DTC	P0401/71	EXHAUST GAS RECIRCULATION FLOW INSUFFICIENT DETECTEDE

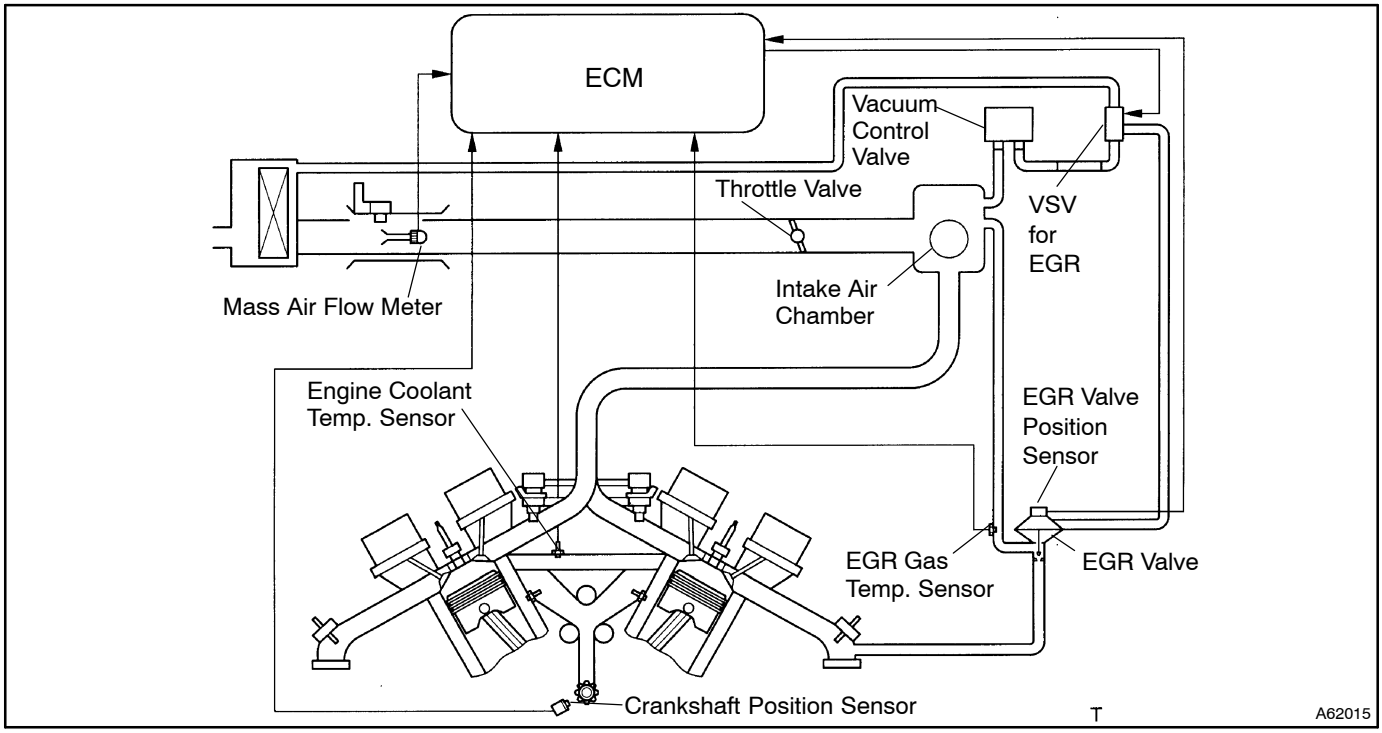
CIRCUIT DESCRIPTION

The EGR system recirculates exhaust gas, which is controlled to the proper quantity to suit the driving conditions, into the intake air mixture so as to slow down the combustion, reduce the combustion temperature and reduce NOx emissions.

The lift amount of the EGR valve is controlled by the vacuum which is regulated by the Duty–VSV operated by the ECM. The lift amount of EGR valve is detected by the EGR valve position sensor which is mounted on the EGR valve and it provides feedback to the ECM to control the lift amount of EGR valve in response to engine operating conditions.

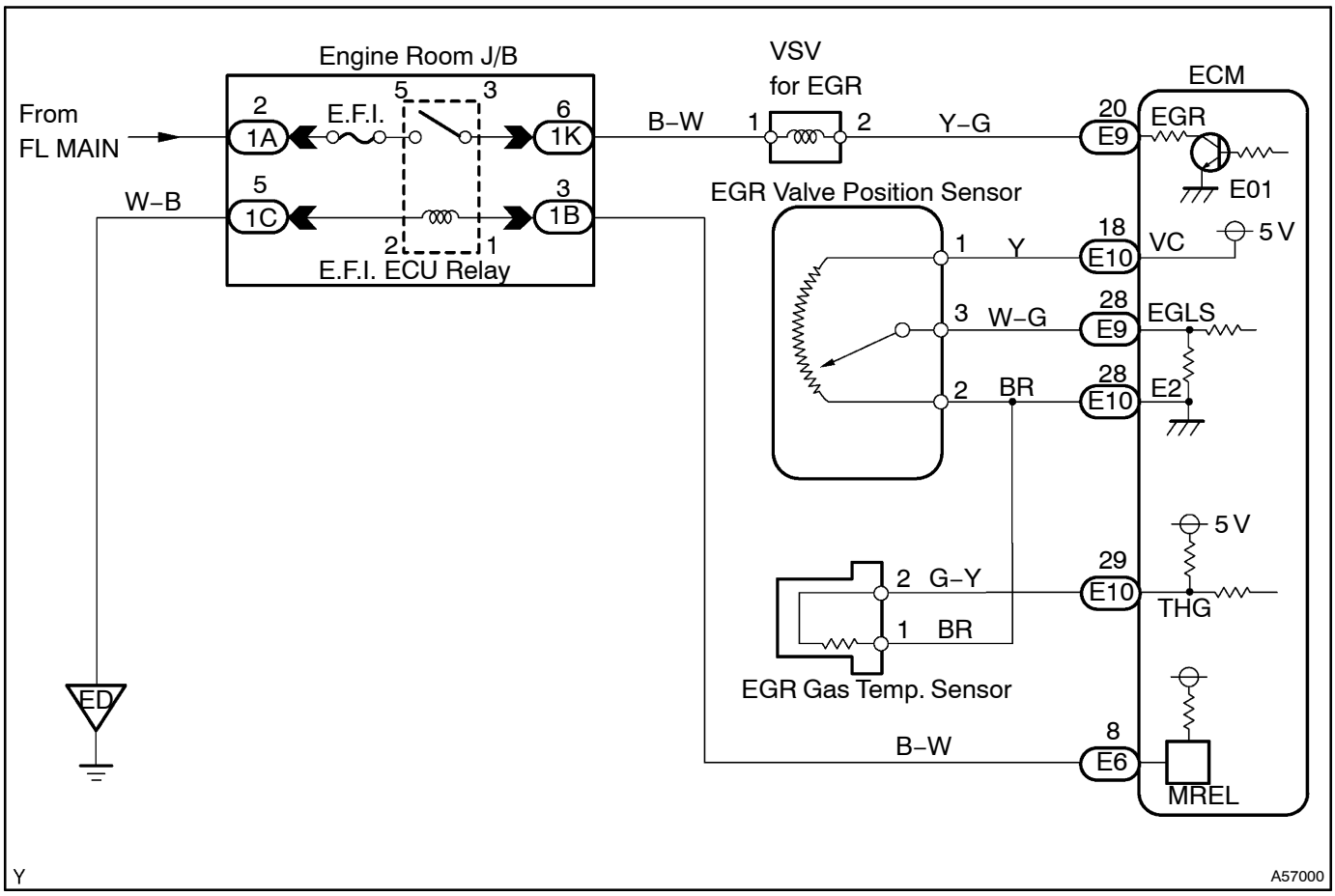
Under the following conditions, EGR is cut to maintain driveability.

- Before the engine is warmed up
- During deceleration (throttle valve closed)
- Light engine load (amount of intake air very small)
- Engine speed over 4,000 rpm
- Engine idling

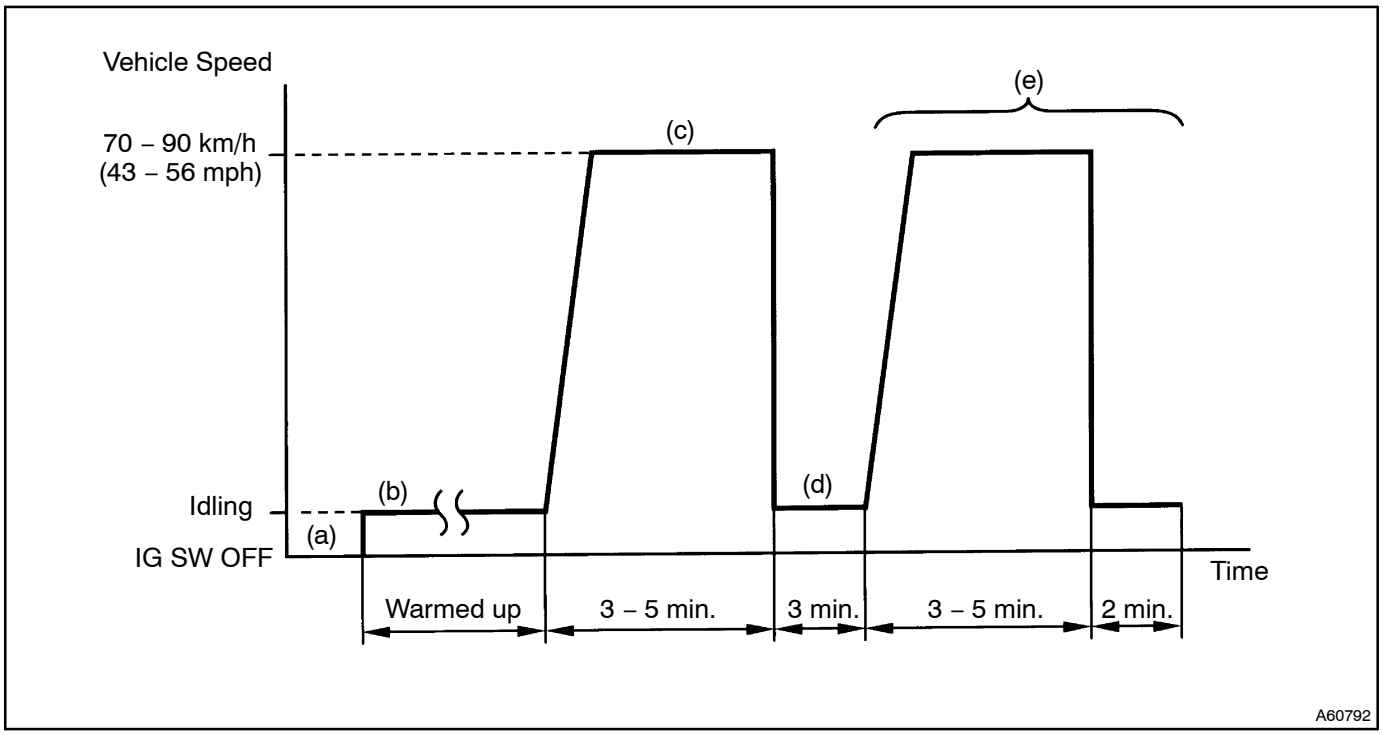


DTC No.	DTC Detection Condition	Trouble Area
P0401/71	After engine is warmed up and run at 80 km/h (50 mph) for 3 to 5 min. EGR gas temp. sensor valve does not exceed 35°C (95°F) above ambient air Temp. (2 trip detection logic)	• Open or short in EGR gas temp. sensor circuit • EGR gas temp. sensor • Vacuum hose disconnected or blocked • Open in VSV circuit for EGR • VSV for EGR • EGR system • EGR valve (stuck closed) • Vacuum control valve • ECM

WIRING DIAGRAM



SYSTEM CHECK DRIVING PATTERN



(a) Connect the hand–held tester to the DLC3.
(b) Start and warm up the engine with all the accessories switched OFF.
(c) Run the vehicle at 70 – 90 km/h (43 – 56 mph) for 3 minutes or more.
(d) Idle the engine for about 2 minutes.
(e) Do steps (c) and (d) again.
(f) Stop in a safe place and turn the ignition switch OFF.
(g) Do step (b) to (e) again.
(h) Check the READINESS TESTS mode on the hand–held tester.

If COMPL is displayed and the MIL does not light up, the system is normal
If INCMPL is displayed and the MIL does not light up, run the vehicle steps (b) to (f) from some times and check it.
HINT:
INCMPL is displayed when either condition (1) or (2) exists.
(1) The system check is incomplete.
(2) There is a malfunction in the system.
If there is a malfunction in the system, the MIL light up after step (g) above is done (2trip detection logic).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using hand–held tester, as freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air–fuel ratio was lean or rich, etc. at the time of the malfunction.

When using Hand–held Tester:

1	READ VALUE OF HAND–HELD TESTER(EGR GAS TEMP.)

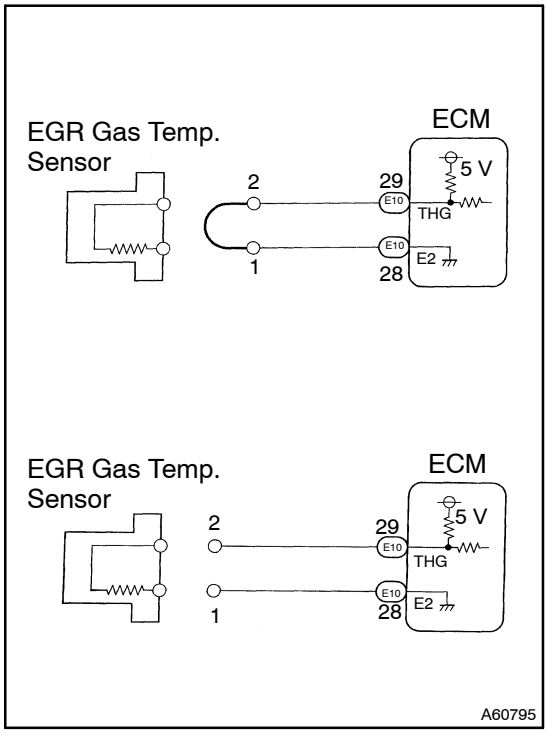
(a) Connect the hand–held tester to the DLC3.
(b) Warm up the engine.
(c) Read the EGR gas temperature on hand–held tester during idling.
EGR gas temperature: 5 – 150°C (41 – 302°F) (Not immediately after driving)

HINT:
If there is an open circuit, hand–held tester indicates 3.1°C (37.6°F).
If there is an short circuit, hand–held tester indicates 159.3°C (318.7°F).

NO → **Go to step 4**

NG

2 CHECK HARNESS AND CONNECTOR(CHECK FOR OPEN OR SHORT)



(a) For open circuit
(1) Disconnect the EGR gas temperature sensor connector.
(2) Connect the sensor wire harness terminals together.
(3) Turn the ignition switch ON.
(4) Read the EGR gas temperature on the hand–held tester.

EGR gas temperature: 159.3°C (318.7°F)

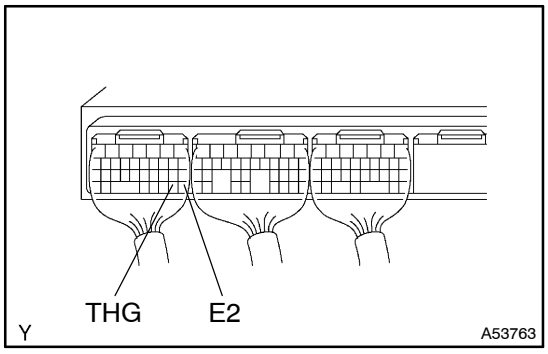
(b) For short circuit
(1) Disconnect the EGR gas temperature sensor connector.
(2) Read the EGR gas temperature on the hand–held tester.

EGR gas temperature: 3.1°C (37.6°F)

NO → **CHECK AND REPLACE E.G.R GAS TEMPERATURE SENSOR**

NG

3 INSPECT ECM(CHECK FOR OPEN OR SHORT)

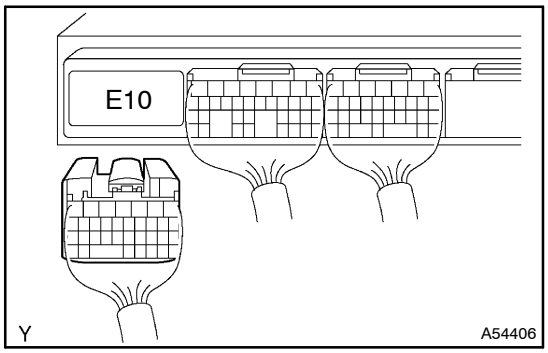


(a) For open circuit
(1) Connect between terminals THG and E2 of the ECM connectors.

HINT:
The EGR gas temperature sensor connector is disconnected. Before checking, do a visual check and contact pressure check for the ECM connector.

(2) Read the EGR gas temperature on the hand–held tester.

EGR gas temperature: 159.3°C (318.7°F)



(b) For short circuit
(1) Disconnect the ECM E10 connector.
(2) Read the EGR gas temperature on the hand–held tester.

EGR gas temperature: 3.1°C (37.6°F)

NO → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

NG

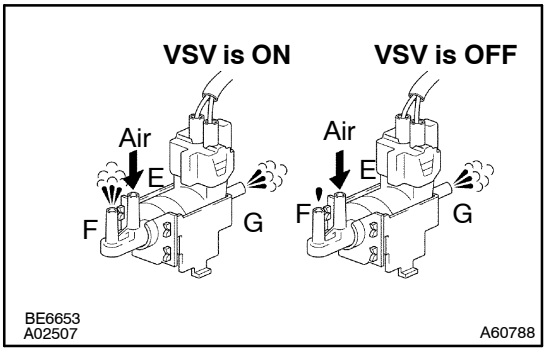
CHECK AND REPLACE ECM

4	CHECK THE CONNECTION OF VACUUM HOSE(AND BLOCKAGE) (See page 14–156)

NG → REPAIR OR REPLACE VACUUM HOSE

OK

5	PERFORM ACTIVE TEST BY VACUUM SWITCHING VALVE NO.1(FOR EGR)



(a) Select the ACTIVE TEST mode on the hand–held tester.
(b) Check the VSV operation when it is operated by the hand–held tester.
VSV is ON:
Air from port E flows out through ports F and G.
VSV is OFF:
Air from port E flows out through port G.

OK → Go to step 8

NG

6	INSPECT VACUUM SWITCHING VALVE NO.1(CHECK OPERATION) (See page 12–17)

NG → REPLACE VACUUM SWITCHING VALVE ASSY NO.1

OK

7	CHECK HARNESS AND CONNECTOR(ENGINE ROOM J/B – ECM)

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

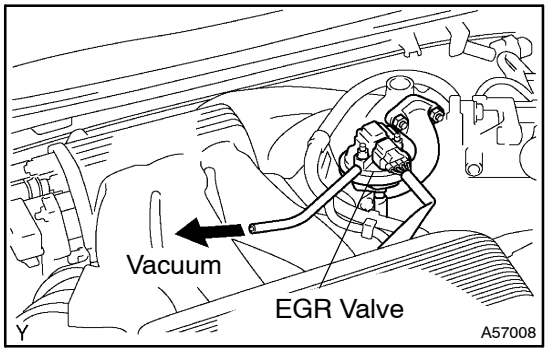
REPAIR OR REPLACE POWER SOURCE CIRCUIT

8	CHECK EGR SYSTEM (See page 12–16)

NG → REPAIR OR REPLACE

OK

9	INSPECT EGR VALVE ASSY



(a) Disconnect the vacuum hose from the EGR valve.
(b) Start the engine.
(c) Check whether the engine stall when apply vacuum to the EGR valve.
Result: Engine runs rough or stall.

NG → **REPAIR OR REPLACE EGR VALVE ASSY**

OK

10	INSPECT VACUUM CONTROL VALVE (See page 12–17)

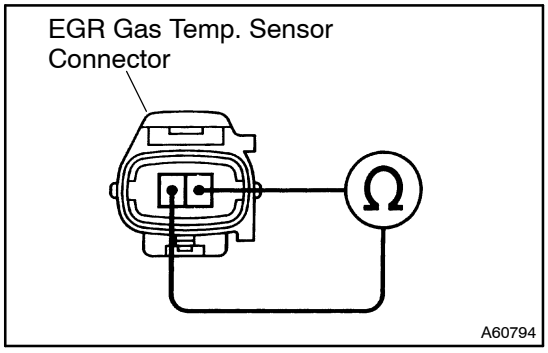
NG → **REPLACE VACUUM CONTROL VALVE**

OK

CHECK AND REPLACE ECM

When not using Hand–held Tester:

1	INSPECT E.G.R GAS TEMPERATURE SENSOR



(a) Disconnect the EGR gas temperature sensor connector.
(b) Measure the resistance between terminals of the EGR gas temperature sensor connector.
Resistance: 2.5 – 600 kΩ
(Not immediately after driving)

HINT:
If there is open circuit, ohmmeter indicates 720 kΩ or more.
If there is short circuit, ohmmeter indicates 200 Ω or less.

NG → **REPLACE E.G.R GAS TEMPERATURE SENSOR**

OK

2	CHECK HARNESS AND CONNECTOR(EGR GAS TEMP. SENSOR – ECM)

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

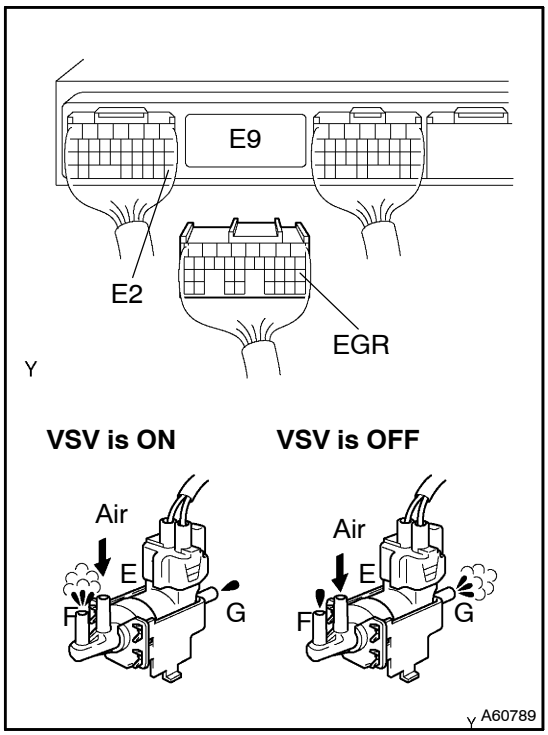
OK

3	CHECK THE CONNECTION OF VACUUM HOSE(AND BIOCKAGE) (See page 14–20)

NG → REPAIR OR REPLACE VACUUM HOSE

OK

4	INSPECT VACUUM SWITCHING VALVE NO.1



(a) Disconnect the ECM E9 connector.
(b) Turn the ignition switch ON.
(c) Check the VSV function.
(1) Connect between terminal EGR and E2 of the ECM (VSV is ON).
VSV is ON:
Air from port E flows out through port F.
(2) Disconnect between terminal EGR and E2 of the ECM (VSV is OFF).
VSV is OFF:
Air from port E flows out through port G.

OK → Go to step 7

NG

5	INSPECT VACUUM SWITCHING VALVE NO.1(CHECK OPERATION) (See page 12–17)

NG → REPLACE VACUUM SWITCHING VALVE NO.1

OK

6	CHECK HARNESS AND CONNECTOR(ENGINE ROOM J/B – ECM)

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

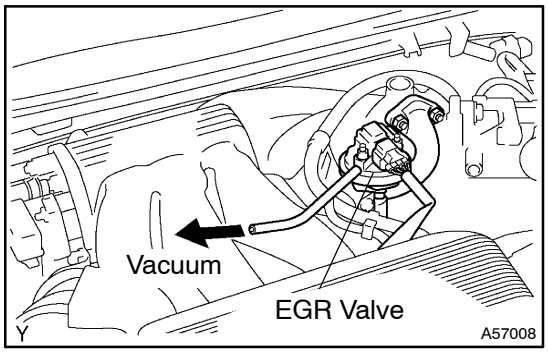
REPAIR OR REPLACE POWER SOURCE CIRCUIT

7	CHECK EGR SYSTEM(See page 10–13)

NG → CHECK AND REPLACE REPAIR OR REPLACE

OK

8	INSPECT EGR VALVE ASSY



(a) Disconnect the vacuum hose from the EGR valve.
(b) Start the engine.
(c) Check whether the engine stall when apply vacuum to the EGR valve.
Result: Engine runs rough or stall.

NG → REPAIR OR REPLACE EGR VALVE ASSY

OK

9	INSPECT VACUUM CONTROL VALVE(See page 12–17)

NG → REPLACE VACUUM CONTROL VALVE

OK

CHECK AND REPLACE ECM