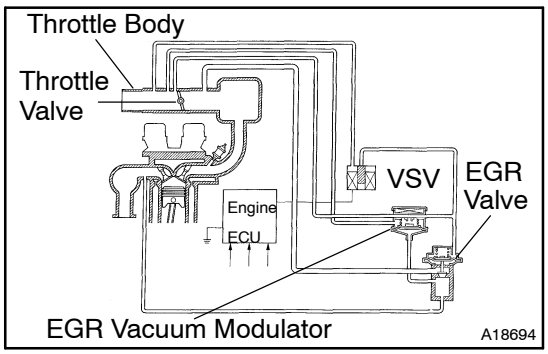
DTC	P0401	Exhaust Gas Recirculation Flow Insufficient Detected

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 to slow down the combustion, reduce the combustion temperature and reduce the NOx emissions. The amount of EGR is regulated by the EGR vacuum modulator according to the engine load.

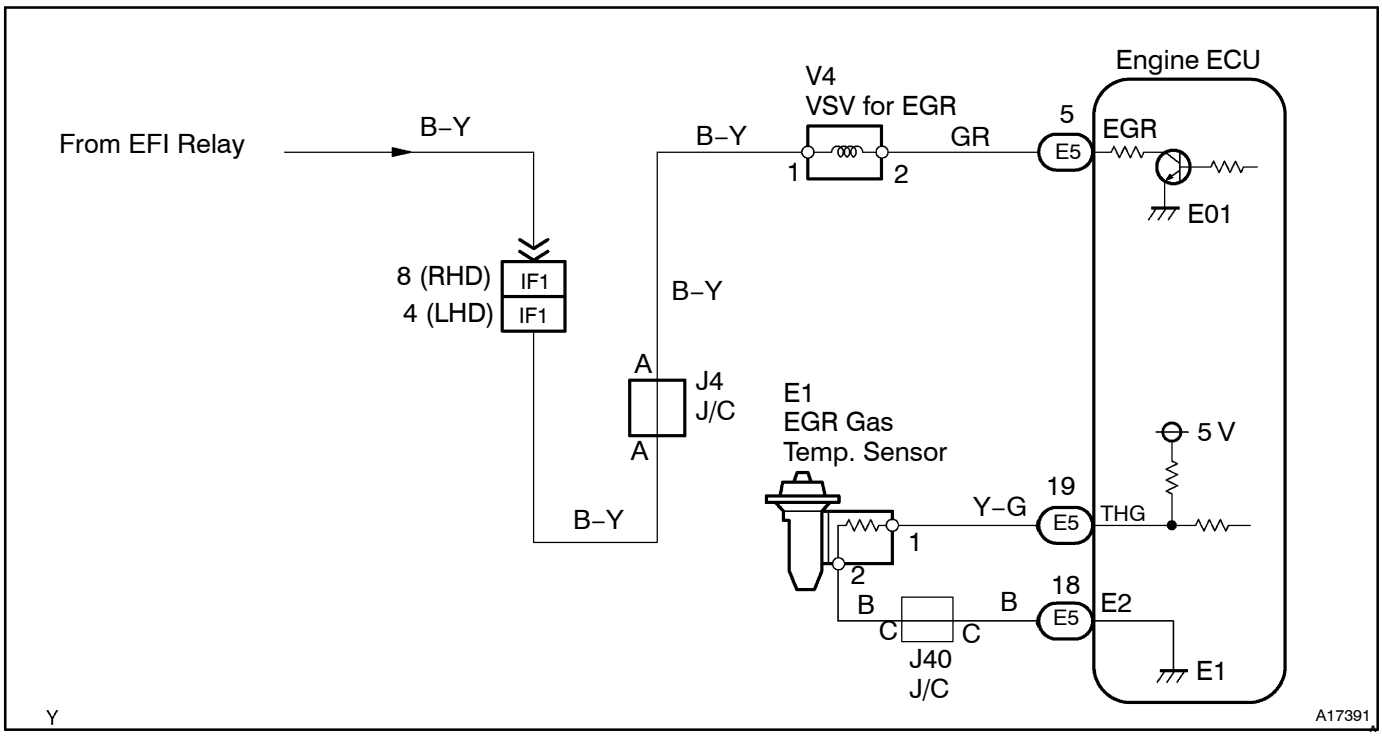


If even one of the following conditions is fulfilled, the VSV is turned on by a signal from the engine ECU.
This causes in atmospheric air act on the EGR valve, closing the EGR valve to close and the exhaust gas to be shut off (EGR cut–off).
Under the following conditions, EGR is cut to maintain driveability.

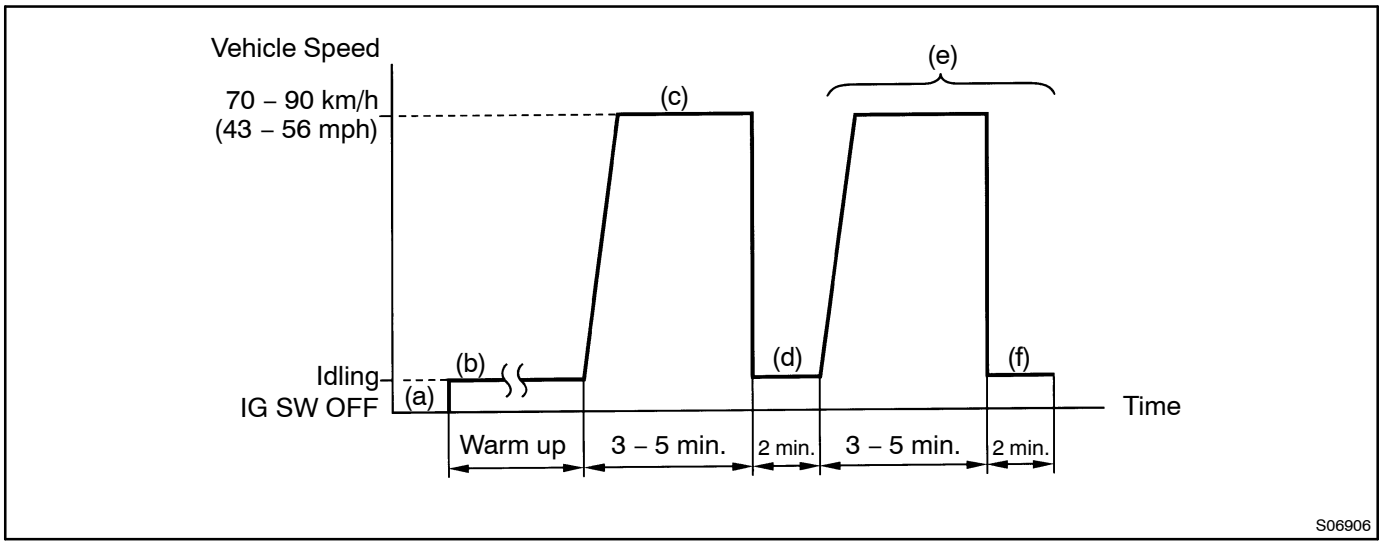
- Before the engine is warmed up.
- During deceleration (throttle valve closed).
- Light engine load (very small amount of intake air).
- Engine racing.

DTC No.	DTC Detection Condition	Trouble Area
P0401	After engine is warmed up and run at 80 km/h (50 mph) for 3 to 5 minutes, small difference occars between value of EGR gas temperature sensor and ambient air temperature (2 trip detection logic)	• Open in EGR gas temperature sensor circuit • EGR gas temperature sensor • Vacuum or EGR hose disconnected • Open or short in VSV circuit for EGR • VSV for EGR • EGR system • EGR vacuum modulator • EGR valve stuck closed • Engine ECU

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) Check the READINESS TESTS mode on the hand–held tester.

If COMPL is displayed and the engine warning light does not light up, the system is normal.
If INCMPL is displayed and the engine warning light does not light up, run the vehicle and do step (e), and check it again.
HINT:
INCMPL is displayed when either condition (1) or (2) is satisfied.
(1) The system check is incomplete.

(2) There is a malfunction in the system.
If there is a malfunction in the system, the engine warning light will light up after steps (b) to (e) above are done (2 trip detection logic).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester. Because 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:

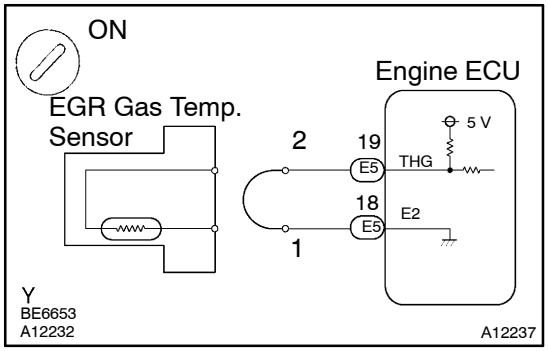
1	**Connect hand–held tester, and read value of EGR gas temperature value.**

PREPARATION:
(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
CHECK:
Read the EGR gas temperature on the hand–held tester.
OK:
EGR gas temperature: 10°C (50°F) or more
HINT:
If there is an open circuit, the hand–held tester indicates 3.1°C (37.6°F).

OK → **Go to step 4.**

NG

2	**Check for open in harness or engine ECU.**

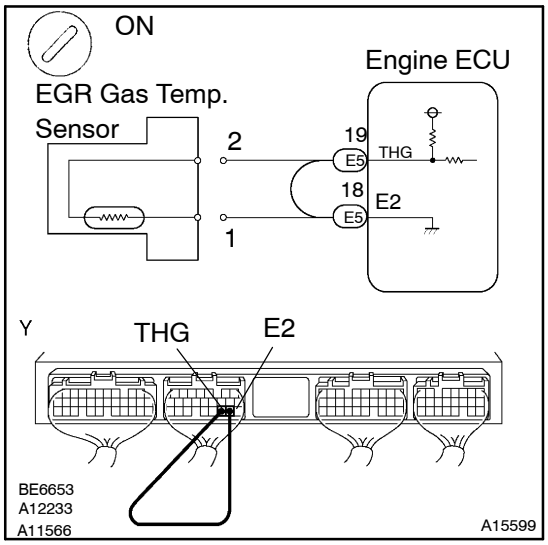


PREPARATION:
(a) Disconnect the EGR gas temperature sensor connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn the ignition switch ON.
CHECK:
Read the EGR gas temperature on the hand–held tester.
OK:
EGR gas temperature: 159.3°C (318.7°F)

OK → **Confirm good connection at sensor. If OK, replace EGR gas temperature sensor.**

NG

3	Check for open in harness or engine ECU.



PREPARATION:

(a) Remove the glove compartment.

(b) Connect between terminals THG and E2 of the ECU connector.

HINT:

The EGR gas temperature sensor connector is disconnected. Before checking, do a visual check and contact pressure check for the engine ECU connector (See page IN–19).

CHECK:

Read the EGR gas temperature on the hand–held tester.

OK:

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

OK	Open in harness between terminal E2 or THG. Repair or replace harness.

NG

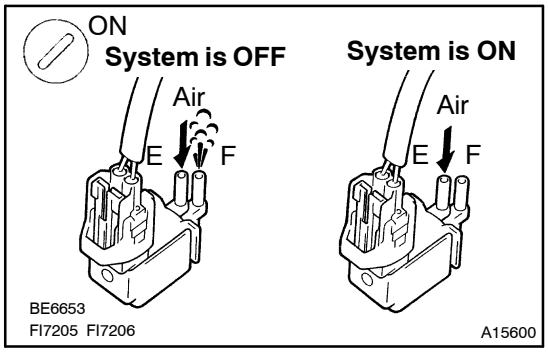
Confirm connection at engine ECU. If OK, replace engine ECU.

4	Check connection of vacuum hose and EGR hose.

NG	Repair or replace.

OK

5	Check VSV for EGR.



PREPARATION:

Select the ACTIVE TEST mode on the hand–held tester.

CHECK:

Check the operation of the VSV when it is operated by the hand–held tester.

OK:

EGR system is OFF:
Air from port E flows out through port F.
EGR system is ON:
Air does not flow from port E to port F.

OK → Go to step 8.

NG

6	Check operation of VSV for EGR.

NG → Replace VSV for EGR.

OK

Check for short in harness and connector between VSV and engine ECU (See page IN–19).

7	Check EGR system.

NG → Repair or replace.

OK

8	Check EGR vacuum modulator.

NG → Repair or replace.

OK

9	**Check EGR valve (See page EC–9).**

NG → **Repair or replace (See page EC–9).**

OK

10	**Check value of EGR gas temperature sensor (See page FI–3).**

PREPARATION:

(a) Connect the hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand–held tester (EGR system ON).
(d) Race the engine at 4,000 rpm for 3 minutes.

CHECK:

Measure the EGR gas temperature while racing the engine at 4,000 rpm.

OK:

EGR gas temperature after 3 minutes: 100°C (212°F) or more

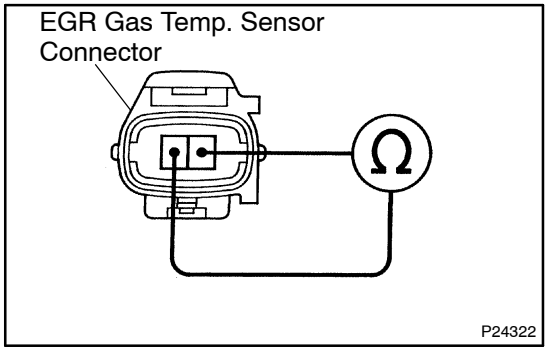
NG → **Replace EGR gas temperature sensor (See page FI–3).**

OK

Check and replace engine ECU (See page IN–19).

When not using hand–held tester:

1	Check resistance of EGR gas temperature sensor.

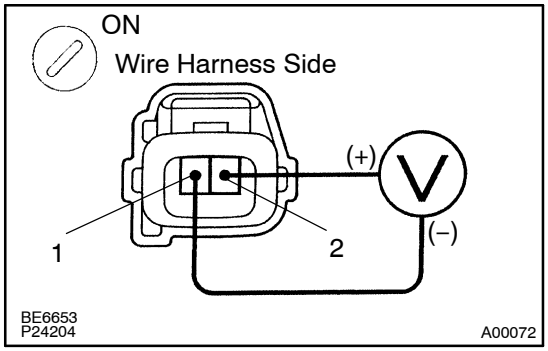


PREPARATION:
Disconnect the EGR gas temperature sensor connector.
CHECK:
Measure the resistance between the terminals of the EGR gas temperature sensor connector.
OK:
Resistance: 600 kΩ or less
HINT:
If there is a open circuit, the ohmmeter indicates 720 kΩ or more.

NG	Check and replace EGR gas temperature sensor (See page FI–3).

OK

2	Check for open in harness or engine ECU.

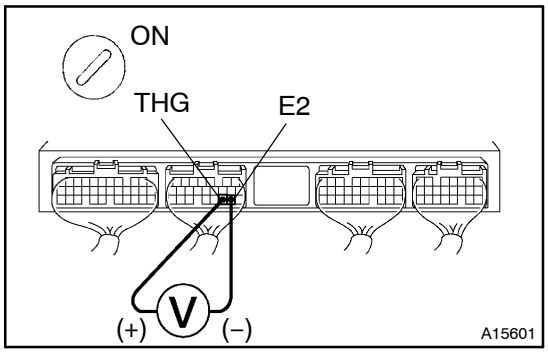


PREPARATION:
(a) Disconnect the EGR gas temperature sensor connector.
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals of the EGR gas temperature sensor wire harness side connector.
OK:
Voltage: 4.5 – 5.5 V

OK	Go to step 4.

NG

3	Check for open in harness or engine ECU.



PREPARATION:

(a) Remove the glove compartment.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals of THG and E2 of the engine ECU connector.

HINT:

The EGR gas temperature sensor connector is disconnected.

OK:

Voltage: 4.5 – 5.5 V

OK	Open in harness between terminals E2 or THG. Repair or replace harness.

NG

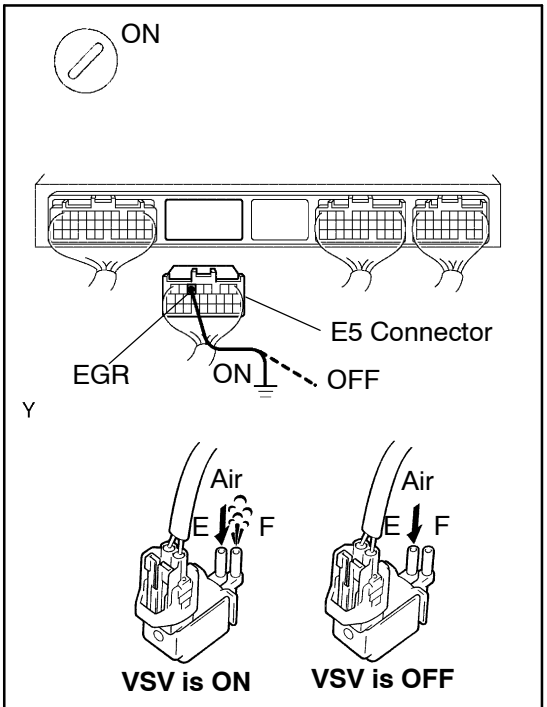
Confirm connection at engine ECU. If OK, replace engine ECU.

4	Check connection of vacuum hose and EGR hose.

NG	Repair or replace.

OK

5	Check VSV for EGR.



PREPARATION:

(a) Remove the glove compartment.
(b) Disconnect the E5 connector from the engine ECU.
(c) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect terminal EGR of the engine ECU connector and the body ground (ON).
(2) Disconnect terminal EGR of the engine ECU connector and the body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK	Go to step 8.

NG

6	Check operation for VSV for EGR.

NG	Replace VSV for EGR.

OK

Check for open in harness and connector between R/B No. 2 and engine ECU (See page IN–19).

7	Check EGR system.

NG	Repair or replace.

OK

8	**Check EGR vacuum modulator.**

NG → **Repair or replace.**

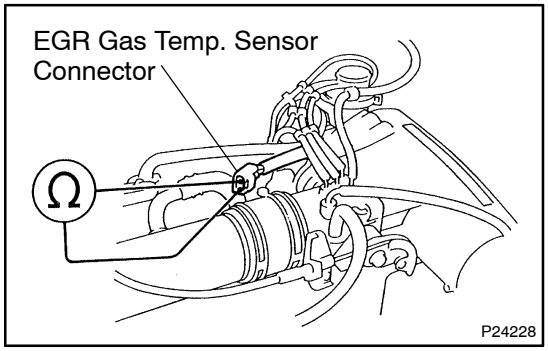
OK

9	**Check EGR valve (See page EC–6).**

NG → **Repair or replace (See page EC–9).**

OK

10	**Check resistance of EGR gas temperature sensor (See page FI–3).**



PREPARATION:

(a) Disconnect the EGR gas temperature sensor connector.
(b) Start the engine and warm it up.
(c) Disconnect the VSV connector for the EGR.
(d) Race the engine at 4,000 rpm for 3 minutes.

CHECK:

Measure the resistance of the EGR gas temperature sensor while racing the engine at 4,000 rpm.

OK:

Resistance of EGR gas temperature sensor after 3 minutes: 4.3 kΩ or less

HINT:

188.6 – 439.0 kΩ resistance at 20°C (68°F)

NG → **Replace EGR gas temperature sensor (See page FI–3).**

OK

Check and replace engine ECU (See page IN–19).