test / EGR CUT VSV.
(e) Check the operation.
Result:
When VSV is ON, air from port E flows out through air filter.
When VSV is OFF, air does not flow from port E to air filter.

OK → **Go to step 12**

NG

4 INSPECT VACUUM SWITCHING VALVE FOR EGR CUT (RESISTANCE)



(a) Disconnect the V8 VSV connector.
(b) Measure the resistance of the VSV.

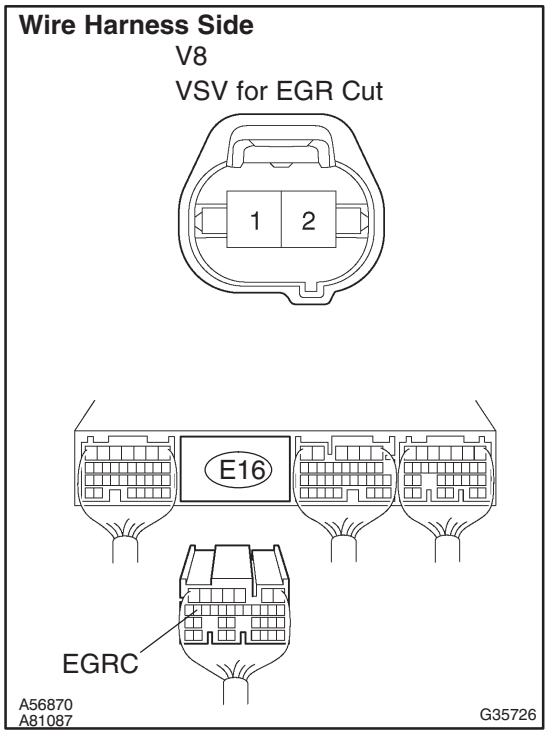
Standard:

Tester Connection	Condition	Specified Condition
1 – 2	20°C (68°F)	37 to 44 Ω

NG → **REPLACE VACUUM SWITCHING VALVE**

OK

5 CHECK WIRE HARNESS (VACUUM SWITCHING VALVE FOR EGR CUT – ECM)



(a) Disconnect the V8 VSV connector.
(b) Disconnect the E16 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

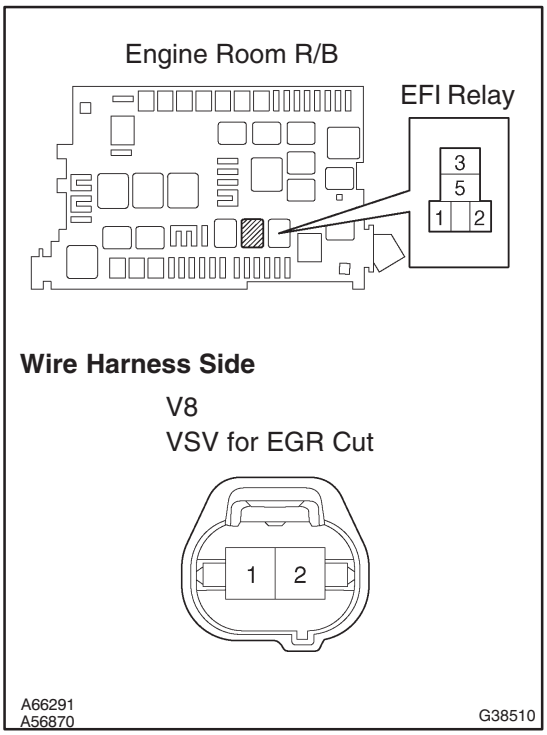
Standard:

Tester Connection	Specified Condition
E16–18 (EGRC) – V8–2	Below 1 Ω
E16–18 (EGRC) or V8–2 – Body ground	10 kΩ or higher

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

OK

6 CHECK WIRE HARNESS (VACUUM SWITCHING VALVE FOR EGR CUT – EFI RELAY)



(a) Remove the EFI relay from the engine room R/B.
(b) Disconnect the V8 VSV connector.
(c) Measure the resistance of the wire harness side connectors.

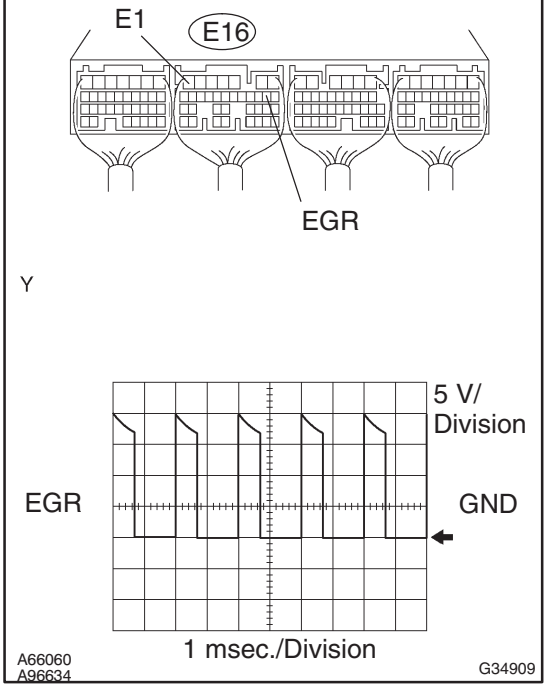
Standard:

Tester Connection	Specified Condition
EFI relay (3) – V8–1	Below 1 Ω
EFI relay (3) or V8–1 – Body ground	10 kΩ or higher

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

OK

7 CHECK ECM (EGR VOLTAGE)



(a) During idling, check the waveform of the ECM connector.

Standard:

Tester Connection	Specified Condition
E16–9 (EGR) – E16–7 (E1)	Correct waveform is as shown

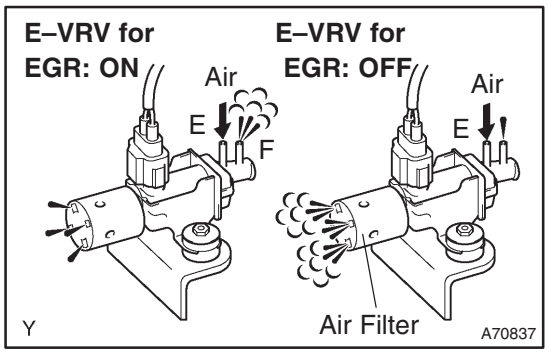
NG → **REPLACE ECM (See Pub. No. RM990E, page 10–34)**

NOTICE:

After replacing the ECM, allow for ECM learning start the engine and idle it until it is fully warmed up.

OK

8 CHECK OPERATION OF ELECTRIC VACUUM REGULATING VALVE FOR EGR

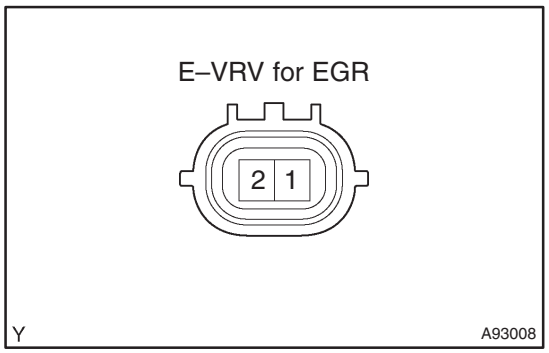


(a) Disconnect the vacuum hoses from the E–VRV.
(b) Connect the intelligent tester II to the DLC3.
(c) Turn the ignition switch ON and turn the intelligent tester II ON.
(d) Enter the following menus: Powertrain / Engine / Active Test / Control the EGR system.
(e) Check the operation
OK:
When E–VRV for EGR is ON, air from port E flows out through port F.
When E–VRV for EGR is OFF, air from port E flows out through air filter.

OK	**Go to step 12**

NG

9 INSPECT ELECTRIC VACUUM REGULATING VALVE FOR EGR (RESISTANCE)



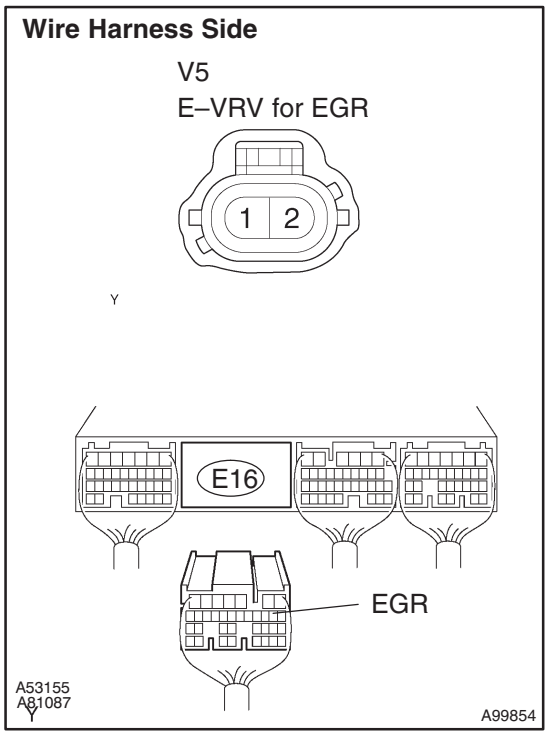
(a) Disconnect the V5 E–VRV connector.
(b) Measure the resistance of the E–VRV.
Standard:

Tester Connection	Condition	Specified Condition
1 – 2	20°C (68°F)	11 to 13 Ω

NG	**REPLACE ELECTRIC VACUUM REGULATING VALVE FOR EGR**

OK

10 CHECK WIRE HARNESS (ELECTRIC VACUUM REGULATING VALVE FOR EGR – ECM)



(a) Disconnect the V5 E–VRV connector.
(b) Disconnect the E16 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

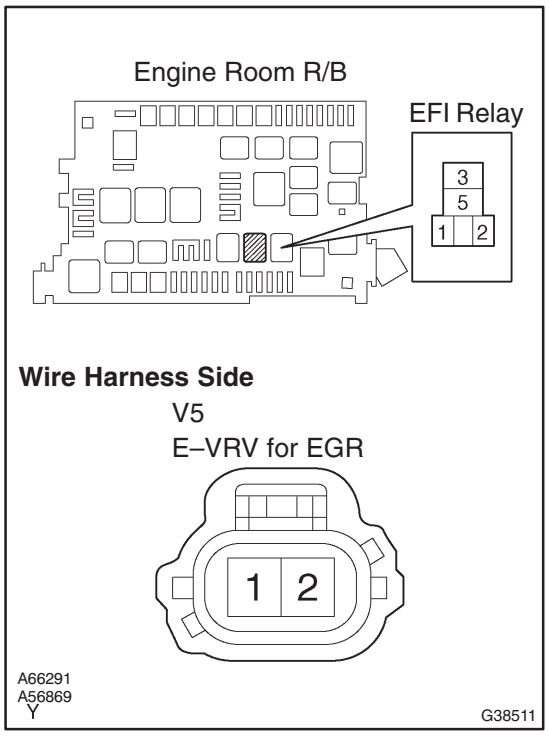
Standard:

Tester Connection	Specified Condition
E16–9 (EGR) – V5–2	Below 1 Ω
E16–9 (EGR) or V5–2 – Body ground	10 kΩ or higher

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

OK

11 CHECK WIRE HARNESS (ELECTRIC VACUUM REGULATING VALVE FOR EGR – EFI RELAY)



(a) Remove the EFI relay from the engine room R/B.
(b) Disconnect the V5 E–VRV connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
EFI relay (3) – V5–1	Below 1 Ω
EFI relay (3) or V5–1 – Body ground	10 kΩ or higher

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

OK

12	INSPECT EGR VALVE ASSY (See page 12–20)

NG → REPLACE EGR VALVE ASSY (See page 10–20)

OK

REPLACE ECM (See Pub. No. RM990E, page 10–34)

NOTICE:
After replacing the ECM, allow for ECM learning start the engine and idle it until it is fully warmed up.

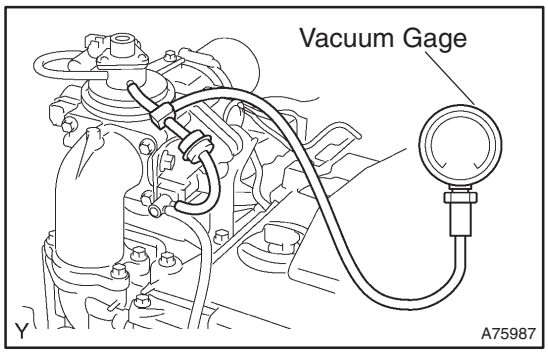
When not using intelligent tester II:

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 VRV for EGR and the EGR valve.
(b) Warm up the engine to above 80°C (176°F).
(c) Check the vacuum at 1,500 rpm.
Result:

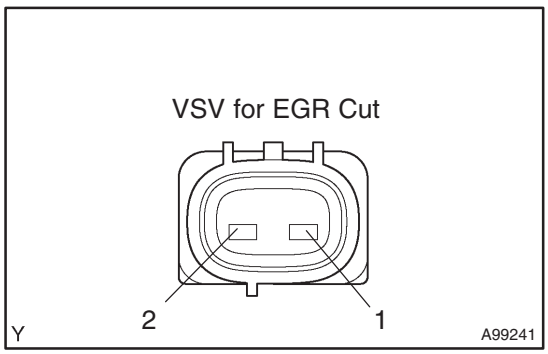
Type	Vacuum
A	0 kPa (0 mmHg, 0 in. Hg)
B	0 kPa (0 mmHg, 0 in. Hg) to 28 kPa (210 mmHg, 8.3 in. Hg)
C	Above 28 kPa (210 mmHg, 8.3 in. Hg)

B → Go to step 7

C → Go to step 12

A

3	INSPECT VACUUM SWITCHING VALVE FOR EGR CUT (RESISTANCE)



(a) Disconnect the V8 VSV connector.
(b) Measure the resistance of the VSV.
Standard:

Tester Connection	Condition	Specified Condition
1 – 2	20°C (68°F)	37 to 44 Ω

NG → REPLACE VACUUM SWITCHING VALVE FOR EGR CUT

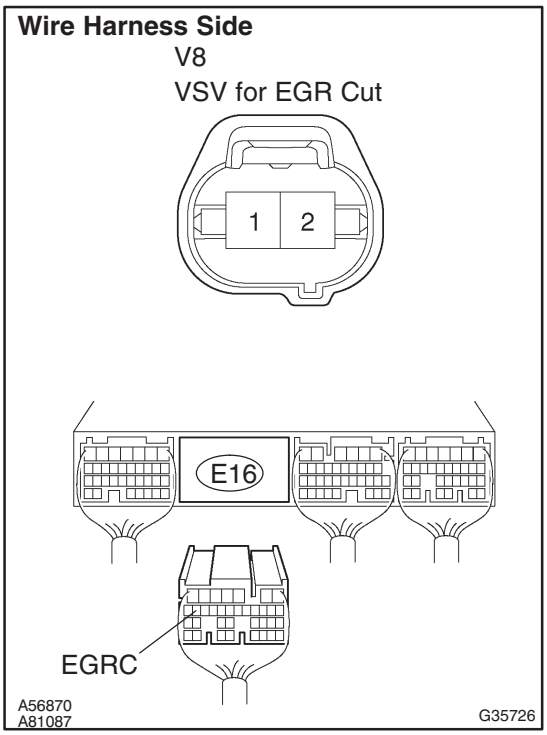
OK

4	INSPECT VACUUM SWITCHING VALVE FOR EGR CUT(OPERATION) (See page 12–20)

NG → REPLACE VACUUM SWITCHING VALVE FOR EGR CUT

OK

5 CHECK WIRE HARNESS (VACUUM SWITCHING VALVE FOR EGR CUT – ECM)



(a) Disconnect the V8 VSV connector.
(b) Disconnect the E16 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

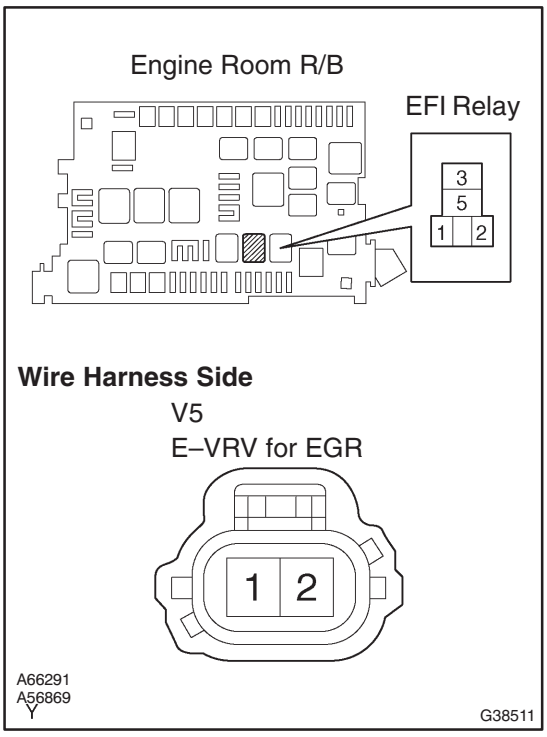
Standard:

Tester Connection	Specified Condition
E16–18 (EGRC) – V8–2	Below 1 Ω
E16–18 (EGRC) or V8–2 – Body ground	10 kΩ or higher

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

OK

6 CHECK WIRE HARNESS (VACUUM SWITCHING VALVE FOR EGR CUT – EFI RELAY)



(a) Remove the EFI relay from the engine room R/B.
(b) Disconnect the V8 VSV connector.
(c) Measure the resistance of the wire harness side connectors.

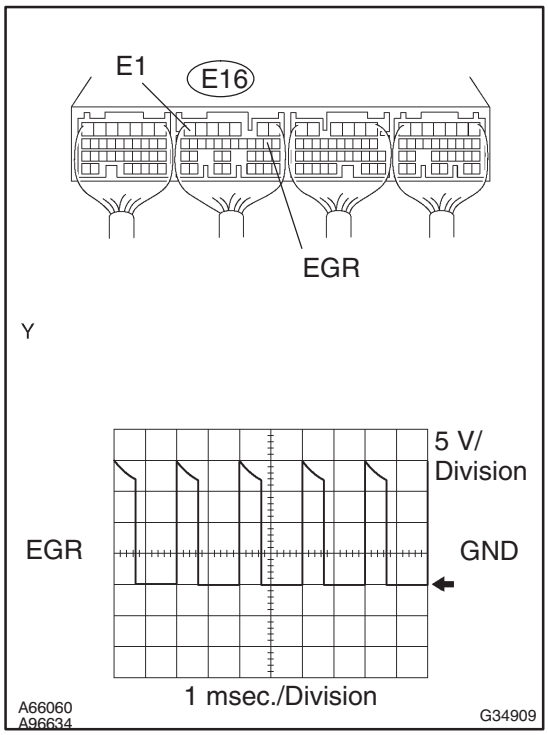
Standard:

Tester Connection	Specified Condition
EFI relay (3) – V5–1	Below 1 Ω
EFI relay (3) or V5–1 – Body ground	10 kΩ or higher

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

OK

7 CHECK ECM (EGR VOLTAGE)



(a) During idling, check the waveform of the ECM connector.

Standard:

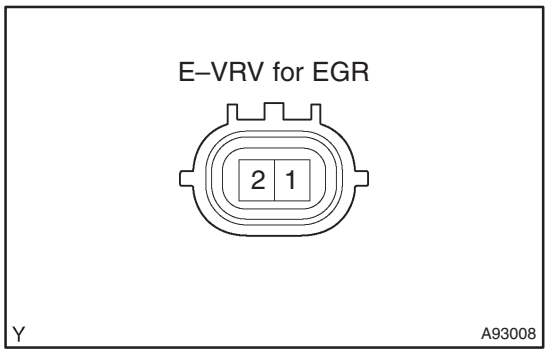
Tester Connection	Specified Condition
E16–9 (EGR) – E16–7 (E1)	Correct waveform is as shown

NG → **REPLACE ECM (See Pub. No. RM990E, page 10–34)**

NOTICE:
After replacing the ECM, allow for ECM learning start the engine and idle it until it is fully warmed up.

OK

8 INSPECT ELECTRIC VACUUM REGULATING VALVE FOR EGR (RESISTANCE)



(a) Disconnect the V5 E–VRV connector.
(b) Measure the resistance of the E–VRV.

Standard:

Tester Connection	Condition	Specified Condition
1 – 2	20°C (68°F)	11 to 13 Ω

NG → **REPLACE ELECTRIC VACUUM REGULATING VALVE FOR EGR**

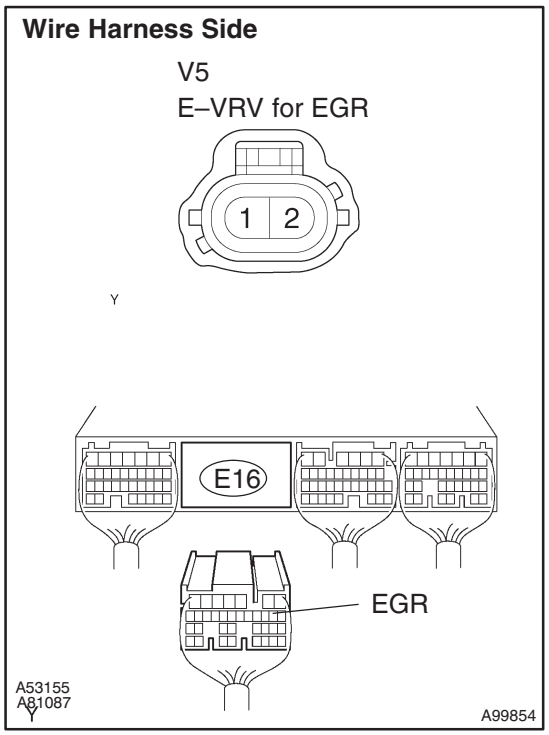
OK

9 INSPECT ELECTRIC VACUUM REGULATING VALVE FOR EGR (OPERATION) (See page 12–20)

NG → **REPLACE ELECTRIC VACUUM REGULATING VALVE FOR EGR**

OK

10 CHECK WIRE HARNESS (ELECTRIC VACUUM REGULATING VALVE FOR EGR – ECM)



(a) Disconnect the V5 E–VRV connector.
(b) Disconnect the E16 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

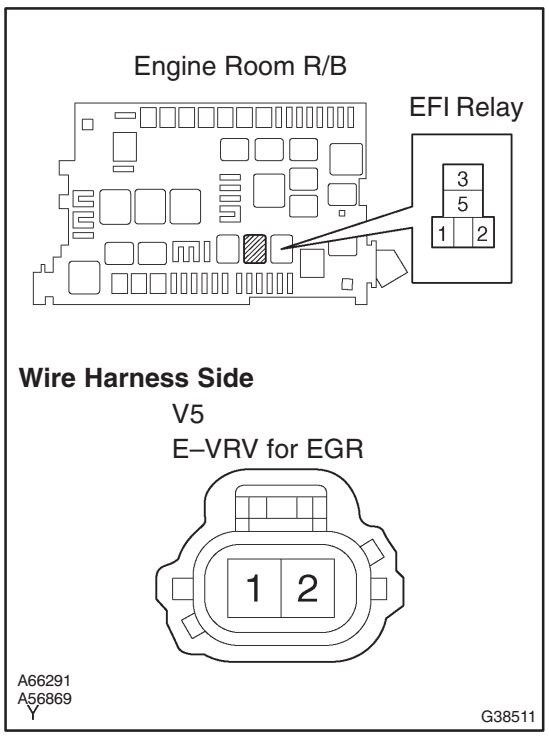
Standard:

Tester Connection	Specified Condition
E16–9 (EGR) – V5–2	Below 1 Ω
E16–9 (EGR) or V5–2 – Body ground	10 kΩ or higher

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

OK

11 CHECK WIRE HARNESS (ELECTRIC VACUUM REGULATING VALVE FOR EGR – EFI RELAY)



(a) Remove the integration relay from the engine room R/B.
(b) Disconnect the V5 E–VRV connector.
(c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
EFI relay (3) – V5–1	Below 1 Ω
EFI relay (3) or V5–1 – Body ground	10 kΩ or higher

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

OK

12	INSPECT EGR VALVE ASSY (See page 12–20)

NG → REPLACE EGR VALVE ASSY (See page 10–20)

OK

REPLACE ECM (See Pub. No. RM990E, page 10–34)

NOTICE:
After replacing the ECM, allow for ECM learning start the engine and idle it until it is fully warmed up.