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< BASIC INSPECTION >

BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

Work Flow



[VQ37VHR]

INFOID:000000004250592 EC **OVERALL SEQUENCE** Inspection start D 1. Get information for symptom Get the detailed information about symptom from the customer. Е 2. Check DTC*1 Check DTC*1 Print out DTC*1 and freeze frame data*2 (or, write it down). Check related service bulletins. Symptom is described. Symptom is not described. Symptom is described. DTC*1 is detected. DTC*1 is detected. DTC*1 is not detected. 3. Confirm the symptom 4. Confirm the symptom Try to confirm the symptom described by the Try to confirm the symptom described by the Н customer. customer. Also study the normal operation and fail-safe Also study the normal operation and fail-safe related to the symptom. related to the symptom. 5. Perform DTC CONFIRMATION PROCEDURE 6. Perform BASIC INSPECTION With CONSULT-III Without CONSULT-III 9. Detect malfunctioning 7. Perform "SPEC" in system by Symptom Within the "DATA MONITOR" mode Κ SP value Table Out of the SP value 8. Detect malfunctioning part by **TROUBLE DIAGNOSIS** Malfunctioning part - SPECIFICATION VALUE is not detected. Malfunctioning part 10. Detect malfunctioning part by is detected M **Diagnosis Procedure** Ν 11. Repair or replace the malfunctioning part 12. Final check DTC*1 is detected. Check that the symptom is not detected. Symptom remains. Perform DTC Confirmation Procedure again, and then check that the malfunction is repaired. Ρ DTC*1 is not detected. Symptom does not remain. **INSPECTION END**

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

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< BASIC INSPECTION >

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to <u>EC-12</u>, "<u>Diagnostic Work</u> <u>Sheet</u>".)

>> GO TO 2.

2.CHECK DTC

- 1. Check DTC.
- 2. Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC. (Refer to EC-112, "Diagnosis Description".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to <u>EC-602</u>, "Symptom Table".)
- 3. Check related service bulletins for information.

Are any symptoms described and any DTCs detected?

Symptom is described, DTC is detected>>GO TO 3. Symptom is described, DTC is not detected>>GO TO 4. Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON). Also study the normal operation and fail-safe related to the symptom. Refer to <u>EC-606, "Description"</u> and <u>EC-560</u>, "Fail safe".

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail-safe related to the symptom. Refer to <u>EC-606</u>, "<u>Description</u>" and <u>EC-560</u>, "<u>Fail safe</u>".

Diagnosis Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.

If two or more DTCs are detected, refer to <u>EC-562, "DTC Inspection Priority Chart"</u> and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.

If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIR-MATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.

NO >> Check according to <u>GI-41, "Intermittent Incident"</u>.

6.PERFORM BASIC INSPECTION

Perform EC-13, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION > [VQ37VHR]	
YES >> GO TO 7. NO >> GO TO 9.	А
7.PERFORM SPEC IN DATA MONITOR MODE	
With CONSULT-III	EC
Make sure that "MAS A/F SE-B1", "MAS A/F SE-B2", "B/FUEL SCHDL", "A/F ALPHA-B1" and "A/F ALPHA- B2" are within the SP value using CONSULT-III "SPEC" in "DATA MONITOR" mode. Refer to <u>EC-137, "Com-</u> ponent Function Check".	
Is the measurement value within the SP value?	С
YES >> GO TO 9. NO >> GO TO 8.	
${f 8}.$ DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE	D
Detect malfunctioning part according to EC-138, "Diagnosis Procedure".	
Is a malfunctioning part detected?	Е
YES >> GO TO 11. NO >> GO TO 9.	
9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE	F
Detect malfunctioning system according to <u>EC-602</u> , " <u>Symptom Table</u> " based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.	G
>> GO TO 10.	
10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE	Н
Inspect according to Diagnosis Procedure of the system. NOTE:	
The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-44</u> , " <u>Circuit Inspection</u> ".	Ι
Is a malfunctioning part detected?	J
 YES >> GO TO 11. NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CON- SULT-III. Refer to <u>EC-525, "Reference Value"</u>. 	
11. REPAIR OR REPLACE THE MALFUNCTIONING PART	Κ
1. Repair or replace the malfunctioning part.	
 Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement. 	L
3. Check DTC. If DTC is displayed, erase it. Refer to <u>EC-112, "Diagnosis Description"</u> .	
>> GO TO 12.	M
12.FINAL CHECK	
When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been completely repaired.	Ν
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.	0
Is DTC detected and does symptom remain?	
YES-1 >> DTC is detected: GO TO 10. YES-2 >> Symptom remains: GO TO 6.	Р
NO >> Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (Transmission Control Module). (Refer to <u>EC-112</u> , " <u>Diagnosis Description</u> ".) If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to <u>EC-569</u> , " <u>How to Set SRT Code</u> ".	

DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

Diagnostic Work Sheet

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the WORKSHEET SAMPLE below in order to organize all the information for troubleshooting. Some conditions may cause the MIL to illuminate steady or blink and DTC to be detected. Examples:

DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

WORKSHEET SAMPLE

Customer nan	ne MB/MS	Model & Year	VIN
Engine # Trans. Mileage			
Incident Date		Manuf. Date	In Service Date
Fuel and fuel	filler cap	 Vehicle ran out of fuel causing misfire Fuel filler cap was left off or incorrectly screwed on. 	
Symptoms	Startability	 Impossible to start No combustion Partial combustion affected by throttle position Partial combustion NOT affected by throttle position Possible but hard to start Others [
	Idling	□ No fast idle □ Unstable □ H □ Others [High idle ☐ Low idle]
	Driveability	Stumble Surge Knock Lack of power Intake backfire Exhaust backfire Others []	
	Engine stall	At the time of start While idling While accelerating While dece Just after stopping While loadi	lerating
Incident occurrence] In the daytime	
Frequency		All the time Under certain cond	ditions 🗌 Sometimes
Weather cond	itions	Not affected	
	Weather	Fine Raining Snowing	Others []
	Temperature	Hot Warm Cool] Cold 🔲 Humid °F
Engine conditions		Cold During warm-up	After warm-up
		Engine speed0 2,000	4,000 6,000 8,000 rpm
Road conditions		🗌 In town 🔄 In suburbs 🗌 Hig	hway 🗌 Off road (up/down)
Driving conditions		 Not affected At starting While idling At racing While accelerating While cruising While decelerating While turning (RH/LH) 	
		Vehicle speed 0 10 20	30 40 50 60 MPH
Malfunction indicator lamp		Turned on Not turned on	

 KEY POINTS

 WHAT
 WHAT

 WHEN
 Date, Frequencies

 WHERE
 Road conditions

 HOW
 Operating conditions, Weather conditions, Symptoms

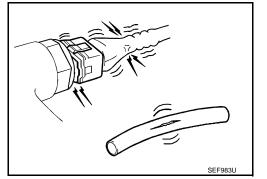
Revision: 2009 October

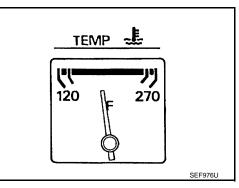
INSPECTION AND ADJUSTMENT BASIC INSPECTION

BASIC INSPECTION : Special Repair Requirement

1.INSPECTION START

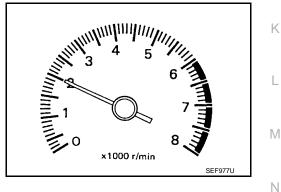
- Check service records for any recent repairs that may indicate a related malfunction, or a current need for 1. scheduled maintenance.
- 2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut _
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
- 3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
- 4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.





- Run engine at about 2,000 rpm for about 2 minutes under no 5. load
- Make sure that no DTC is displayed with CONSULT-III or GST.
- Are any DTCs detected?

YES	>> GO TO 2.
NO	>> GO TO 3.



2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnosis Procedure.

>> GO TO 3

3.CHECK IDLE SPEED

Run engine at about 2,000 rpm for about 2 minutes under no load. 1.

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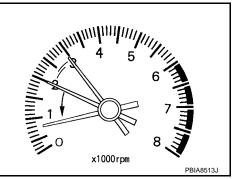
< BASIC INSPECTION >

- Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
- Check idle speed.
 For procedure, refer to <u>EC-17, "IDLE SPEED : Special Repair</u> <u>Requirement"</u>.
 For specification, refer to <u>EC-619, "Idle Speed"</u>.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 4.



[VQ37VHR]

4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- Perform <u>EC-18</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.

NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7.CHECK IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.

 Check idle speed. For procedure, refer to <u>EC-17, "IDLE SPEED : Special Repair Requirement"</u>. For specification, refer to <u>EC-619, "Idle Speed"</u>.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-280, "Component Inspection"</u>.
- Check crankshaft position sensor (POS) and circuit. Refer to EC-276, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace. Then GO TO 4.

9.CHECK ECM FUNCTION

- 1. Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
- Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to EC-16, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> GO TO 4. 10.CHECK IGNITION TIMING

1. Run engine at idle.

< BASIC INSPECTION >

[VQ37VHR]

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2. Check ignition timing with a timing light.

A :Timing indicator

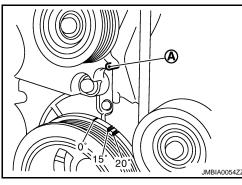
For procedure, refer to <u>EC-17, "IGNITION TIMING : Special</u> <u>Repair Requirement"</u>.

For specification, refer to EC-619. "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 11.



11.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform <u>EC-18</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
 - >> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.

NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

- **14.**CHECK IDLE SPEED AGAIN
- 1. Start engine and warm it up to normal operating temperature.
- Check idle speed.
 For procedure, refer to <u>EC-17, "IDLE SPEED : Special Repair Requirement"</u>.
 For specification, refer to <u>EC-619, "Idle Speed"</u>.

Is the inspection result normal?

YES >> GO TO 15. NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.

2. Check ignition timing with a timing light.

A :Timing indicator

For procedure, refer to <u>EC-17</u>, "IGNITION TIMING : <u>Special</u> <u>Repair Requirement</u>". For specification, refer to EC-619, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 19. NO >> GO TO 16.

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16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-51, "Removal and Installation".

Is the inspection result normal?

NO >> Repair the timing chain installation. Then GO TO 4.

< BASIC INSPECTION >

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-280, "Component Inspection"</u>.
- Check crankshaft position sensor (POS) and circuit. Refer to EC-276. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace. Then GO TO 4.

18.CHECK ECM FUNCTION

- 1. Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
- Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to <u>EC-16. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Require-</u> <u>ment"</u>.

>> GO TO 4.

19.INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to <u>EC-16, "ADDITIONAL SERVICE WHEN</u> <u>REPLACING CONTROL UNIT (ECM) : Special Repair Requirement"</u>.

>> INSPECTION END ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM)

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Description

INFOID:000000004250595

When replacing ECM, the following procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement

1. PERFORM INITIALIZATION OF IVIS (NATS) SYSTEM AND REGISTRATION OF ALL IVIS (NATS) IGNITION KEY IDS

Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 2.

2. PERFORM VIN REGISTRATION

Refer to EC-18, "VIN REGISTRATION : Special Repair Requirement".

>> GO TO 3.

3. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-18, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

< BASIC INSPECTION >	[VQ37VHR]	
>> END ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEI MODULE)		A
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL C MODULE) : Description	ONTROL	EC
When replacing VVEL control module, the following procedure must be performed. ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL C MODULE) : Special Repair Requirement	ONTROL INFOID:000000004250598	C
1. PERFORM IDLE AIR VOLUME LEARNING Refer to <u>EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"</u> .		E
Refer to <u>LO-13, IDEL AIR VOLOME LEARNING : Opecial Repair Requirement</u> .		
>> END IDLE SPEED		F
IDLE SPEED : Description	INFOID:000000004250599	
This describes how to check the idle speed. For the actual procedure, follow the instruct INSPECTION".	tions in "BASIC	G
IDLE SPEED : Special Repair Requirement	INFOID:000000004250600	Н
1.CHECK IDLE SPEED		
With CONSULT-III Check idle speed in "DATA MONITOR" mode with CONSULT-III. With GST Check idle speed with Service \$01 of GST.		 J
>> INSPECTION END IGNITION TIMING		K
IGNITION TIMING : Description	INFOID:000000004250601	
This describes how to check the ignition timing. For the actual procedure, follow the instru- INSPECTION".	ctions in "BASIC	L
IGNITION TIMING : Special Repair Requirement	INFOID:000000004250602	M
1. CHECK IGNITION TIMING		
1. Attach timing light to loop wire as shown.		Ν
		0
	JMBIA0846ZZ	Ρ

- 1. Loop wire
- A. Timing light

B. Timing indicator

< BASIC INSPECTION >

2. Check ignition timing.

>> INSPECTION END VIN REGISTRATION

VIN REGISTRATION : Description

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced. **NOTE:**

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

VIN REGISTRATION : Special Repair Requirement

INFOID:000000004250604

INFOID:000000004250603

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-23, "Information About Identification or Model Code".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

With CONSULT-III

- 1. Turn ignition switch ON and engine stopped.
- 2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode.
- 3. Follow the instruction of CONSULT-III display.

>> END ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description INFOLD:0000004250005

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time the harness connector of the accelerator pedal position sensor or ECM is disconnected.

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Re-

quirement

INFOID:000000004250606

1.START

- 1. Make sure that accelerator pedal is fully released.
- 2. Turn ignition switch ON and wait at least 2 seconds.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON and wait at least 2 seconds.
- 5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:000000004250607

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:000000004250608

1.START

1. Make sure that accelerator pedal is fully released.

2.	Turn	ignition	switch	ON.

< BASIC INSPECTION >

 Turn ignition switch OFF and wait at least 10 seconds. Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

>> END EC IDLE AIR VOLUME LEARNING IDLE AIR VOLUME LEARNING : Description INFOID:000000004250609 Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps engine idle speed within the specific range. It must be performed under the following conditions: • Each time electric throttle control actuator or ECM is replaced. D Each time VVEL actuator sub assembly or VVEL control module is replaced. Idle speed or ignition timing is out of specification. IDLE AIR VOLUME LEARNING : Special Repair Requirement INFOID:000000004250610 1.PRECONDITIONING Make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment. Battery voltage: More than 12.9 V (At idle) Engine coolant temperature: 70 - 105°C (158 - 221°F) PNP switch: ON (M/T models) Selector lever: P or N (A/T models) Electric load switch: OFF Н (Air conditioner, headlamp, rear window defogger) On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated. Steering wheel: Neutral (Straight-ahead position) Vehicle speed: Stopped Transmission: Warmed-up - A/T models With CONSULT-III: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9V. Without CONSULT-III: Drive vehicle for 10 minutes. Κ - M/T models • Drive vehicle for 10 minutes. Do you have CONSULT-III? YES >> GO TO 2. NO >> GO TO 3. 2.PERFORM IDLE AIR VOLUME LEARNING M (P)With CONSULT-III Perform Accelerator Pedal Released Position Learning. Refer to EC-18, "ACCELERATOR PEDAL 1. RELEASED POSITION LEARNING : Special Repair Requirement" Ν 2. Perform Throttle Valve Closed Position Learning. EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement". Start engine and warm it up to normal operating temperature. 3. 4 Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode. Touch "START" and wait 20 seconds. 5. Is "CMPLT" displayed on CONSULT-III screen? Ρ YES >> GO TO 4. NO >> GO TO 5. 3.PERFORM IDLE AIR VOLUME LEARNING

Without CONSULT-III

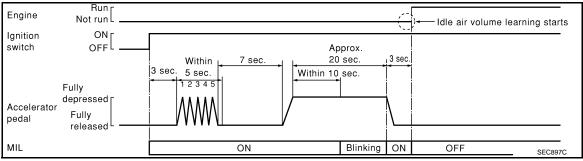
• It is better to count the time accurately with a clock.

[VQ37VHR]

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• It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

- 1. Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-18</u>, "ACCELERATOR PEDAL <u>RELEASED POSITION LEARNING : Special Repair Requirement"</u>.
- 2. Perform Throttle Valve Closed Position Learning. <u>EC-18, "THROTTLE VALVE CLOSED POSITION</u> <u>LEARNING : Special Repair Requirement"</u>.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- 7. Wait 7 seconds, fully depress the accelerator pedal for approx. 20 seconds until the MIL stops blinking and illuminates.
- 8. Fully release the accelerator pedal within 3 seconds after the MIL illuminates.
- 9. Start engine and let it idle.
- 10. Wait 20 seconds.



>> GO TO 4.

CHECK IDLE SPEED AND IGNITION TIMING

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let it idle for 20 seconds.
- 3. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. Refer to <u>EC-619</u>, "Idle Speed" and <u>EC-619</u>, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART-I

Check the following

- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.DETECT MALFUNCTIONING PART-II

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to <u>EC-137</u>, "<u>Description</u>". If any of the following conditions occur after the engine has started, eliminate the cause of the incident and

- perform Idle Air Volume Learning again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

EC-20

< BASIC INSPECTION >

VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Description

VVEL control shaft position sensor adjustment is an operation to adjust the initial position angle that is the basis for the VVEL control shaft position sensor. EC

It must be performed each time VVEL actuator sub assembly is replaced.

CAUTION:

- It must be performed only on the replaced bank side.
- It must not be performed except when VVEL actuator sub assembly is replaced. If by any chance the adjustment is performed, replace VVEL actuator sub assembly.

VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Repair Requirement INFOID:000000004250612

1.START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2.PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

(P) With CONSULT-III

- 1. Turn ignition switch ON.
- Select "VVEL POS SEN ADJ PREP" in "WORK SUPPORT" mode with CONSULT-III. 2.
- Touch "Start" and wait a few seconds. 3.
- 4. Make sure the "CMPLT" is displayed on CONSULT-III screen.
- Select "VVEL POSITION SEN- B1" or "VVEL POSITION SEN- B2" in "DATA MONITOR" mode with CON-SULT-III.
- 6. Loosen the VVEL control shaft position sensor mounting bolt (1).
- 7. Turn the VVEL control shaft position sensor (2) right and left while monitoring the output voltage of "VVEL POSITION SEN-B1" or "VVEL POSITION SEN-B2" and adjust the output voltage to be within the standard value.

Voltage : 500 ± 48 mV

Tighten the VVEL control shaft position sensor mounting bolt. 8.

0

: 7.0 N•m (0.71 kg-m, 62 in-lb)

Reconfirm that the output voltage of "VVEL POSITION SEN- B1" or "VVEL POSITION SEN- B2" is within the standard value.

Voltage : 500 \pm 48 mV

NOTE:

If it varies from the standard value after the bolt is tightened, perform steps 6 to 8 again.

- 10. Turn ignition switch OFF and wait at least 10 seconds.
- 11. Start engine and warm it up to normal operating temperature.
- 12. Turn ignition switch OFF and wait at least 10 seconds.
- 13. Perform idle air volume learning. Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> INSPECTION END

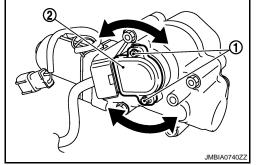
${\it 3.}$ perform vvel control shaft position sensor adjustment

Without CONSULT-III

- Disconnect VVEL control shaft position sensor harness connector.
- 2. Remove VVEL actuator motor relay.
- Turn ignition switch ON, wait at least 5 seconds and then turn OFF. 3.

EC-21





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[VQ37VHR]

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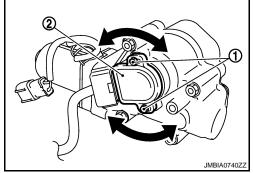
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< BASIC INSPECTION >

- 4. Reconnect all harness connectors disconnected.
- 5. Install VVEL actuator motor relay.
- 6. Turn ignition switch ON and wait at least 5 seconds.
- 7. Loosen the VVEL control shaft position sensor mounting bolt (1).
- 8. Turn the VVEL control shaft position sensor (2) right and left while monitoring the output voltage between the VVEL control module terminals with a tester and adjust the output voltage to be within the standard value.



Bank	Connector	Voltage			
Dalik			Terminal		
1	E15	3	4	500 ± 48 mV	
2	E15	5	6	500 ± 48 mV	

9. Tighten the VVEL control shaft position sensor mounting bolt.

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: 7.0 N•m (0.71 kg-m, 62 in-lb)

10. Reconfirm that the output voltage of VVEL control shaft position sensor is within the standard value.

Bank	Connector	+	_	Voltage
Dalik	Terminal Terminal		Terminal	
1	E15	3	4	500 ± 48 mV
2		5	6	500 ± 40 mV

NOTE:

If it varies from the standard value after the bolt is tightened, perform steps 7 to 9 again.

- 11. Turn ignition switch OFF and wait at least 10 seconds.
- 12. Start engine and warm it up to normal operating temperature.
- 13. Turn ignition switch OFF and wait at least 10 seconds.
- 14. Perform idle air volume learning. Refer to <u>EC-19</u>, "IDLE <u>AIR VOLUME LEARNING</u> : <u>Special Repair</u> <u>Requirement</u>".

>> INSPECTION END MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:000000004250613

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in "Diagnosis Procedure".

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:000000004250614

1.START

With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-III.

INSPECTION AND ADJUSTMENT	
< BASIC INSPECTION >	[VQ37VHR]
 Clear mixture ratio self-learning value by touching "CLEAR". With GST Start engine and warm it up to normal operating temperature. 	A
 Turn ignition switch OFF. Disconnect mass air flow sensor (bank 1) harness connector. Restart engine and let it idle for at least 5 seconds. 	EC
 Stop engine and reconnect mass air flow sensor (bank 1) harness connector. Select Service \$03 with GST. Make sure DTC P0102 is detected. Select Service \$04 with GST to erase the DTC P0102. 	С
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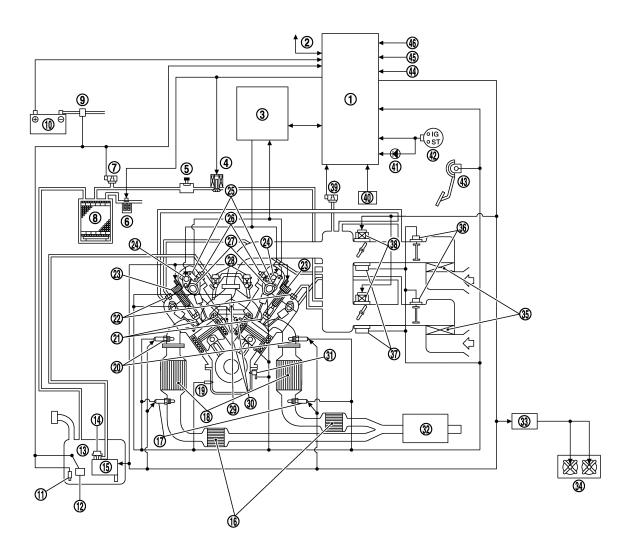
< SYSTEM DESCRIPTION >

[VQ37VHR]

SYSTEM DESCRIPTION ENGINE CONTROL SYSTEM

System Diagram

INFOID:000000004250615



- 1. ECM
- 4. EVAP canister purge volume control 5. solenoid valve
- 7. EVAP control system pressure sen- 8. sor
- 10. Battery
- 13. Fuel tank
- 16. Three way catalyst 2
- 19. Engine oil temperature sensor
- 22. PCV valve

- 2. Can communication
 - EVAP service port
 - EVAP canister
- 11. Fuel tank temperature sensor
- 14. Fuel pressure regulator
- 17. Heated oxygen sensor 2
- 20. A/F sensor 1
- 23. Ignition coil (with power transistor)

JMBIA2007ZZ

- 3. VVEL control module
- 6. EVAP canister vent control valve
- 9. Battery current sensor
- 12. Fuel level sensor
- 15. Fuel pump
- 18. Three way catalyst 1
- 21. Spark plug
- 24. VVEL actuator motor



< SYSTEM DESCRIPTION >

[VQ37VHR]

25.	VVEL control shaft position sensor	26.	Intake valve timing control solenoid valve	27.	Camshaft position sensor (PHASE)	А
28.	Fuel damper	29.	Engine coolant temperature sensor	30.	Knock sensor	
31.	Crankshaft position sensor (POS)	32.	Muffler	33.	Cooling fan control module	
34.	Cooling fan	35.	Air cleaner	36.	Mass air flow sensor (with intake air temperature sensor)	EC
37.	Electric throttle control actuator	38.	Throttle position sensor	39.	Manifold absolute pressure (MAP) sensor	C
40.	Brake booster pressure sensor	41.	MIL	42.	Ignition switch	0
43.	Accelerator pedal position sensor	44.	Power steering pressure sensor	45.	Refrigerant pressure sensor	
46.	PNP signal					D

System Description

INFOID:000000004250616

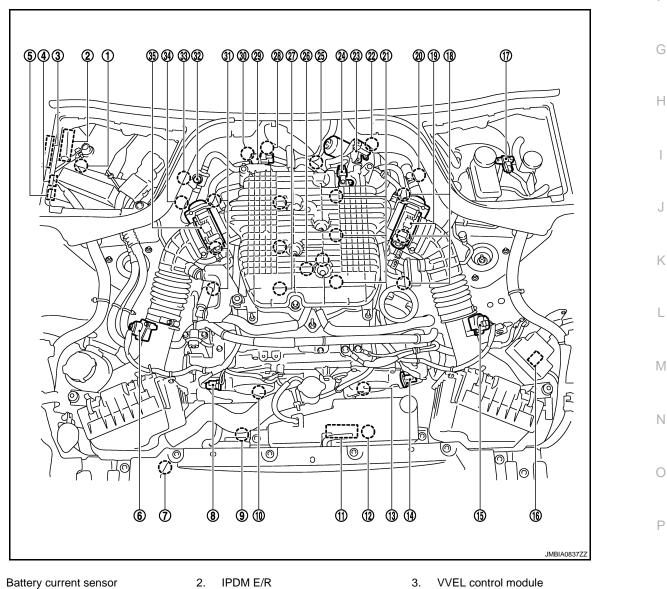
ECM performs various controls such as fuel injection control and ignition timing control.

Component Parts Location

INFOID:000000004250617

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Cooling fan relay 4.

1.

- 5. VVEL actuator motor relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)

< SYSTEM DESCRIPTION >

[VQ37VHR]

- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- 13. Intake valve timing control solenoid valve (bank 2)
- 16. ICC brake hold relay (ICC models)
- 19. Electric throttle control actuator (bank 2)
- 22. VVEL control shaft position sensor (bank 2)
- 25. Engine coolant temperature sensor
- 28. VVEL actuator motor (bank 1)
- 31. Ignition coil (with power transistor) and spark plug (bank 1)
- 34. Crankshaft position sensor (POS)

- Camshaft position sensor (PHASE) (bank 1)
- Cooling fan control module
 Camshaft position sensor (PHASE)
- 17. Brake booster pressure sensor
- 20. A/F sensor 1 (bank 2)
- 23. VVEL actuator motor (bank 2)
- 26. Knock sensor

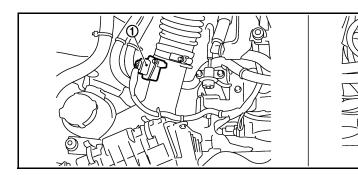
(bank 2)

- 29. EVAP canister purge volume control solenoid valve
- 32. EVAP service port
- 35. Electric throttle control actuator (bank 1)

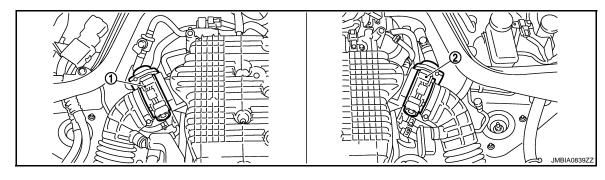
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. Fuel injector (bank 2)
- 24. Manifold absolute pressure (MAP) sensor
- 27. Fuel injector (bank 1)
- 30. VVEL control shaft position sensor (bank 1)

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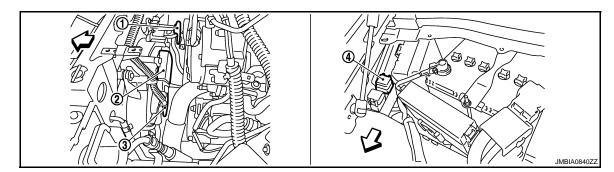
33. A/F sensor 1 (bank 1)



- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



< SYSTEM DESCRIPTION >

[VQ37VHR]

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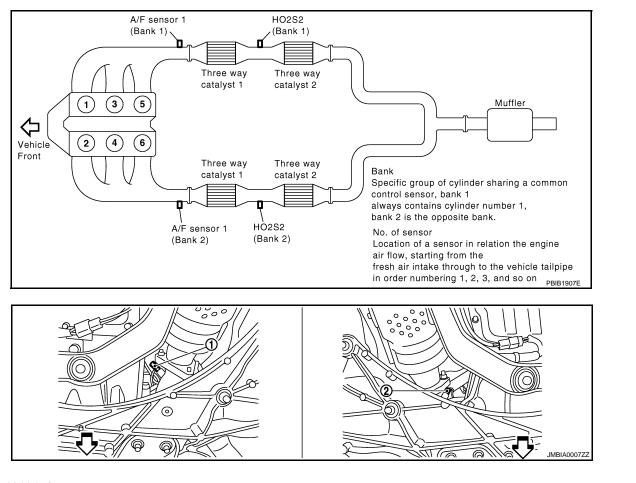
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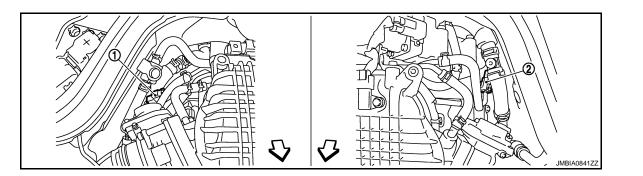
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- C: Vehicle front
- 1. Cooling fan motor-2
- 2. Cooling fan control module
- 3. Cooling fan motor-1

4. Cooling fan relay



- C: Vehicle front
- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)

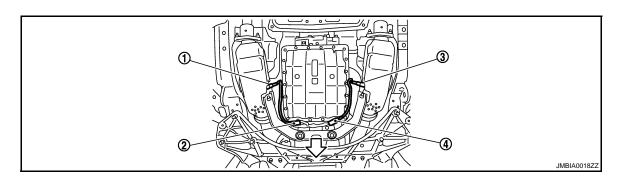


C: Vehicle front

1. A/F sensor 1 (bank 1) harness con- 2. nector

A/F sensor 1 (bank 2) harness connector Р

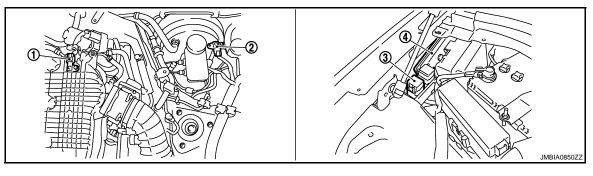
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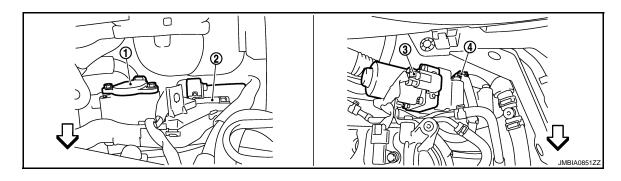
└□: Vehicle front

- Heated oxygen sensor 2 (bank 2) 1.
- Heated oxygen sensor 2 (bank 2) 2. harness connector
- Heated oxygen sensor 2 (bank 1) 3.

4. Heated oxygen sensor 2 (bank 1) harness connector



- Manifold absolute pressure (MAP) 2. VVEL actuator motor relay 1. Brake booster pressure sensor 3. sensor
- VVEL control module 4.



C: Vehicle front

(bank 2)

4.

1. VVEL control shaft position sensor (bank 1)

VVEL control shaft position sensor

- 2. VVEL actuator motor (bank 1)
- 3. VVEL actuator motor (bank 2)

Revision: 2009 October

< SYSTEM DESCRIPTION >

[VQ37VHR]

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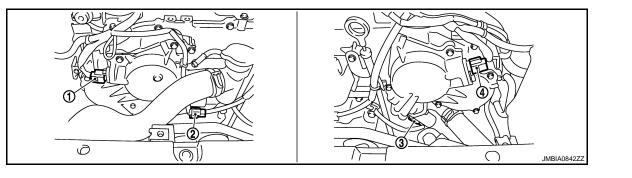
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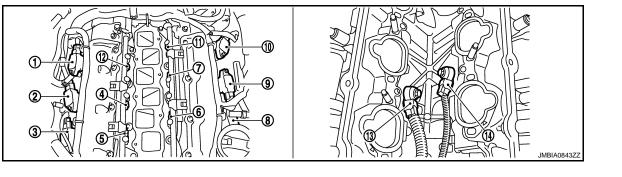
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- Camshaft position sensor (PHASE) 2. 1. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No.5 (with power transis- 2. 1. tor)
- 4. Fuel injector No.3
- Fuel injector No.4 7.
- 10. Ignition coil No.6 (with power transis- 11. tor)
- 13. Knock sensor (bank 1)

- Ignition coil No.3 (with power transis- 3. tor)
- 5. Fuel injector No.1
- Ignition coil No.2 (with power transis- 9. 8. tor)
 - Fuel injector No.6

- Ignition coil No.1 (with power transistor)
- 6. Fuel injector No.2
 - Ignition coil No.4 (with power transistor)
- 12. Fuel injector No.5

14. Knock sensor (bank 2)

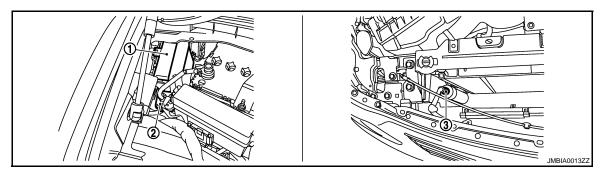
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C: Vehicle front

- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1) 1.
- 3. Crankshaft position sensor (POS)

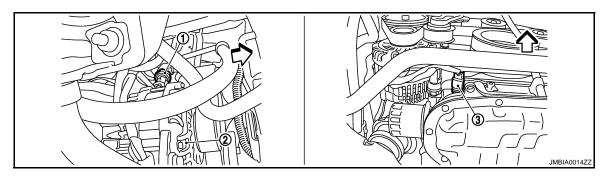
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< SYSTEM DESCRIPTION >



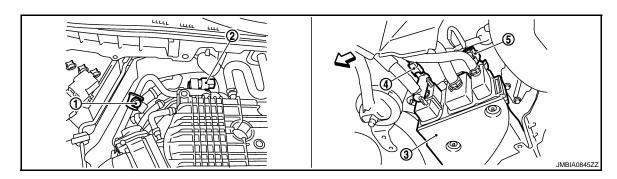
1. IPDM E/R

- 2. Battery current sensor
- 3. Refrigerant pressure sensor



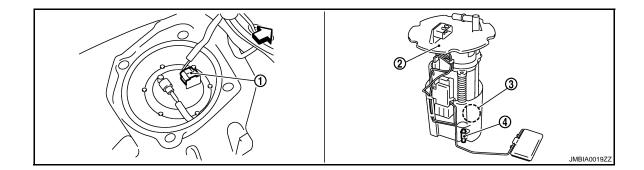
└□: Vehicle front

Power steering pressure sensor 1. 2. Alternator 3. Engine oil temperature sensor



\triangleleft : Vehicle front

- EVAP service port 1.
- EVAP canister purge volume control 3. EVAP canister 2.
- 4. EVAP canister vent control valve
- solenoid valve
- 5. EVAP control system pressure sensor



< SYSTEM DESCRIPTION >

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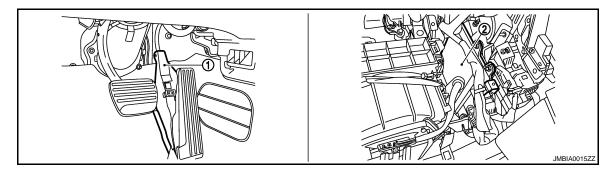
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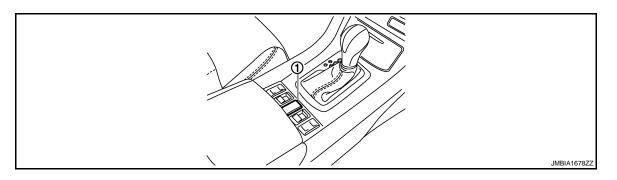
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\triangleleft : Vehicle front

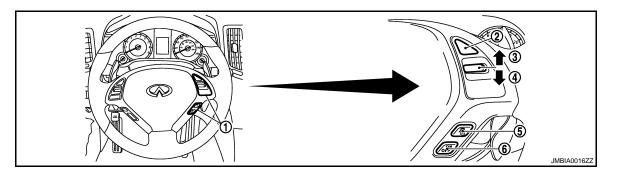
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor



1. Accelerator pedal position sensor 2. ECM



1. Snow mode switch

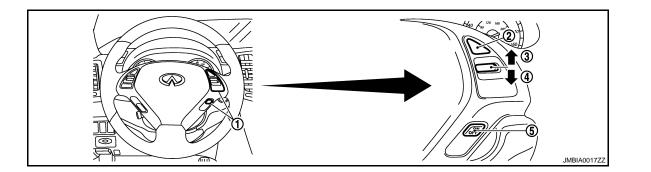


1. ICC steering switch

SET/COAST switch

4.

- CANCEL switch
 DISTANCE switch
- RESUME/ACCELERATE switch
 MAIN switch



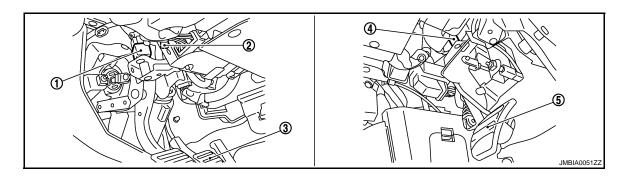
< SYSTEM DESCRIPTION >

- 1. ASCD steering switch SET/COAST switch 4.
- 2. CANCEL switch 5.

MAIN switch

Clutch pedal

3. **RESUME/ACCELERATE** switch



- 1. Stop lamp switch
- ASCD brake switch (ASCD models) 3. 2. Brake pedal ICC brake switch (ICC models)
- 4. ASCD clutch switch (ASCD models) 5. ICC clutch switch (ICC models)

Component Description

INFOID:000000004250618

Component	Reference
A/F sensor 1	EC-205. "Description"
A/F sensor 1 heater	EC-159, "Description"
Accelerator pedal position sensor	EC-467, "Description"
ASCD brake switch	EC-438. "Description"
ASCD steering switch	EC-431, "Description"
Battery current sensor	EC-418, "Description"
Brake booster pressure sensor	EC-358. "Description"
Camshaft position sensor (PHASE)	EC-277, "Description"
Cooling fan control module	EC-490, "Description"
Cooling fan motor	EC-490, "Description"
Crankshaft position sensor (POS)	EC-273. "Description"
Electric throttle control actuator	EC-409. "Description"
Engine coolant temperature sensor	EC-191, "Description"
Engine oil temperature sensor	EC-254. "Description"
EVAP canister purge volume control solenoid valve	EC-297. "Description"
EVAP canister vent control valve	EC-305. "Description"
EVAP control system pressure sensor	EC-313, "Description"
Fuel injector	EC-496. "Description"
Fuel level sensor	EC-340. "Description"
Fuel pump	EC-499, "Description"
Fuel tank temperature sensor	EC-248, "Description"
Heated oxygen sensor 2	EC-220. "Description"
Heated oxygen sensor 2 heater	EC-162, "Description"
ICC brake switch	EC-445, "Description"
ICC steering switch	EC-434, "Description"
Ignition signal	EC-507. "Description"
Intake air temperature sensor	EC-186, "Description"

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< SYSTEM DESCRIPTION >

[VQ37VHR]

Component	Reference	
Intake valve timing control solenoid valve	EC-165, "Description"	A
Knock sensor	EC-270, "Description"	
Manifold absolute pressure (MAP) sensor	EC-182, "Description"	EC
Mass air flow sensor	EC-168. "Description"	
PCV valve	EC-518, "Description"	
Power steering pressure sensor	EC-355, "Description"	C
Refrigerant pressure sensor	EC-520, "Description"	
Stop lamp switch	EC-464, "Description"	
Throttle control motor	EC-406, "Description"	
Throttle control motor relay	EC-414, "Description"	
Throttle position sensor	EC-194, "Description"	E
VVEL actuator motor	EC-384, "Description"	
VVEL actuator motor relay	EC-388, "Description"	
VVEL control module	EC-457, "Description"	F
VVEL control shaft position sensor	EC-380, "Description"	

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MULTIPORT FUEL INJECTION SYSTEM

< SYSTEM DESCRIPTION >

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

Crankshaft position sensor (POS)	Engine speed ^{*2} & Piston position			
Camshaft position sensor (PHASE)				
Mass air flow sensor	Amount of intake air			
Intake air temperature sensor	Intake air temperature			
Engine coolant temperature sensor	Engine coolant temperature			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas	•		
Throttle position sensor	Throttle position		Fuel injection & mixture ratio	
Accelerator pedal position sensor	Accelerator pedal position	ЕСМ	control Fuel inject	or
Park/neutral position (PNP) switch (M/T models) TCM(A/T models)	Gear position			
Battery	Battery voltage ^{*2}			
Knock sensor	Engine knocking condition			
Power steering pressure sensor	Power steering operation			
Heated oxygen sensor 2 ^{*1}	Density of oxygen in exhaust gas			
ABS actuator and electric unit (control unit)	VDC/TCS operation command			
Unified meter and A/C amp.	Air conditioner operation & Vehicle speed			
	the engine system under normal conditions. tatus by the signals of engine speed and batter monunication line	y voltage.	JMBIA2	

System Description

INFOID:000000004250620

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed* ³		
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air	-	
Intake air temperature sensor	Intake air temperature	-	
Engine coolant temperature sensor	Engine coolant temperature	-	
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas	-	
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position	Fuel injection	
Park/neutral position (PNP) switch (M/T models) TCM (A/T models)	Gear position	& mixture ratio	Fuel injector
Battery	Battery voltage*3	-	
Knock sensor	Engine knocking condition	-	
Power steering pressure sensor	Power steering operation	-	
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas	-	
ABS actuator and electric unit (control unit)*2	VDC/TCS operation command		
Unified meter and A/C amp.	Air conditioner operation* ²		
	Vehicle speed* ²		

*1: This sensor is not used to control the engine system under normal conditions.

INFOID:000000004250619

MULTIPORT FUEL INJECTION SYSTEM

< SYSTEM DESCRIPTION >

[VQ37VHR]

*2: This signal is sent to the ECM via the CAN communication line.

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

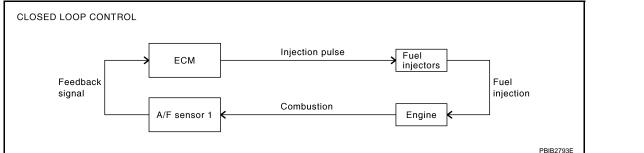
<Fuel increase>

- During warm-up
- · When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. K The three way catalyst 1 can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to <u>EC-205</u>, <u>"Description"</u>. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture). This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst 1. Even if the switching characteristics of A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback ontrol stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally

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< SYSTEM DESCRIPTION >

designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"Fuel trim" refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short-term fuel trim and long-term fuel trim.

"Short-term fuel trim" is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long-term fuel trim" is overall fuel compensation carried out over time to compensate for continual deviation of the short-term fuel trim from the central value. Continual deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING

 Sequential multiport fuel injection system 	 Simultaneous multiport fuel injection system
No. 1 cylinder	No. 1 cylinder No. 2 cylinder No. 3 cylinder No. 4 cylinder No. 5 cylinder No. 6 cylinder No. 6 cylinder No. 6 cylinder No. 6 cylinder No. 6 cylinder SEF17

Two types of systems are used.

 Sequential Multiport Fuel Injection System Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System
Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of
the same width are simultaneously transmitted from the ECM.
The six injectors will then receive the signals two times for each engine cycle.

This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

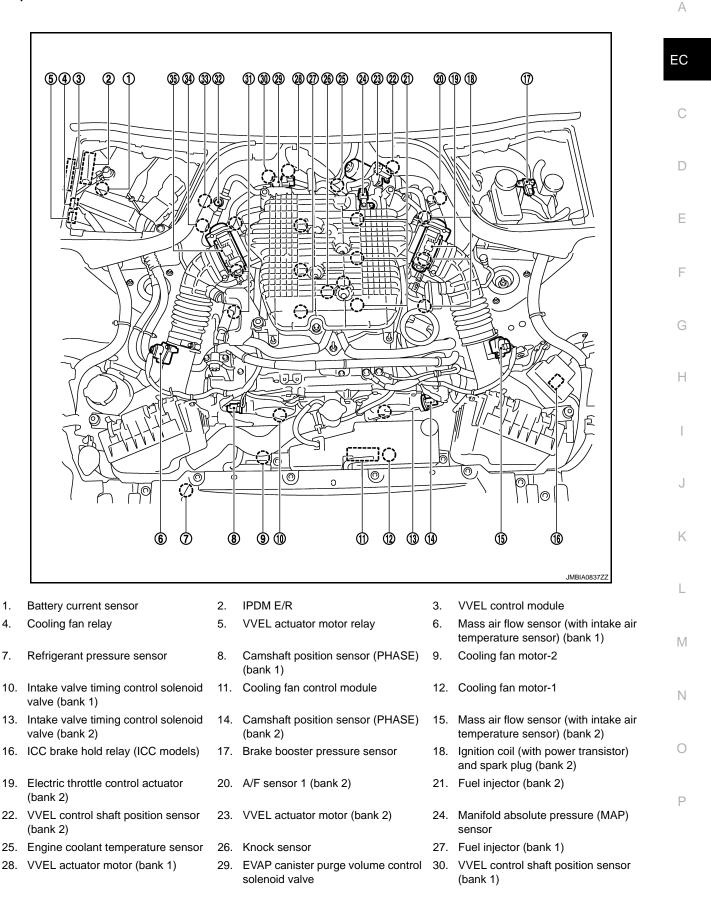
Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

< SYSTEM DESCRIPTION >

Component Parts Location

[VQ37VHR]

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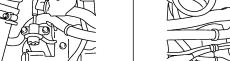


< SYSTEM DESCRIPTION >

- Ignition coil (with power transistor) 32. EV and spark plug (bank 1)
- 32. EVAP service port
- 33. A/F sensor 1 (bank 1)

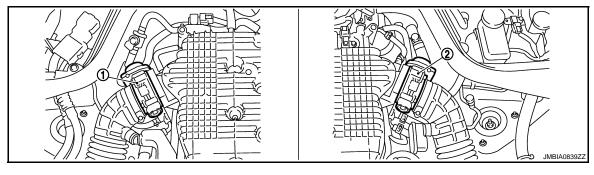
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- 34. Crankshaft position sensor (POS)
- Electric throttle control actuator (bank 1)

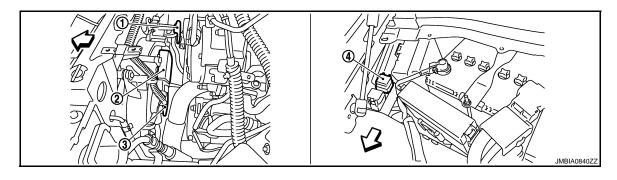




- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)

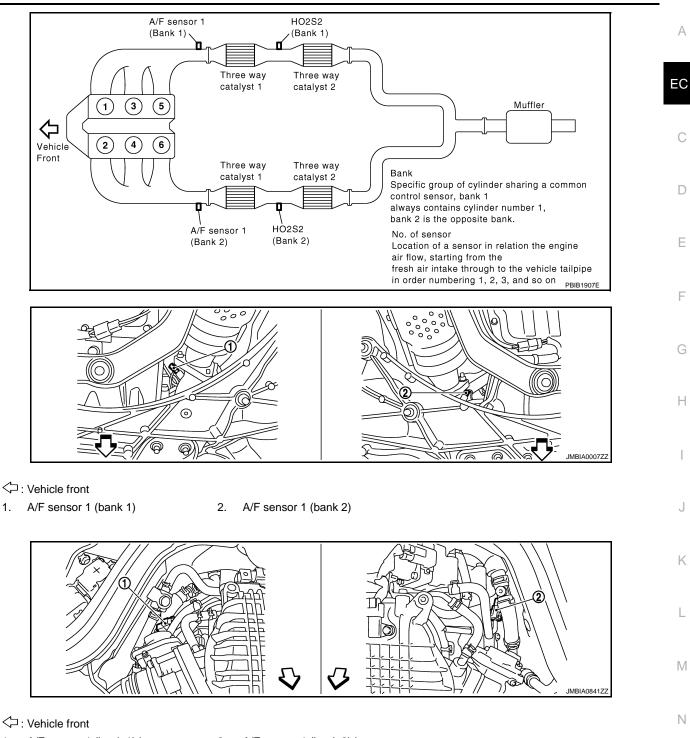


C: Vehicle front

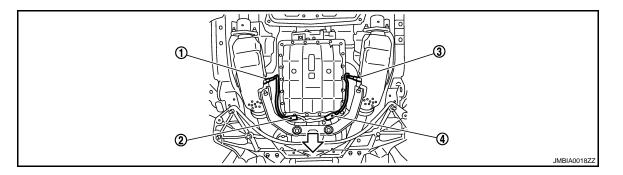
- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

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< SYSTEM DESCRIPTION >



- A/F sensor 1 (bank 1) harness con- 2. 1. nector nector
 - A/F sensor 1 (bank 2) harness con-



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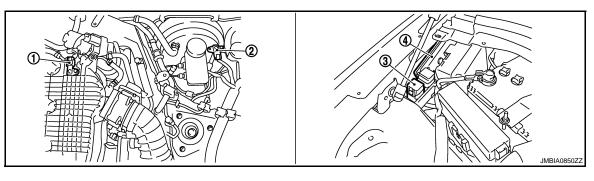
[VQ37VHR]

< SYSTEM DESCRIPTION >

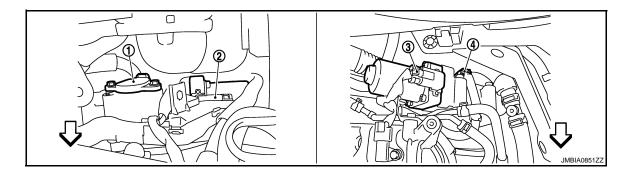
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
 - 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



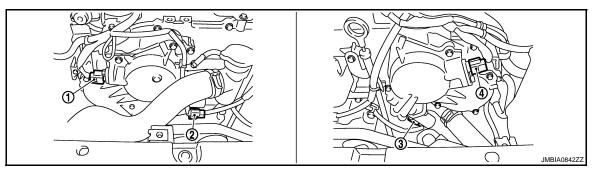
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- 3. VVEL actuator motor (bank 2)

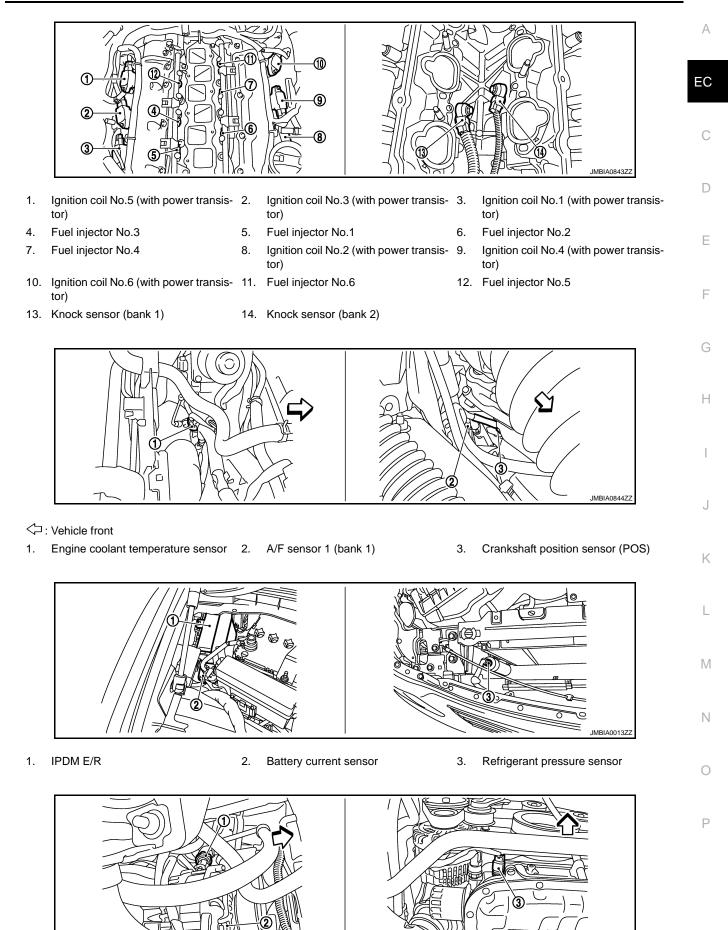
4. VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

[VQ37VHR]



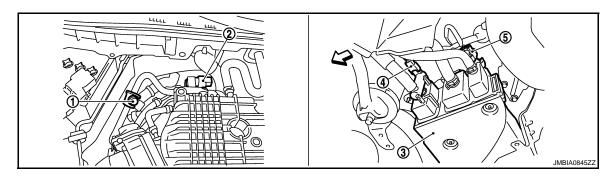
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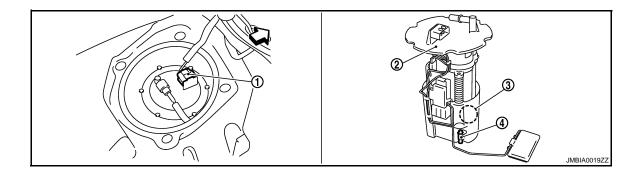
C: Vehicle front

1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor

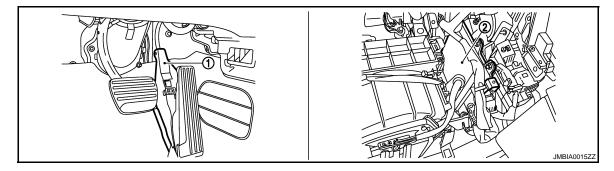


- C: Vehicle front
- 1. EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- 5. EVAP control system pressure sensor



C: Vehicle front

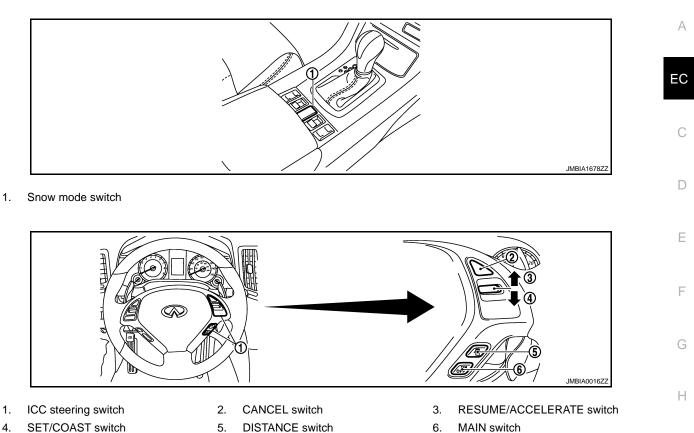
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor



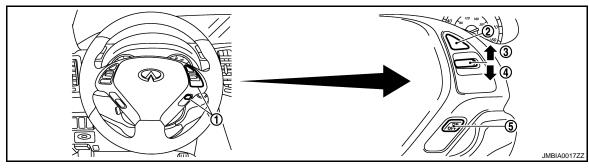
1. Accelerator pedal position sensor 2. ECM

< SYSTEM DESCRIPTION >

[VQ37VHR]



- SET/COAST switch 4.
- 5.
- DISTANCE switch
- MAIN switch



ASCD steering switch 1. SET/COAST switch

4.

CANCEL switch 2. 5. MAIN switch

- 3. **RESUME/ACCELERATE** switch
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- Stop lamp switch 1.
- ASCD brake switch (ASCD models) 3. 2. Brake pedal ICC brake switch (ICC models)
- ASCD clutch switch (ASCD models) 5. 4. ICC clutch switch (ICC models)
- Clutch pedal

< SYSTEM DESCRIPTION >

Component Description

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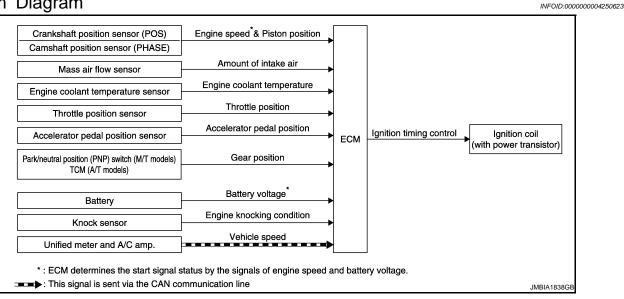
[VQ37VHR]

Component	Reference
A/F sensor 1	EC-205, "Description"
Accelerator pedal position sensor	EC-467, "Description"
Camshaft position sensor (PHASE)	EC-277, "Description"
Crankshaft position sensor (POS)	EC-273, "Description"
Engine coolant temperature sensor	EC-191, "Description"
Fuel injector	EC-496, "Description"
Heated oxygen sensor 2	EC-220, "Description"
Intake air temperature sensor	EC-186, "Description"
Knock sensor	EC-270, "Description"
Mass air flow sensor	EC-168, "Description"
Power steering pressure sensor	EC-355, "Description"
Throttle position sensor	EC-194, "Description"

< SYSTEM DESCRIPTION >

ELECTRIC IGNITION SYSTEM

System Diagram



System Description

INFOID:000000004250624

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed* ²		
Camshaft position sensor (PHASE)	Piston position Amount of intake air		
Mass air flow sensor			
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position	Ignition timing control	Ignition coil (with power transistor)
Park/neutral position (PNP) switch (M/T models) TCM (A/T models)	Gear position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Unified meter and A/C amp.	Vehicle speed*1		

*1: This signal is sent to the ECM via the CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Ignition order: 1 - 2 - 3 - 4 - 5 - 6

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- · At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not

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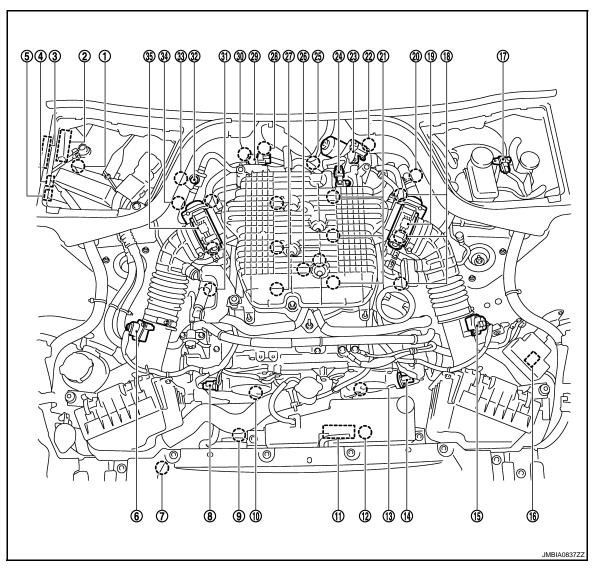
< SYSTEM DESCRIPTION >

[VQ37VHR]

operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Component Parts Location

INFOID:000000004609726



- 1. Battery current sensor
- 4. Cooling fan relay
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. ICC brake hold relay (ICC models)
- 19. Electric throttle control actuator (bank 2)
- 22. VVEL control shaft position sensor (bank 2)
- 25. Engine coolant temperature sensor
- 28. VVEL actuator motor (bank 1)

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Brake booster pressure sensor
- 20. A/F sensor 1 (bank 2)
- 23. VVEL actuator motor (bank 2)
- 26. Knock sensor
- 29. EVAP canister purge volume control solenoid valve

- 3. VVEL control module
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. Fuel injector (bank 2)
- 24. Manifold absolute pressure (MAP) sensor
- 27. Fuel injector (bank 1)
- VVEL control shaft position sensor (bank 1)



< SYSTEM DESCRIPTION >

- 31. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. EVAP service port
- 33. A/F sensor 1 (bank 1)

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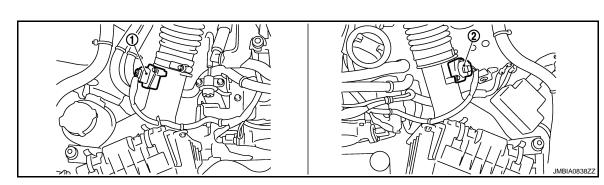
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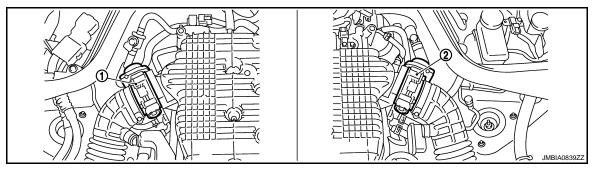
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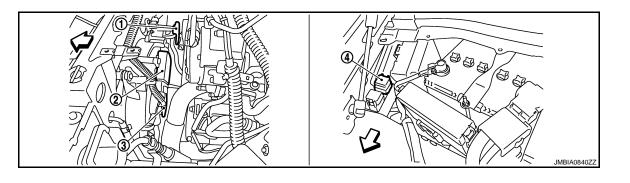
- 34. Crankshaft position sensor (POS)
- Electric throttle control actuator (bank 1)



- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



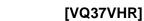
- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)

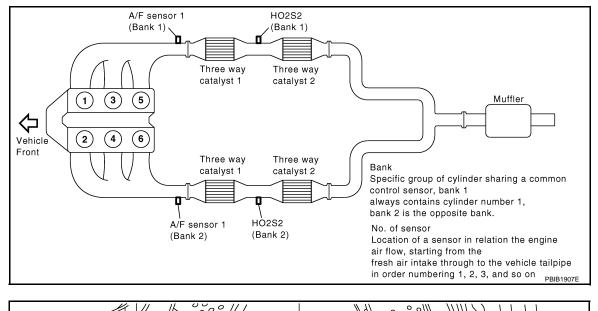


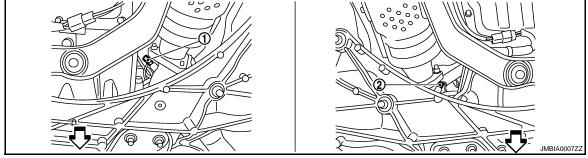
- C: Vehicle front
- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

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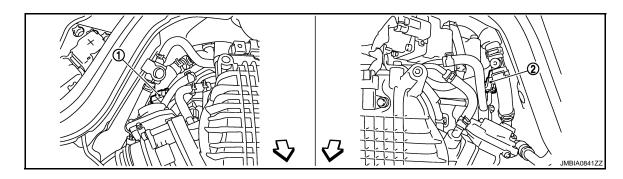
< SYSTEM DESCRIPTION >





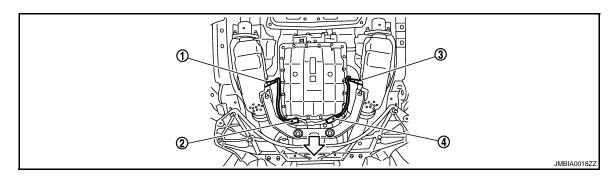


- └□: Vehicle front
- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)



C: Vehicle front

1. A/F sensor 1 (bank 1) harness connector 2. A/F sensor 1 (bank 2) harness connector



< SYSTEM DESCRIPTION >

[VQ37VHR]

C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)
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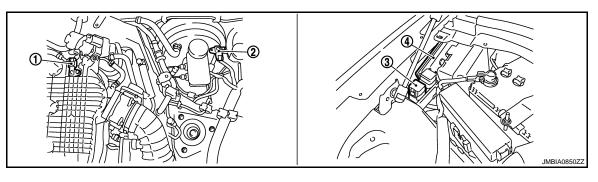
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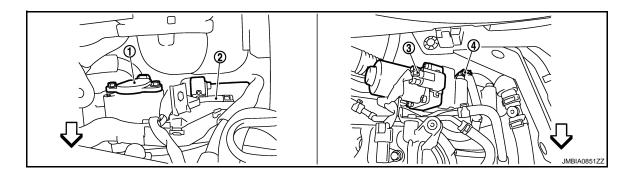
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Heated oxygen sensor 2 (bank 1) 4. harness connector



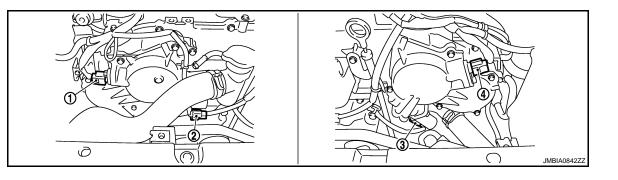
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- VVEL control module 4.



C: Vehicle front

- VVEL control shaft position sensor 1. 2. VVEL actuator motor (bank 1) (bank 1)
 - 3.
- VVEL actuator motor (bank 2)

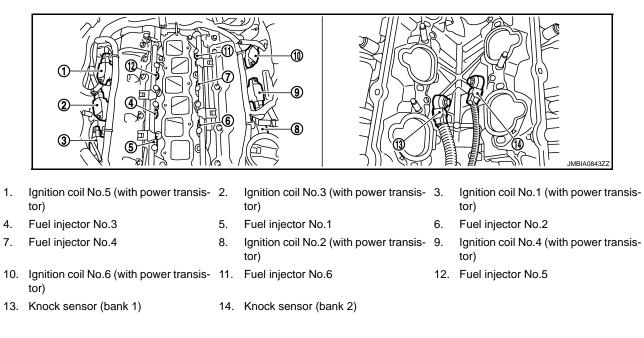
4. VVEL control shaft position sensor (bank 2)

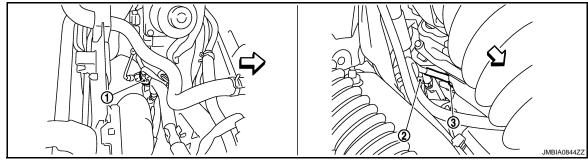


- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

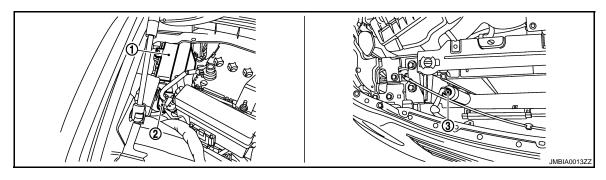
[VQ37VHR]





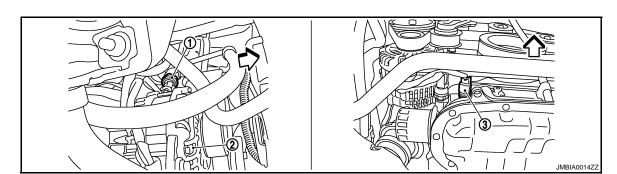
└□: Vehicle front

- 1. Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor (POS)



1. IPDM E/R

- 2. Battery current sensor
- 3. Refrigerant pressure sensor



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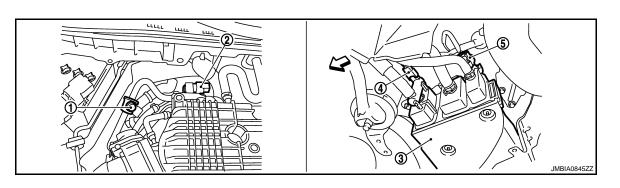
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$\diamondsuit: \mathsf{Vehicle front}$

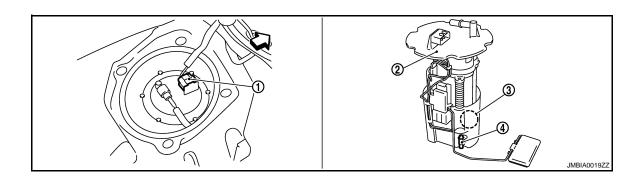
1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



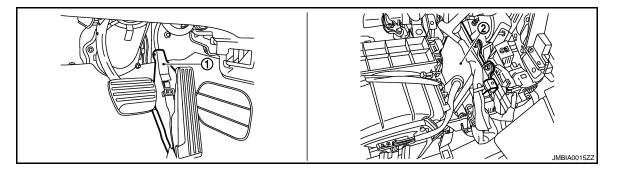
C: Vehicle front

- 1. EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- 5. EVAP control system pressure sensor



C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor

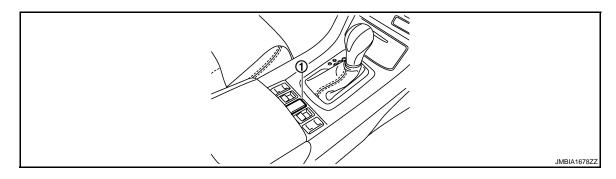


1. Accelerator pedal position sensor 2. ECM

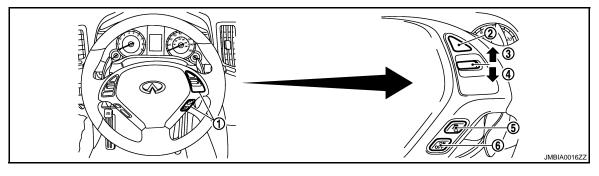
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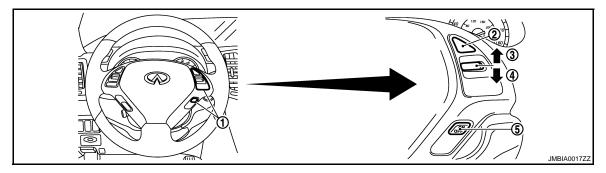
< SYSTEM DESCRIPTION >



Snow mode switch 1.



- ICC steering switch 1.
- CANCEL switch 2.
- SET/COAST switch 4.
- 5.
 - **DISTANCE** switch
- **RESUME/ACCELERATE** switch 3.
- 6. MAIN switch



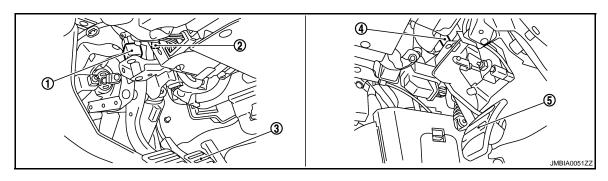
ASCD steering switch 1.

4.

- SET/COAST switch
- CANCEL switch 2. MAIN switch

5.

3. RESUME/ACCELERATE switch



- Stop lamp switch 1.
- ASCD brake switch (ASCD models) 3. 2. Brake pedal ICC brake switch (ICC models)
- ASCD clutch switch (ASCD models) 5. 4. ICC clutch switch (ICC models)
- Clutch pedal

EC-507, "Description"

EC-270, "Description"

EC-168, "Description"

EC-194, "Description"

< SYSTEM DESCRIPTION >

Component Description

Accelerator pedal position sensor Camshaft position sensor (PHASE) Crankshaft position sensor (POS) Engine coolant temperature sensor

Ignition signal

Knock sensor

Mass air flow sensor

Throttle position sensor

Component

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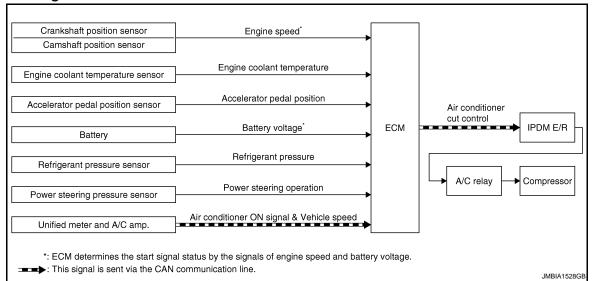
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Reference	
EC-467, "Description"	EC
EC-277, "Description"	
EC-273, "Description"	C
EC-191, "Description"	C

< SYSTEM DESCRIPTION >

AIR CONDITIONING CUT CONTROL

System Diagram



System Description

INFOID:000000004250628

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2			
Engine coolant temperature sensor	Engine coolant temperature		IPDM E/R ↓ A/C relay ↓ Compressor	
Accelerator pedal position sensor	Accelerator pedal position			
Battery	Battery voltage*2	Air conditioner		
Refrigerant pressure sensor	Refrigerant pressure	cut control ↓		
Power steering pressure sensor	Power steering operation			
Unified meter and A/C amp.	Air conditioner ON signal*1			
	Vehicle speed*1			

*1: This signal is sent to the ECM via the CAN communication line.

*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used. Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

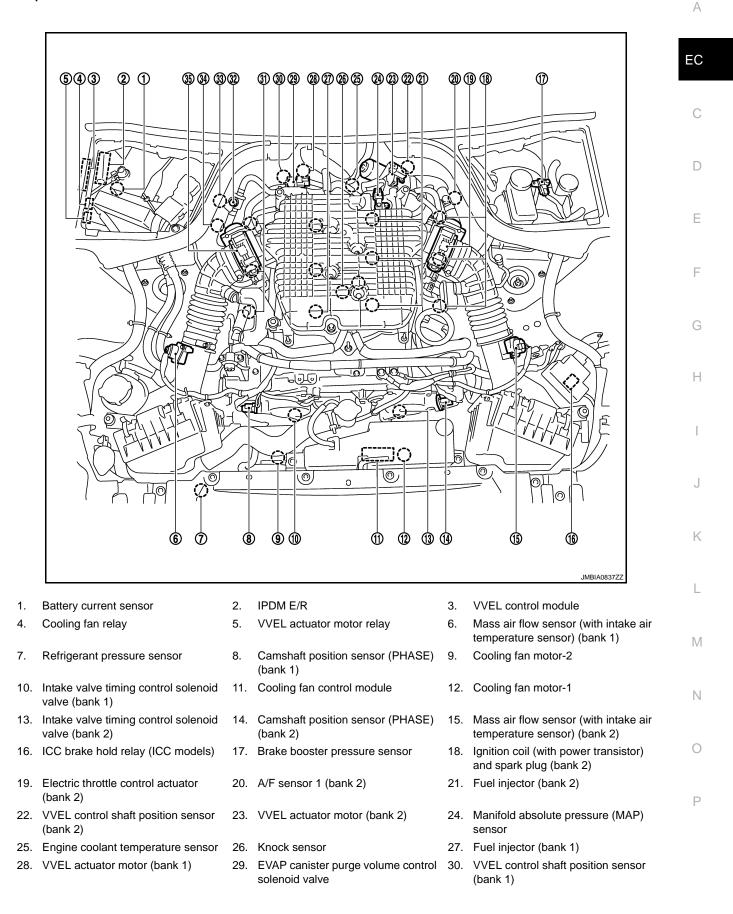
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< SYSTEM DESCRIPTION >

Component Parts Location

[VQ37VHR]

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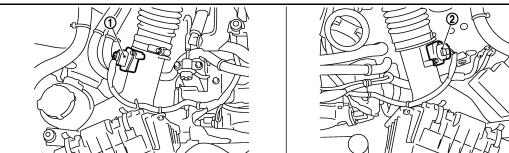


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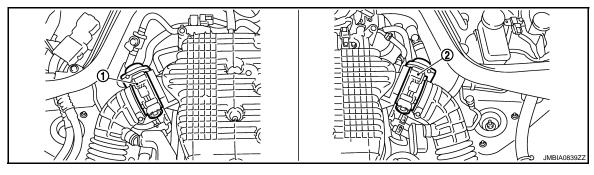
- Ignition coil (with power transistor) 32. EV and spark plug (bank 1)
- 32. EVAP service port

33. A/F sensor 1 (bank 1)

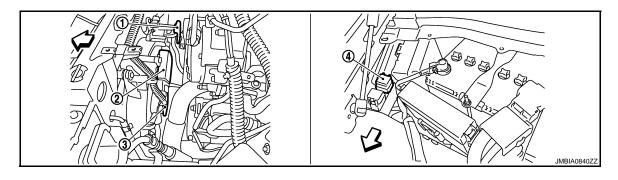
- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)



- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

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Vehicle Front A/F sensor 1

Three way

catalyst 1

Three way

catalyst 1

(Bank 1)

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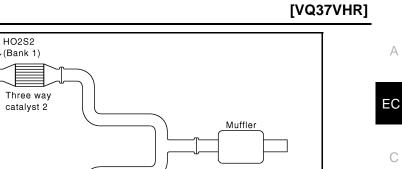
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Specific group of cylinder sharing a common

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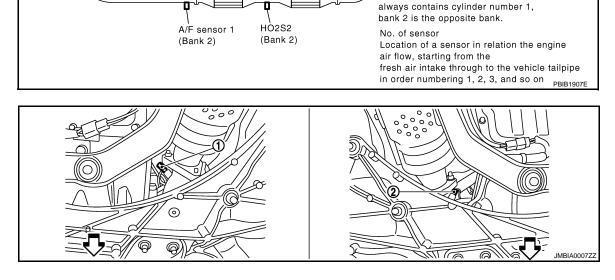
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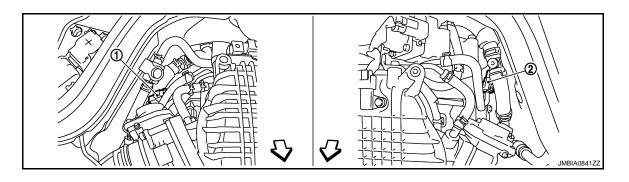
Three way

catalyst 2

Bank

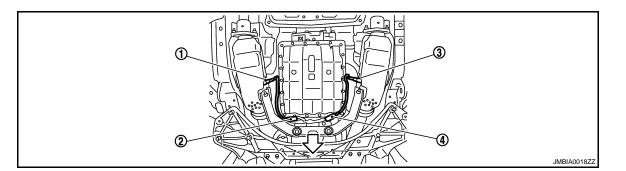
control sensor, bank 1

- └□: Vehicle front
- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)



C: Vehicle front

1. A/F sensor 1 (bank 1) harness con- 2. A/F sensor 1 (bank 2) harness connector nector

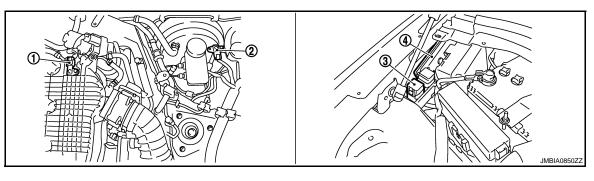


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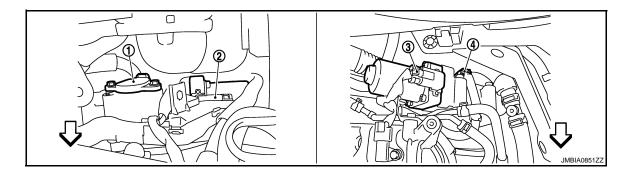
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

Heated oxygen sensor 2 (bank 1) 4. harness connector



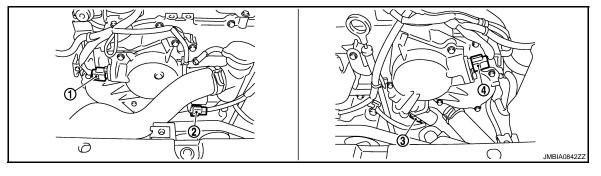
- Manifold absolute pressure (MAP) 1. 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

- VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) 1. (bank 1)
- 3. VVEL actuator motor (bank 2)

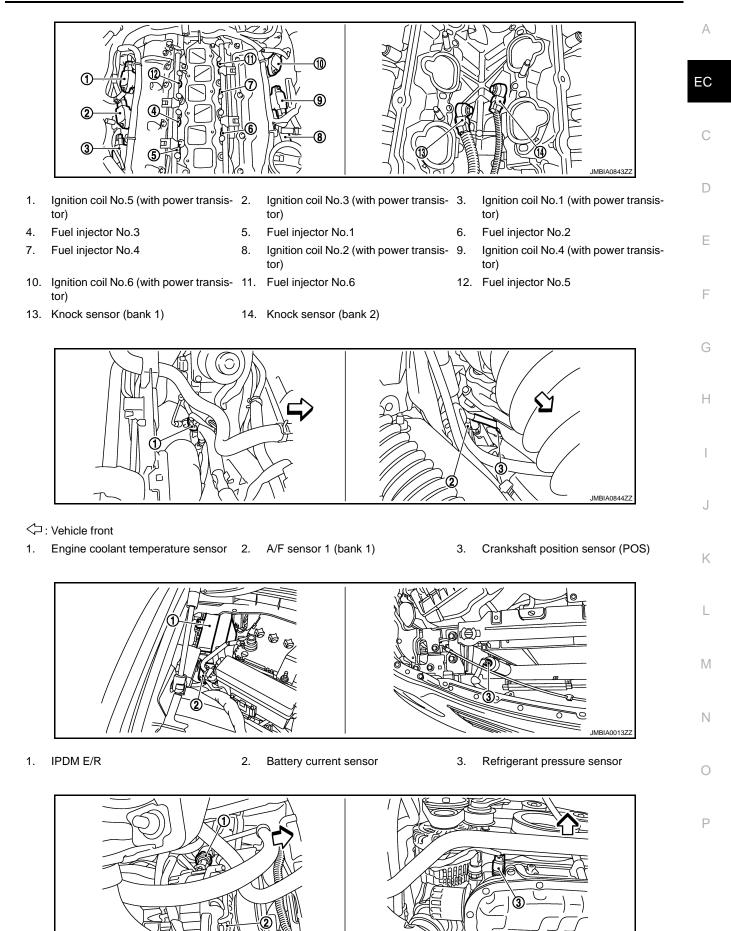
4. VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

[VQ37VHR]



2009 G37 Coupe

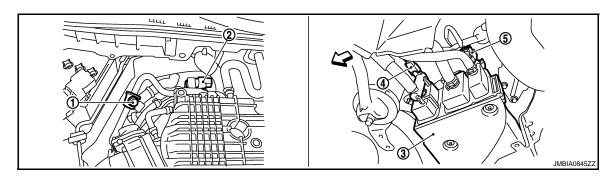
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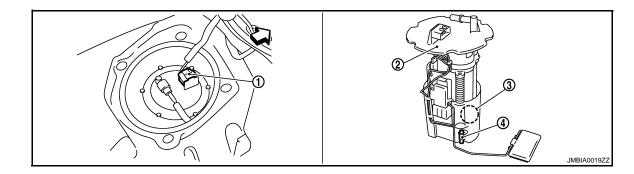
C: Vehicle front

1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor

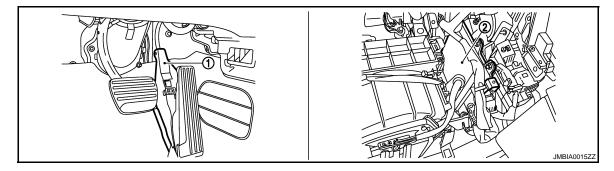


- C: Vehicle front
- 1. EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- 5. EVAP control system pressure sensor



C: Vehicle front

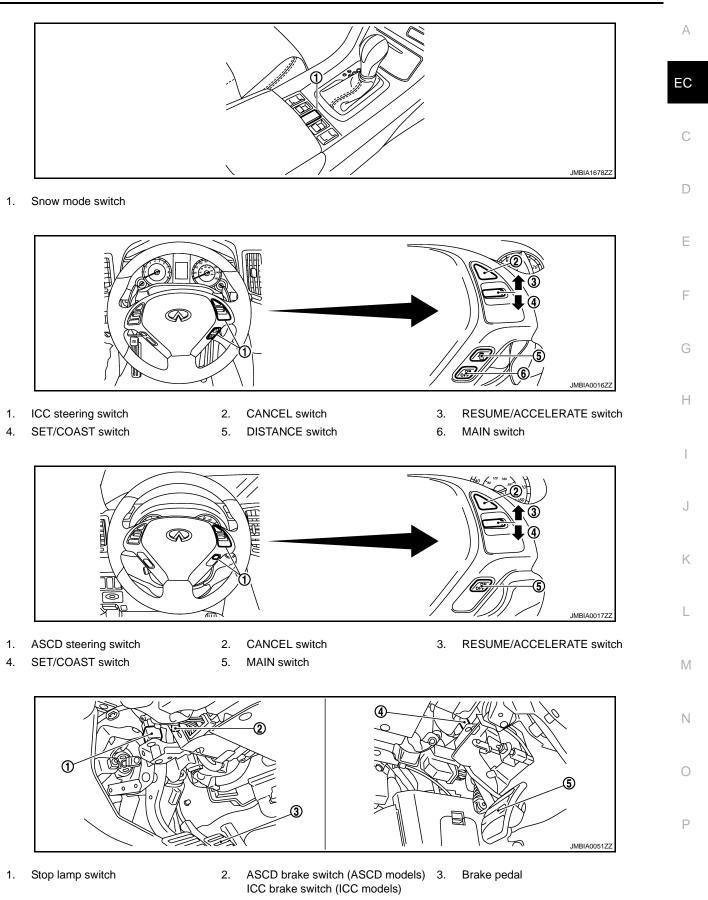
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor



1. Accelerator pedal position sensor 2. ECM

< SYSTEM DESCRIPTION >

[VQ37VHR]



- 4. ASCD clutch switch (ASCD models) 5. ICC clutch switch (ICC models)
- 5. Clutch pedal



< SYSTEM DESCRIPTION >

Component Description

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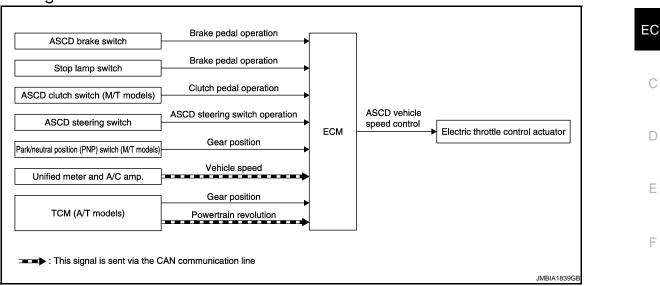
Component	Reference
Accelerator pedal position sensor	EC-467, "Description"
Camshaft position sensor (PHASE)	EC-277, "Description"
Crankshaft position sensor (POS)	EC-273. "Description"
Engine coolant temperature sensor	EC-191, "Description"
Power steering pressure sensor	EC-355, "Description"
Refrigerant pressure sensor	EC-520, "Description"

[VQ37VHR]

< SYSTEM DESCRIPTION >

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator		
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control			
Stop lamp switch	Brake pedal operation				
ASCD clutch switch (M/T models)	Clutch pedal operation				
ASCD steering switch	ASCD steering switch operation		Electric throttle control		
Park/neutral position (PNP) switch (M/T models)Gear positionUnified meter and A/C amp.Vehicle speed*	Gear position		Electric throttle control actuator		
	Vehicle speed*				
TOM(A/T) and $data)$	Gear position				
TCM (A/T models)	Powertrain revolution*				

*: This signal is sent to the ECM via the CAN communication line

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/ h (25 MPH) and 144 km/h (89 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in the ASCD system, it automatically deactivates control.

NOTE:

Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)

When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET lamp in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.



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< SYSTEM DESCRIPTION >

And then ASCD will maintain the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is in the N, P, R position (A/T models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

• Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.

When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.

• Malfunction for some self-diagnoses regarding ASCD control: SET indicator will blink quickly.

If MAIN switch is turned to OFF while ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will maintain the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released (M/T models)
- A/T selector lever is in the P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

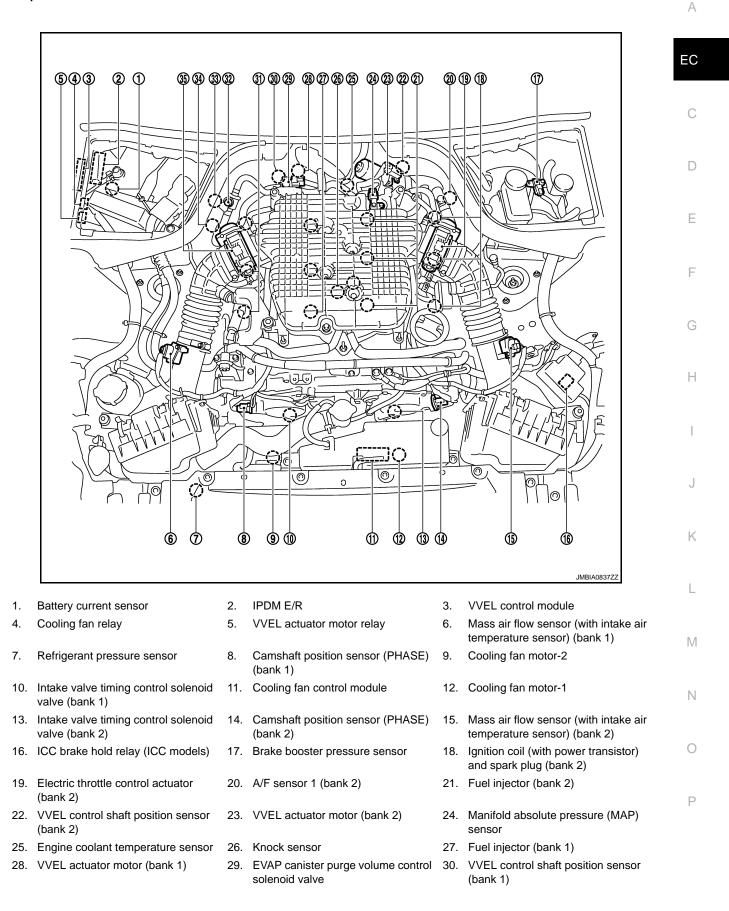
[VQ37VHR]

< SYSTEM DESCRIPTION >

Component Parts Location

[VQ37VHR]

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< SYSTEM DESCRIPTION >

- Ignition coil (with power transistor) 32. EV and spark plug (bank 1)
- 32. EVAP service port

33. A/F sensor 1 (bank 1)

2

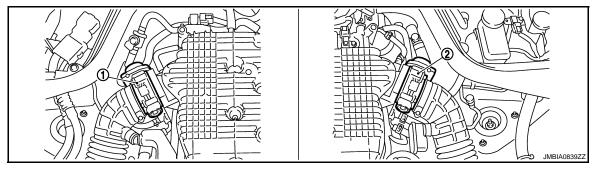
[VQ37VHR]

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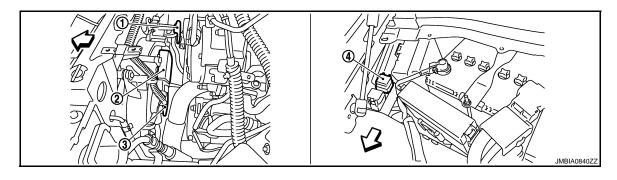
- 34. Crankshaft position sensor (POS)
- Electric throttle control actuator (bank 1)



- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)

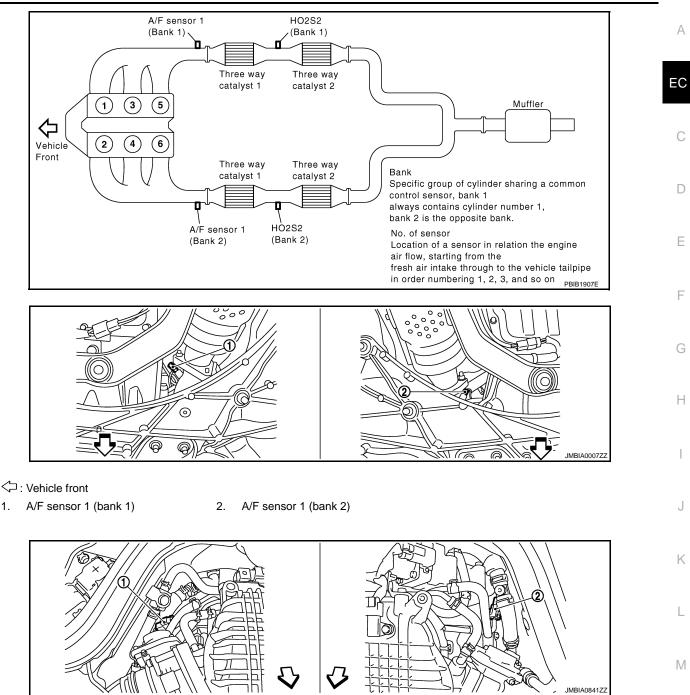


- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



- C : Vehicle front
- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

< SYSTEM DESCRIPTION >



C: Vehicle front

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A/F sensor 1 (bank 1) harness con- 2. 1. A/F sensor 1 (bank 2) harness connector nector

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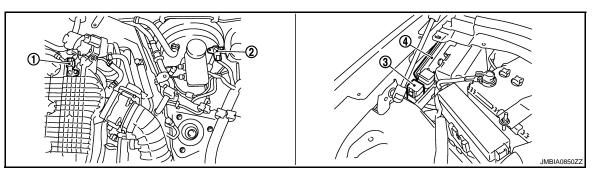
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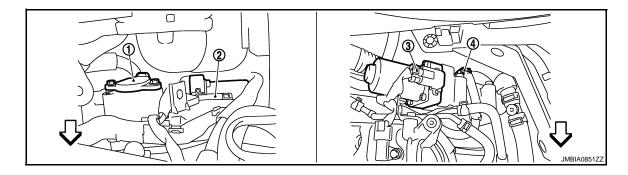
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
 - 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



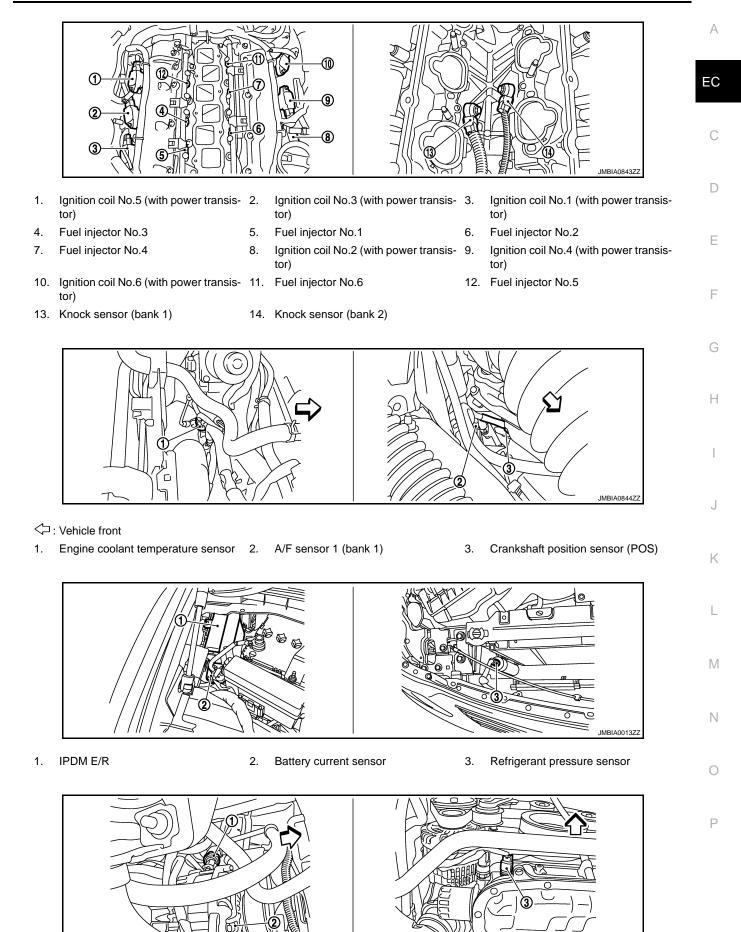
C: Vehicle front

- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- 3. VVEL actuator motor (bank 2)

- 4. VVEL control shaft position sensor (bank 2)
- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

[VQ37VHR]



Revision: 2009 October

2009 G37 Coupe

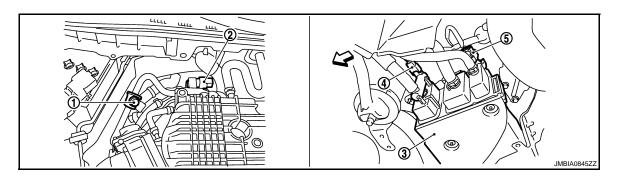
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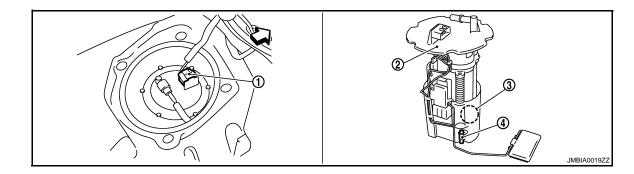
C: Vehicle front

1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor

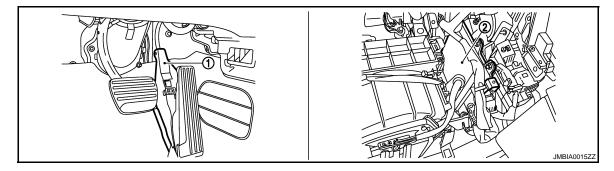


- └□: Vehicle front
- 1. EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- 5. EVAP control system pressure sensor



C : Vehicle front

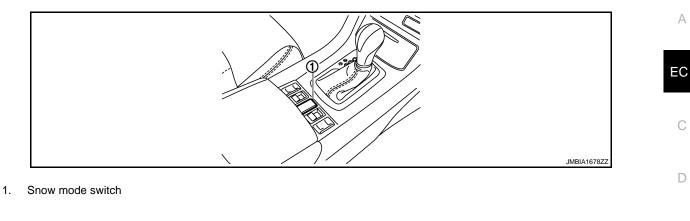
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor

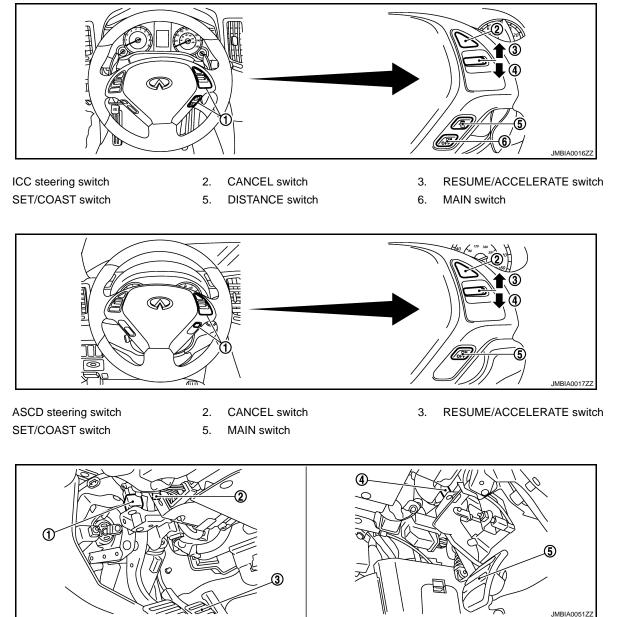


1. Accelerator pedal position sensor 2. ECM

< SYSTEM DESCRIPTION >

[VQ37VHR]





1. Stop lamp switch

1.

4.

1. 4.

- 2. ASCD brake switch (ASCD models) 3. Brake pedal ICC brake switch (ICC models)
- 4. ASCD clutch switch (ASCD models) 5. ICC clutch switch (ICC models)
- 5. Clutch pedal

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< SYSTEM DESCRIPTION >

Component Description

INFOID:000000004250634

[VQ37VHR]

Component	Reference
ASCD brake switch	EC-438. "Description"
ASCD indicator	EC-489, "Description"
ASCD steering switch	EC-431, "Description"
Electric throttle control actuator	EC-414. "Description"
Stop lamp switch	EC-438, "Description"

CAN COMMUNICATION

System Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle mul-EC tiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. Refer to LAN-10, "CAN Communication Control Circuit", about CAN communication for detail.

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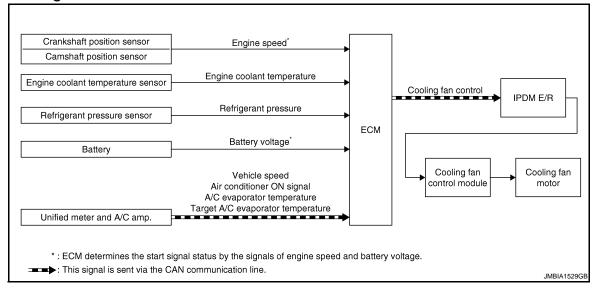
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< SYSTEM DESCRIPTION >

COOLING FAN CONTROL

System Diagram



System Description

INFOID:000000004250637

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1			
Engine coolant temperature sensor	Engine coolant temperature		IPDM E/R ↓ Cooling fan control module ↓	
Refrigerant pressure sensor	Refrigerant pressure	Cooling fan control		
Battery	Battery voltage*1			
Unified meter and A/C amp.	Vehicle speed* ²			
	Air conditioner ON signal* ²		Cooling fan motor	
	A/C evaporator temperature*2			
	Target A/C evaporator temperature*2			

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM via the CAN communication line.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, air conditioner ON signal, refrigerant pressure, target A/C evaporator temperature and A/C evaporator temperature. Cooling fan control signal is sent to IPDM E/R from ECM by CAN communication line. Then, IPDM E/R sends ON/OFF pulse duty signal to cooling fan control module. Corresponding to this ON/OFF pulse duty signal, cooling fan control module gives cooling fan motor operating voltage to cooling fan motors. Cooling fan speed is controlled by duty cycle of cooling fan motor operating voltage sent from cooling fan control module.

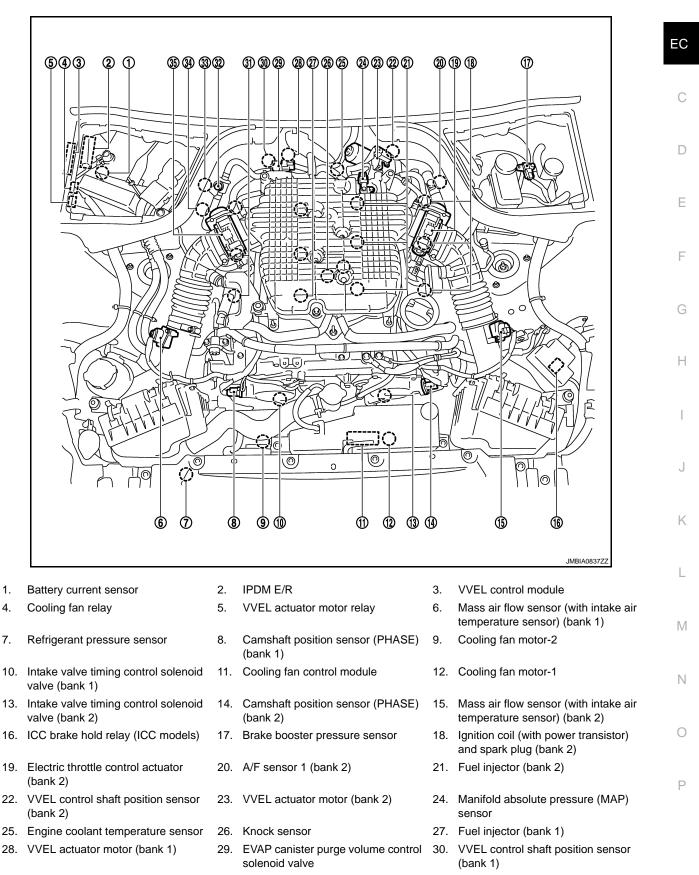
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< SYSTEM DESCRIPTION >

Component Parts Location

[VQ37VHR]





< SYSTEM DESCRIPTION >

 Ignition coil (with power transistor) and spark plug (bank 1)

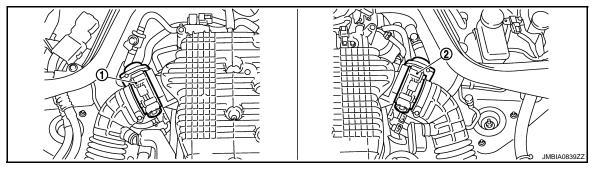
32. EVAP service port

33. A/F sensor 1 (bank 1)

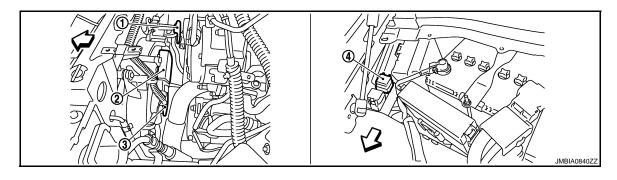
- 34. Crankshaft position sensor (POS) 34.
 - Electric throttle control actuator (bank 1)



- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



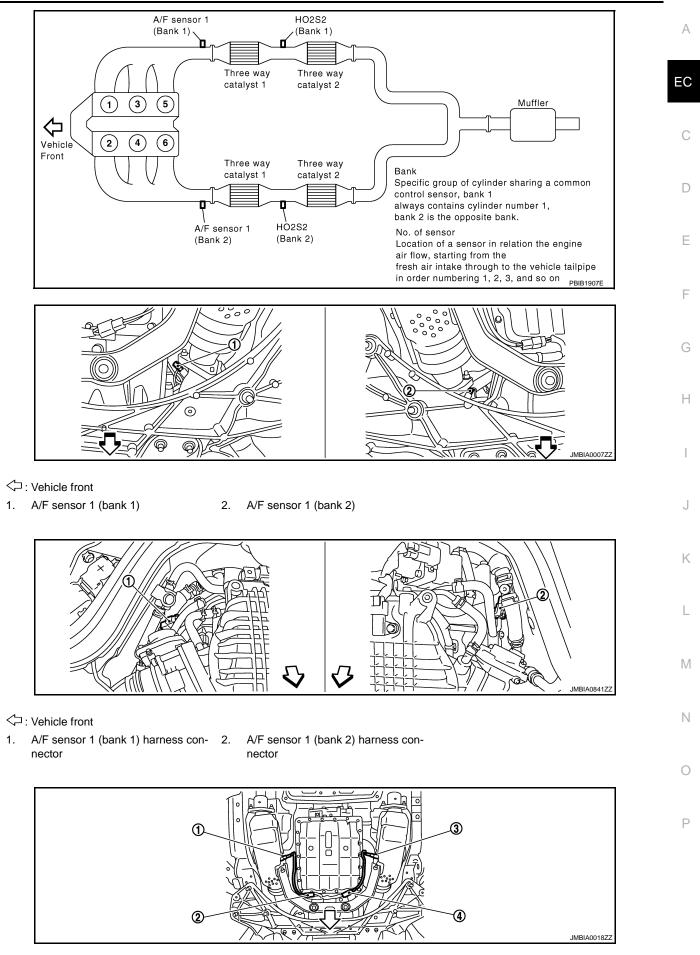
C: Vehicle front

- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

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< SYSTEM DESCRIPTION >





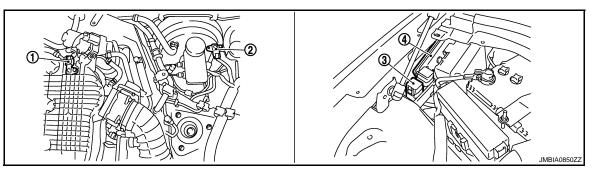
EC-77

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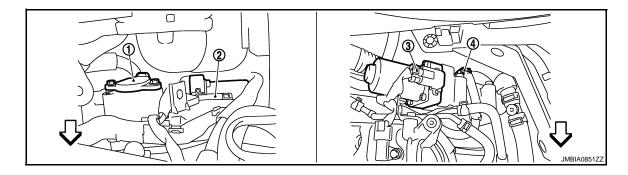
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) 3 harness connector
- 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



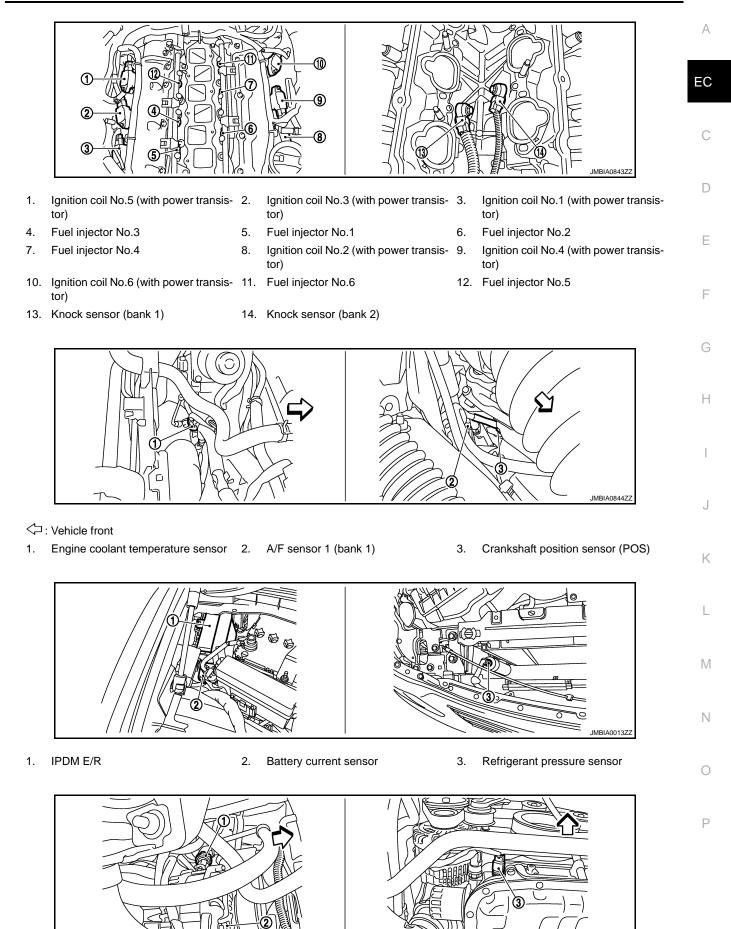
C: Vehicle front

- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- 3. VVEL actuator motor (bank 2)

- 4. VVEL control shaft position sensor (bank 2)
- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

[VQ37VHR]



Revision: 2009 October

2009 G37 Coupe

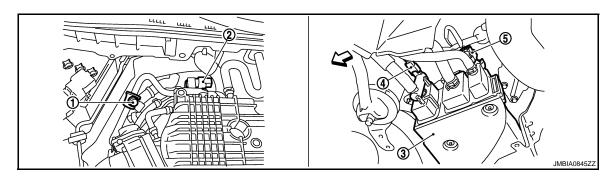
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< SYSTEM DESCRIPTION >

C: Vehicle front

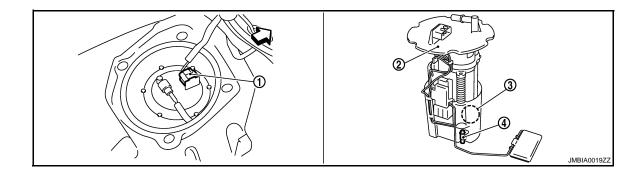
1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



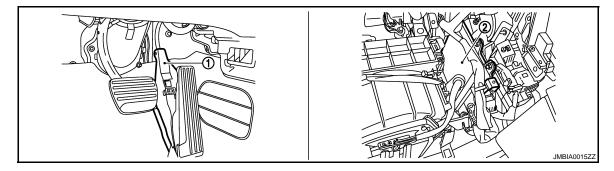
C: Vehicle front

- 1. EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- 5. EVAP control system pressure sensor



C: Vehicle front

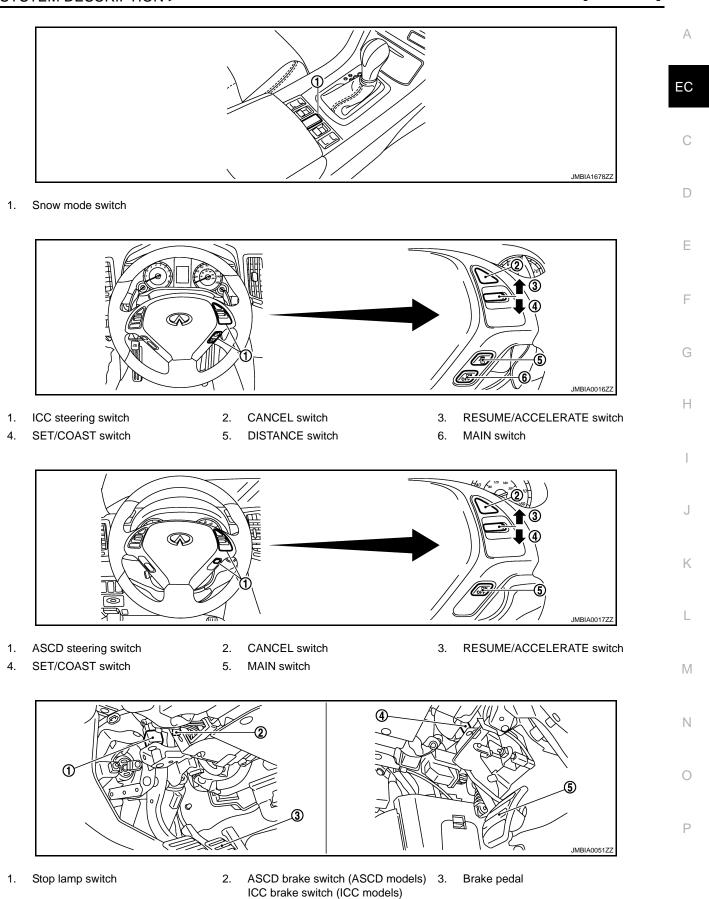
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor



1. Accelerator pedal position sensor 2. ECM

< SYSTEM DESCRIPTION >

[VQ37VHR]



- ASCD clutch switch (ASCD models) 5. 4. ICC clutch switch (ICC models)
- Clutch pedal

< SYSTEM DESCRIPTION >

Component Description

INFOID:000000004250639

[VQ37VHR]

Component	Reference
Camshaft position sensor (PHASE)	EC-277, "Description"
Cooling fan control module	EC-490, "Description"
Cooling fan motor	EC-490. "Description"
Crankshaft position sensor (POS)	EC-273. "Description"
Engine coolant temperature sensor	EC-191, "Description"
Refrigerant pressure sensor	EC-520, "Description"

< SYSTEM DESCRIPTION >

EVAPORATIVE EMISSION SYSTEM

System Diagram

Crankshaft position sensor	Engine speed * & Piston position				
Camshaft position sensor		-			
Mass air flow sensor	Amount of intake air	→			
Engine coolant temperature sensor	Engine coolant temperature	→			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas	_			
. ,	Throttle position		EVAP canister purge flow control		
Throttle position sensor	·	➡ ECM	purge flow control control so		
Accelerator pedal position sensor	Accelerator pedal position	→	valve		
Battery	Battery voltage	→			
Fuel tank temperature sensor	Fuel temperature in fuel tank	-			
EVAP control system pressure sensor	Pressure in purge line	-			
Unified meter and A/C amp.	Vehicle speed	→			
ECM determines the start signal status by	the signals of engine speed and battery vol	tage.			
This signal is sent via the CAN com		-		BIA1530GB	

System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed ^{*1}			
Mass air flow sensor	Amount of intake air			
Engine coolant temperature sensor	Engine coolant temperature			
Battery	Battery voltage*1	EVAP canister		
Throttle position sensor	Throttle position		EVAP canister purge vol-	
Accelerator pedal position sensor	Accelerator pedal position	purge flow control	ume control solenoid valve	
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)			
Fuel tank temperature sensor	Fuel temperature in fuel tank			
EVAP control system pressure sensor	Pressure in purge line	-	ssure in purge line	
Unified meter and A/C amp.	Vehicle speed*2			

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM via the CAN communication line.

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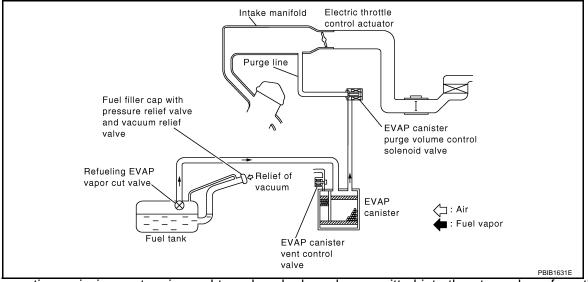
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< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION



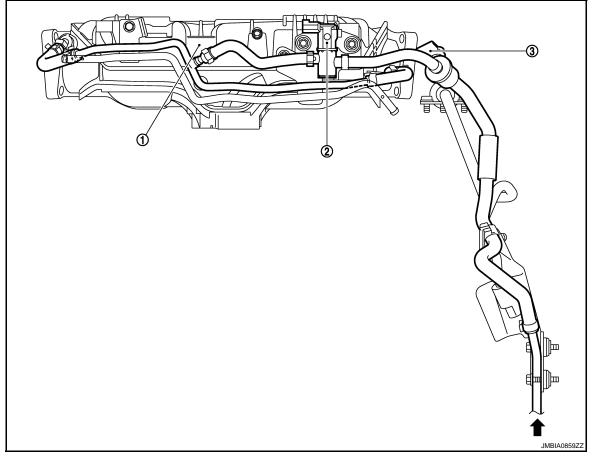
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

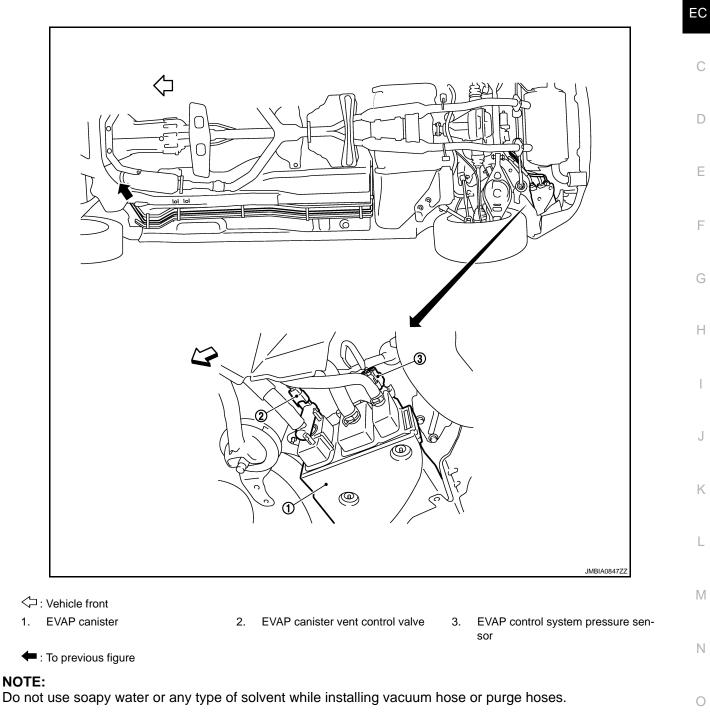
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

EVAPORATIVE EMISSION LINE DRAWING



< SYSTEM DESCRIPTION >

- 1. Intake manifold collector
- 2. EVAP canister purge volume control 3. EVAP service port solenoid valve
- = : From next figure



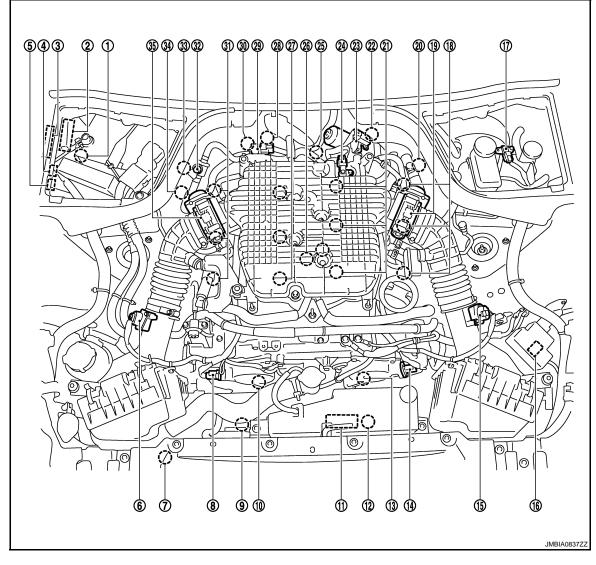
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< SYSTEM DESCRIPTION >

Component Parts Location

INFOID:000000004609731

[VQ37VHR]



- Battery current sensor 1.
- 4. Cooling fan relay
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- 13. Intake valve timing control solenoid valve (bank 2)
- 16. ICC brake hold relay (ICC models)
- 19. Electric throttle control actuator (bank 2)
- 22. VVEL control shaft position sensor (bank 2)
- 25. Engine coolant temperature sensor
- 28. VVEL actuator motor (bank 1)

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Brake booster pressure sensor
- 20. A/F sensor 1 (bank 2)
- 23. VVEL actuator motor (bank 2)
- 26. Knock sensor
- 29. EVAP canister purge volume control 30. VVEL control shaft position sensor solenoid valve

- VVEL control module 3.
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 18. Ignition coil (with power transistor) and spark plug (bank 2)
- 21. Fuel injector (bank 2)
- 24. Manifold absolute pressure (MAP) sensor
- 27. Fuel injector (bank 1)
 - (bank 1)

< SYSTEM DESCRIPTION >

- Ignition coil (with power transistor) 32 and spark plug (bank 1)
- 32. EVAP service port
- 33. A/F sensor 1 (bank 1)

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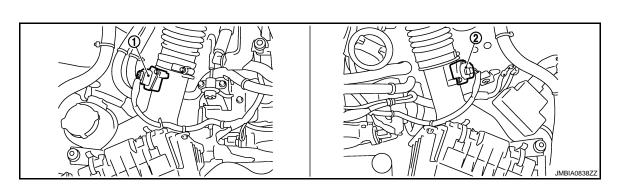
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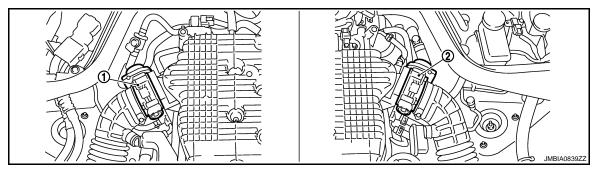
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[VQ37VHR]

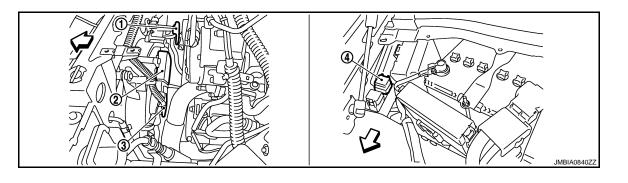
- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)



- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)

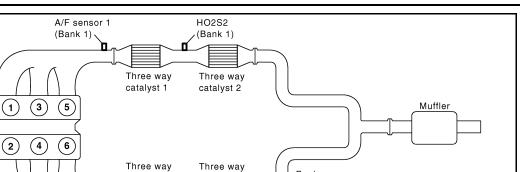


- C: Vehicle front
- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

< SYSTEM DESCRIPTION >

 \Diamond

Vehicle Front



Bank

control sensor, bank 1

air flow, starting from the

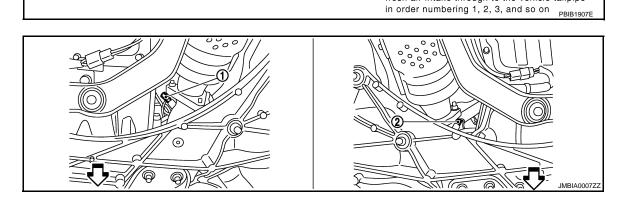
No. of sensor

Specific group of cylinder sharing a common

Location of a sensor in relation the engine

fresh air intake through to the vehicle tailpipe

always contains cylinder number 1, bank 2 is the opposite bank.



catalyst 2

HÖ2S2

(Bank 2)

└□: Vehicle front

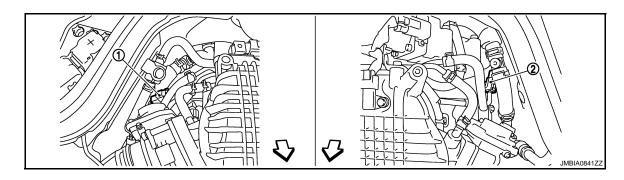
- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)

catalyst 1

П

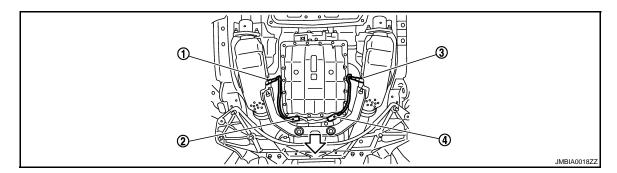
A/F sensor 1

(Bank 2)



C: Vehicle front

1. A/F sensor 1 (bank 1) harness connector 2. A/F sensor 1 (bank 2) harness connector



< SYSTEM DESCRIPTION >

[VQ37VHR]

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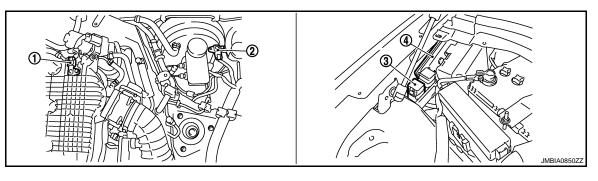
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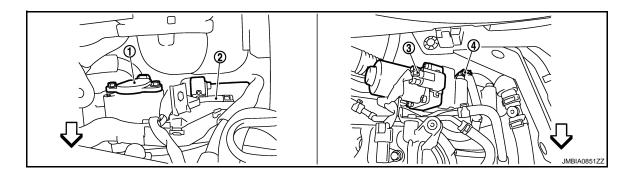
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- motor (bank 1) 3.
- . VVEL actuator motor (bank 2)

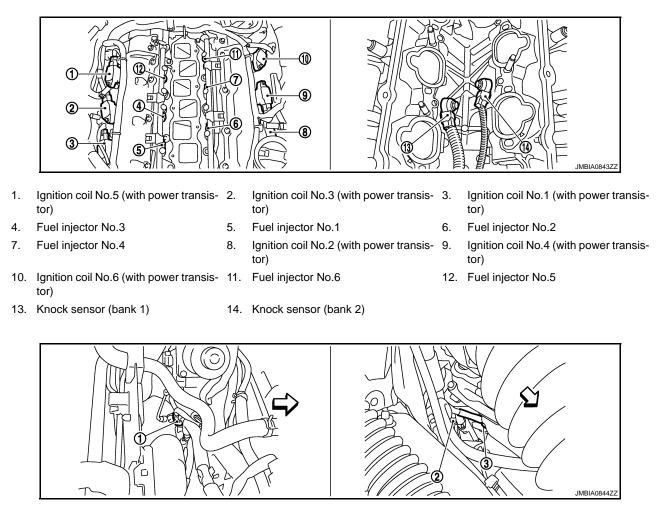
 VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

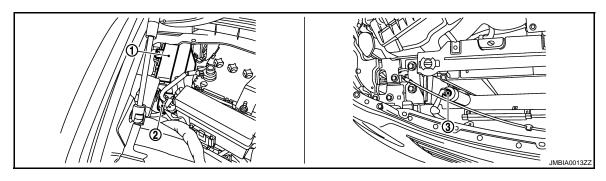
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[VQ37VHR]



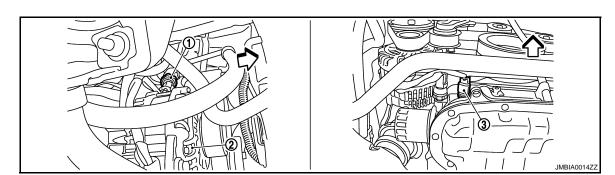
└□: Vehicle front

- 1. Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- 3. Crankshaft position sensor (POS)



1. IPDM E/R

- 2. Battery current sensor
- 3. Refrigerant pressure sensor



< SYSTEM DESCRIPTION >

[VQ37VHR]

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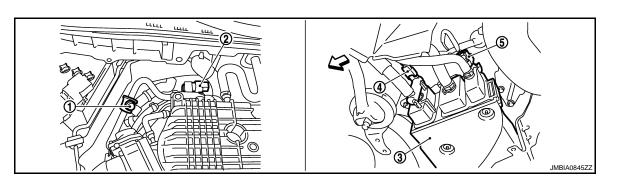
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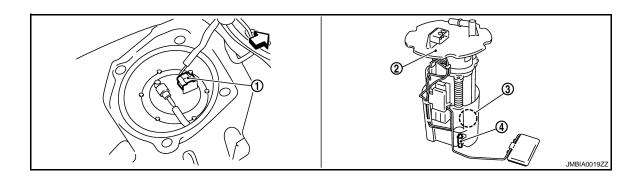
\triangleleft : Vehicle front

1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor

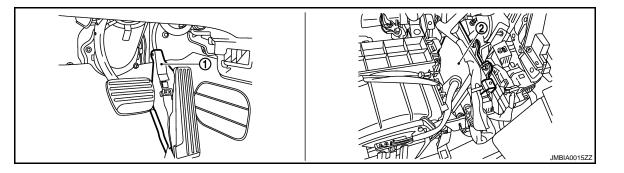


- C: Vehicle front
- 1. EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- 5. EVAP control system pressure sensor



C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor

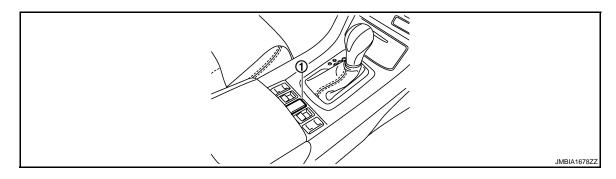


1. Accelerator pedal position sensor 2. ECM

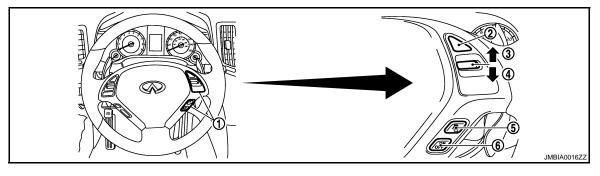
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< SYSTEM DESCRIPTION >

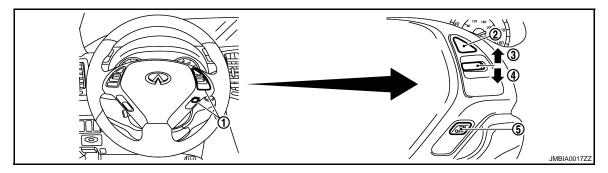


Snow mode switch 1.



- ICC steering switch 1.
- CANCEL switch 2.
- SET/COAST switch 4.
- **DISTANCE** switch
- 5.

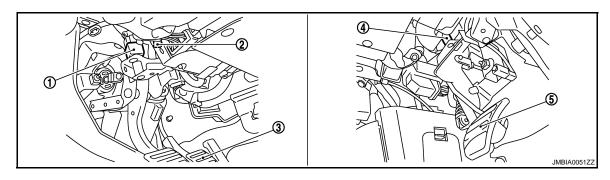
- **RESUME/ACCELERATE** switch 3.
- 6. MAIN switch



ASCD steering switch 1.

4.

- SET/COAST switch 5.
- CANCEL switch 2. MAIN switch
- 3. RESUME/ACCELERATE switch



- Stop lamp switch 1.
- ASCD brake switch (ASCD models) 3. 2. Brake pedal ICC brake switch (ICC models)
- ASCD clutch switch (ASCD models) 5. 4. ICC clutch switch (ICC models)
- Clutch pedal

< SYSTEM DESCRIPTION >

Component Description

INFOID:000000004250643

[VQ37VHR]

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Component	Reference	
A/F sensor 1	EC-205, "Description"	EC
Accelerator pedal position sensor	EC-467, "Description"	
Camshaft position sensor (PHASE)	EC-277, "Description"	0
Crankshaft position sensor (POS)	EC-273, "Description"	U
Engine coolant temperature sensor	EC-191, "Description"	
EVAP canister purge volume control solenoid valve	EC-297, "Description"	D
EVAP control system pressure sensor	EC-313, "Description"	
Fuel tank temperature sensor	EC-248, "Description"	
Mass air flow sensor	EC-168, "Description"	E
Throttle position sensor	EC-194, "Description"	

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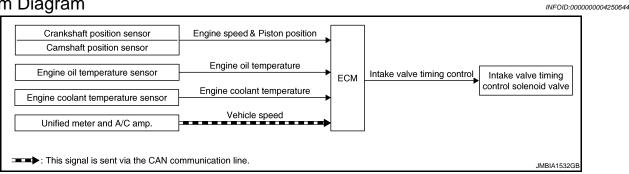
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< SYSTEM DESCRIPTION >

INTAKE VALVE TIMING CONTROL

System Diagram



System Description

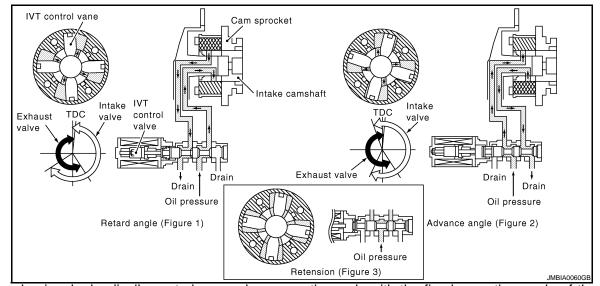
INFOID:000000004250645

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	- Engine speed and piston position	Intake valve timing control		
Camshaft position sensor (PHASE)			Intake valve timing control solenoid valve	
Engine oil temperature sensor	Engine oil temperature			
Engine coolant temperature sensor	Engine coolant temperature			
Unified meter and A/C amp.	Vehicle speed*			

*: This signal is sent to the ECM via the CAN communication line

SYSTEM DESCRIPTION



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

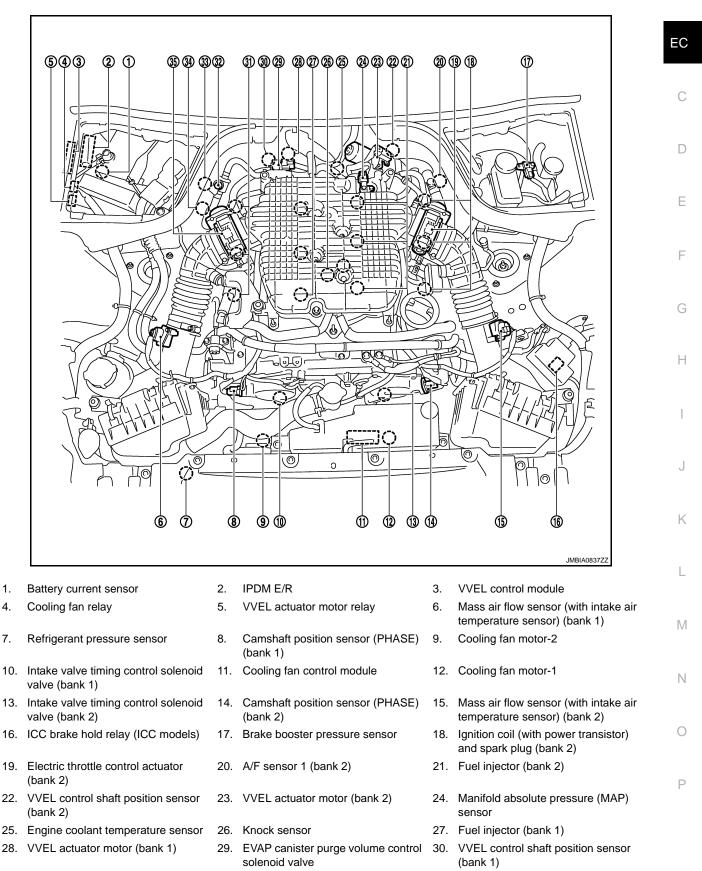
< SYSTEM DESCRIPTION >

Component Parts Location

[VQ37VHR]

INFOID:000000004609732





< SYSTEM DESCRIPTION >

1.

- 31. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. EVAP service port

33. A/F sensor 1 (bank 1)

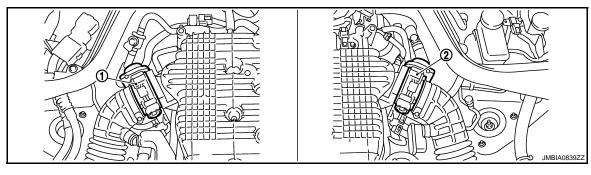
2

- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)

[VQ37VHR]

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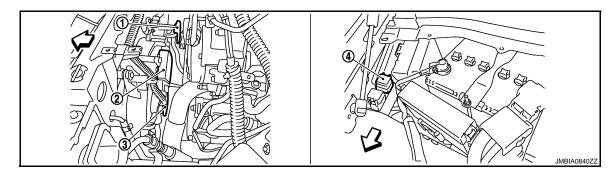
- Mass air flow sensor (with intake air 2. Mass air flow sensor (with intake air temperature sensor) (bank 2)



1. Electric throttle control actuator (bank 1)

temperature sensor) (bank 1)

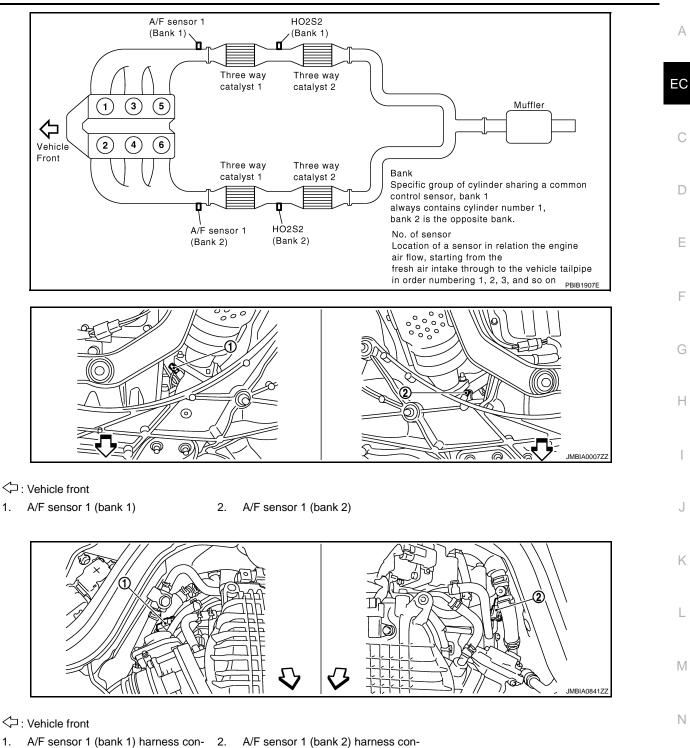
Electric throttle control actuator 2. (bank 2)



C: Vehicle front

- Cooling fan motor-2 1.
- 4. Cooling fan relay
- Cooling fan control module 2.
- Cooling fan motor-1 3.

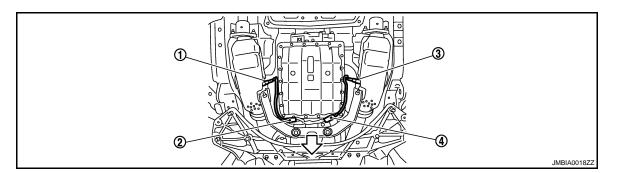
< SYSTEM DESCRIPTION >



C: Vehicle front

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2009 G37 Coupe

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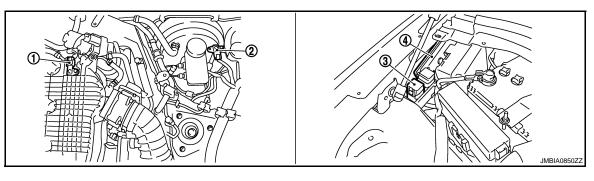
[VQ37VHR]

< SYSTEM DESCRIPTION >

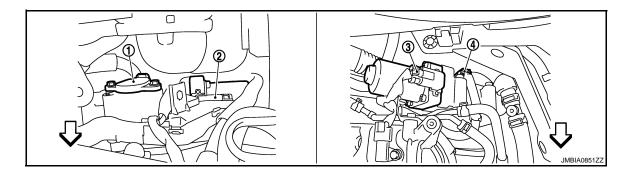
C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

4. Heated oxygen sensor 2 (bank 1) harness connector



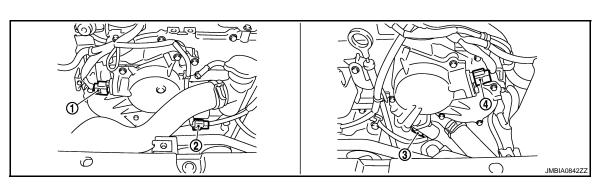
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

- 1. VVEL control shaft position sensor 2. VVEL actuator motor (bank 1) (bank 1)
- 3. VVEL actuator motor (bank 2)

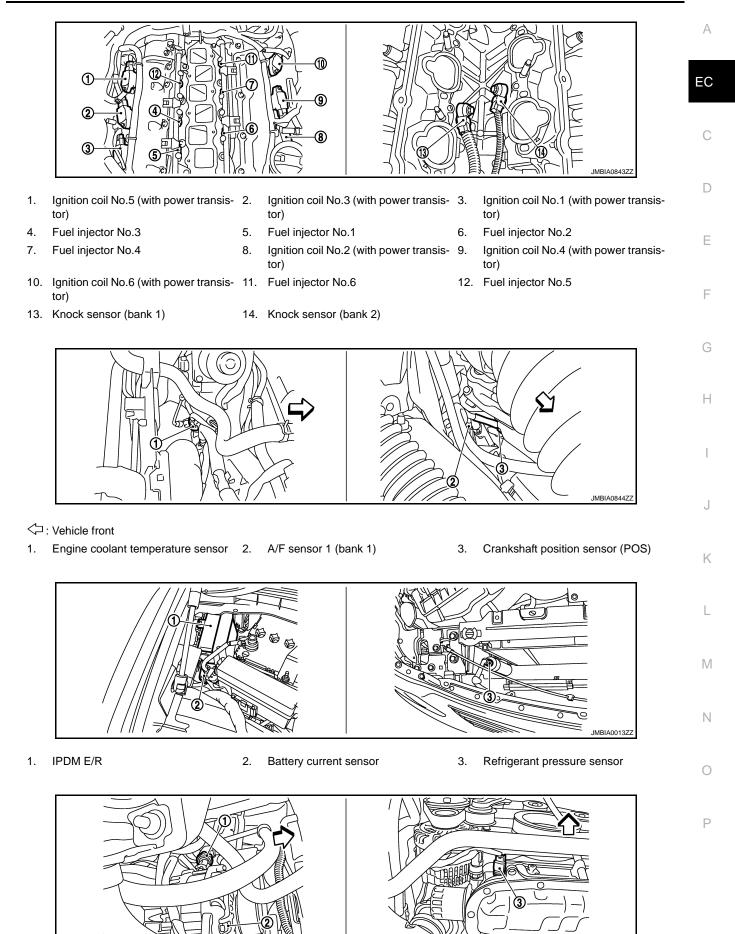
 VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

[VQ37VHR]



2009 G37 Coupe

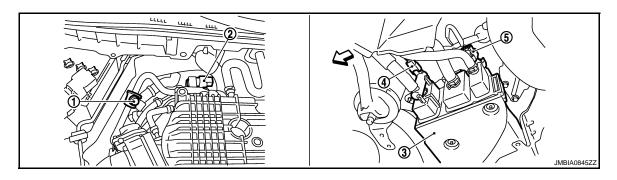
JMBIA0014ZZ

< SYSTEM DESCRIPTION >

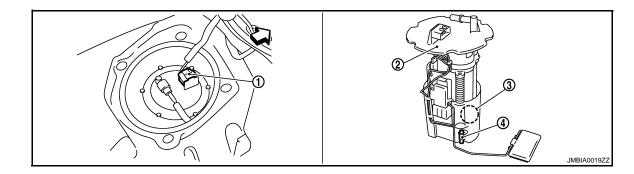
C: Vehicle front

1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor

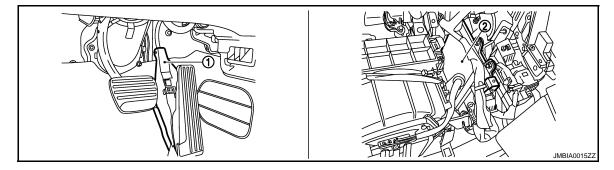


- C: Vehicle front
- 1. EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- 5. EVAP control system pressure sensor



C : Vehicle front

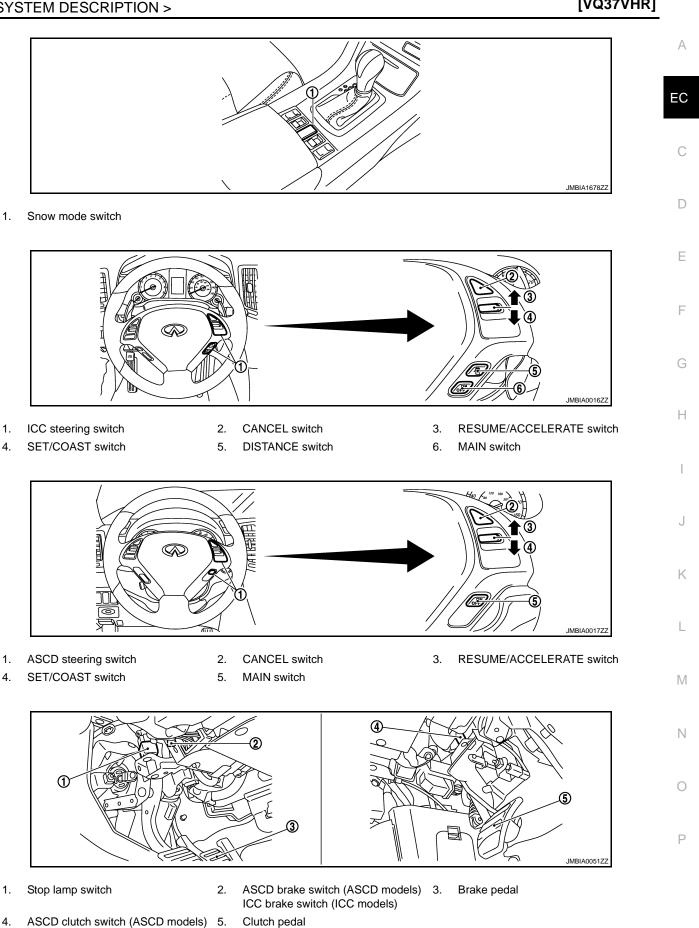
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor



1. Accelerator pedal position sensor 2. ECM

< SYSTEM DESCRIPTION >

[VQ37VHR]



Revision: 2009 October

ICC clutch switch (ICC models)

EC-101

< SYSTEM DESCRIPTION >

Component Description

INFOID:000000004250647

[VQ37VHR]

Component	Reference
Camshaft position sensor (PHASE)	EC-277, "Description"
Crankshaft position sensor (POS)	EC-273, "Description"
Engine coolant temperature sensor	EC-191, "Description"
Engine oil temperature sensor	EC-254. "Description"
Intake valve timing control solenoid valve	EC-165, "Description"

< SYSTEM DESCRIPTION >

VVEL SYSTEM



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System Diagram INFOID:000000004250648 Engine speed & Piston position Crankshaft position sensor (POS) EC VVEL control Accelerator pedal position VVEL control module ECM Accelerator pedal position sensor VVEL actuator sub Control shaft actual angle VVEL control shaft position sensor assembly * : ECM determines the start signal status by the signals of engine speed and battery voltage. JMBIA1803G

System Description

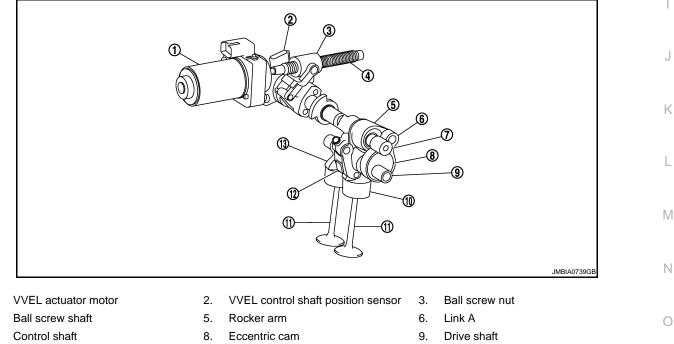
INFOID:000000004250649

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed and piston position		VVEL control module	
Accelerator pedal position sensor	Accelerator pedal position	VVEL control	↓	
VVEL control shaft position sensor	Control shaft actual angle*	_	VVEL actuator sub assembly	

*: This signal is sent to the ECM via the CAN communication line

SYSTEM DESCRIPTION



12. Link B

- 10. Valve lifter
- 13. Output cam

1. 4.

7.

VVEL (Variable Valve Event & Lift) is a system that controls valve event and valve lift continuously. Rotational movement of the drive shaft equipped with eccentric cam is transmitted to output cam via the rocker arm and two kinds of links to depress the intake valve. ECM decides the target valve lift according to the driving condition and sends the command signal to the VVEL control module. The VVEL control module controls the rotation of the control shaft using the VVEL actuator motor and changes the movement of the output cam by shifting the link supporting point. As a result, valve lift changes continuously to improve engine output and response.

11. Intake valve

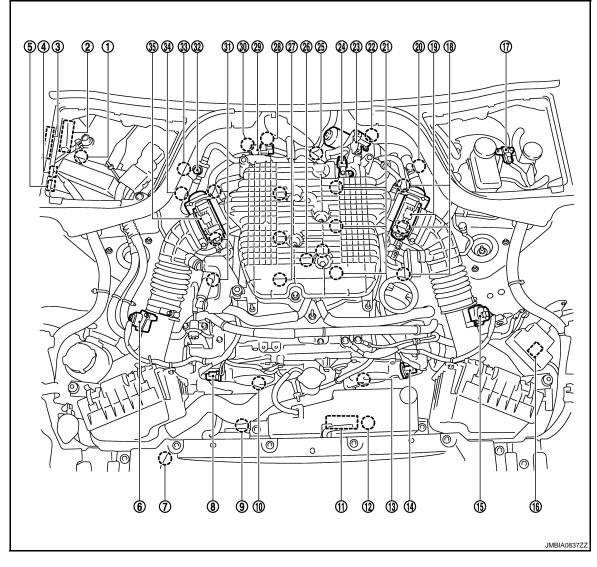
EC-103

< SYSTEM DESCRIPTION >

Component Parts Location

INFOID:000000004609733

[VQ37VHR]



- 1. Battery current sensor
- 4. Cooling fan relay
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. ICC brake hold relay (ICC models)
- 19. Electric throttle control actuator (bank 2)
- 22. VVEL control shaft position sensor (bank 2)
- 25. Engine coolant temperature sensor
- 28. VVEL actuator motor (bank 1)

2. IPDM E/R

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- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Brake booster pressure sensor
- 20. A/F sensor 1 (bank 2)
- 23. VVEL actuator motor (bank 2)
- 26. Knock sensor
- 29. EVAP canister purge volume control solenoid valve

- 3. VVEL control module
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. Fuel injector (bank 2)
- 24. Manifold absolute pressure (MAP) sensor
- 27. Fuel injector (bank 1)
- VVEL control shaft position sensor (bank 1)

< SYSTEM DESCRIPTION >

- 31. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. EVAP service port
- 33. A/F sensor 1 (bank 1)

- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)

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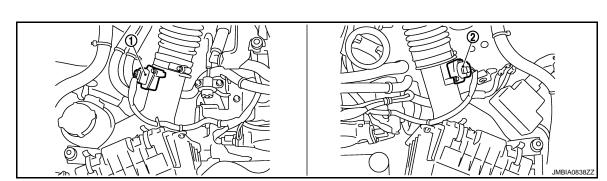
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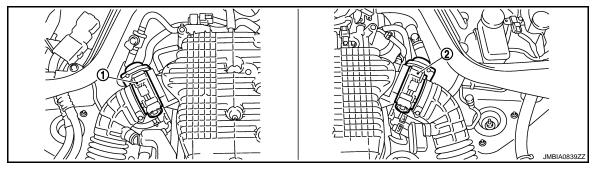
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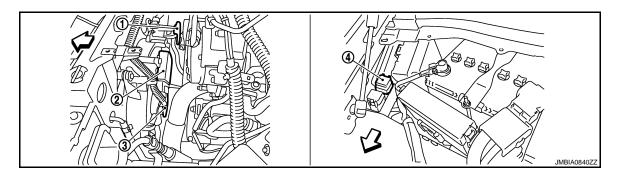
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- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)

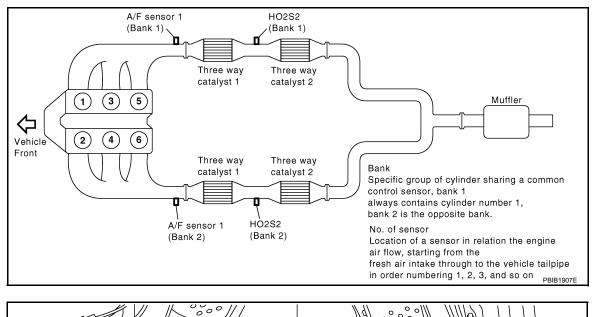


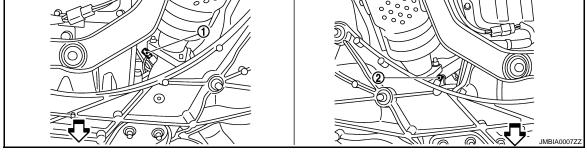
- C: Vehicle front
- 1. Cooling fan motor-2
- 4. Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

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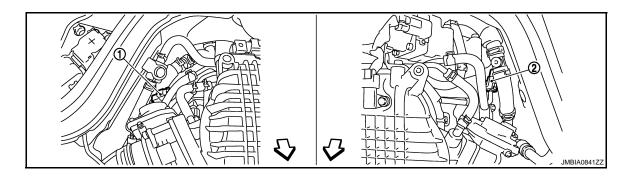
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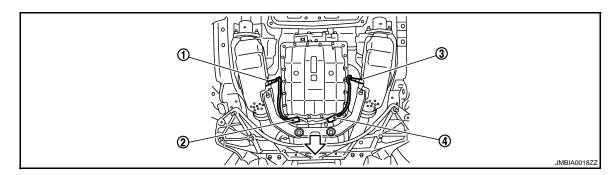


- └□: Vehicle front
- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)



C: Vehicle front

1. A/F sensor 1 (bank 1) harness connector 2. A/F sensor 1 (bank 2) harness connector



< SYSTEM DESCRIPTION >

[VQ37VHR]

C: Vehicle front

- 1. Heated oxygen sensor 2 (bank 2)
- 2. harness connector
- 3. Heated oxygen sensor 2 (bank 1)
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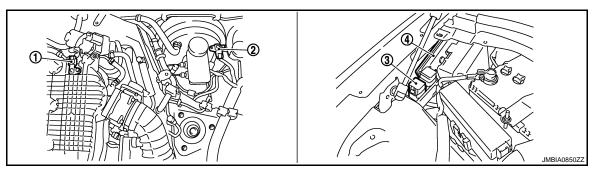
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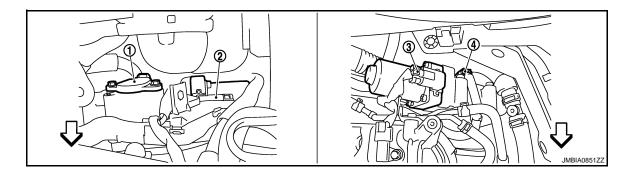
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- Heated oxygen sensor 2 (bank 1) 4. harness connector
- Heated oxygen sensor 2 (bank 2)



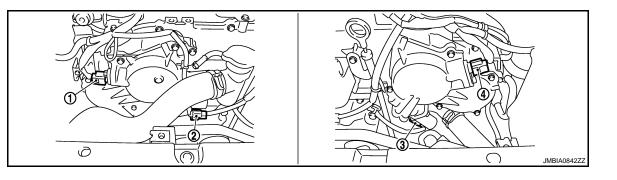
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- VVEL control module 4.



C: Vehicle front

- VVEL control shaft position sensor 1. 2. VVEL actuator motor (bank 1) (bank 1)
- VVEL actuator motor (bank 2) 3.

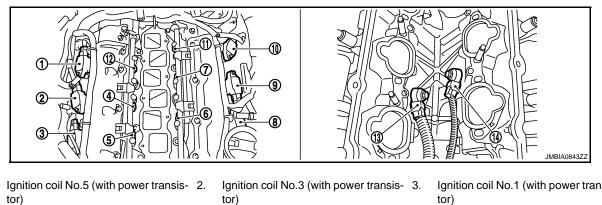
4. VVEL control shaft position sensor (bank 2)



- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

< SYSTEM DESCRIPTION >

[VQ37VHR]



Ignition coil No.2 (with power transis- 9.

- tor)
- 4. Fuel injector No.3

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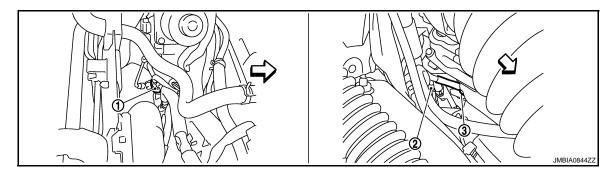
- Fuel injector No.4 7.
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6 tor)
- 13. Knock sensor (bank 1)
- tor)
- 14. Knock sensor (bank 2)

Fuel injector No.1

5.

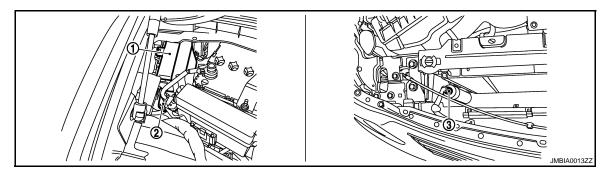
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- Ignition coil No.1 (with power transistor)
- 6. Fuel injector No.2
 - Ignition coil No.4 (with power transistor)
- 12. Fuel injector No.5



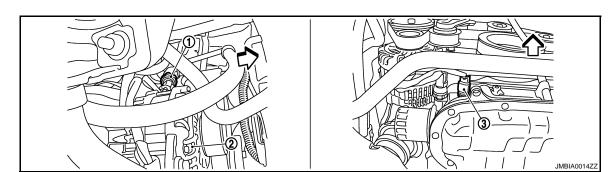
C: Vehicle front

- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1) 1.
- 3. Crankshaft position sensor (POS)



IPDM E/R 1.

- 2. Battery current sensor
- Refrigerant pressure sensor 3.



VVEL SYSTEM

< SYSTEM DESCRIPTION >

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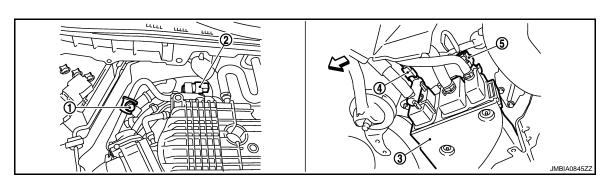
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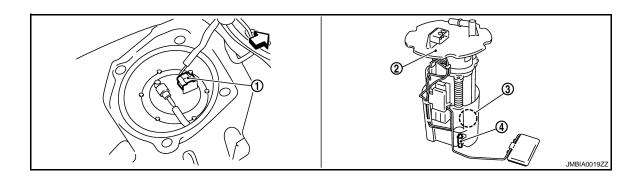
\triangleleft : Vehicle front

1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor

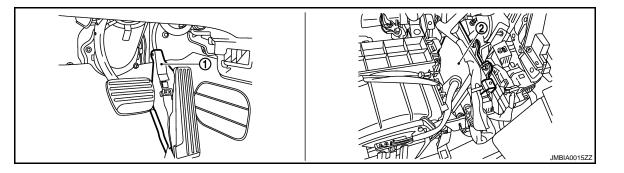


- └□: Vehicle front
- 1. EVAP service port
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- 5. EVAP control system pressure sensor



C: Vehicle front

- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor



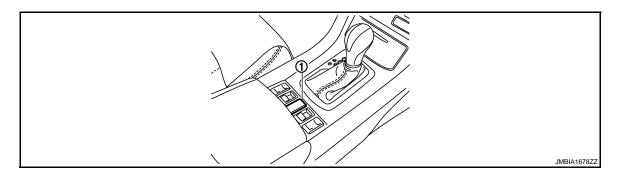
1. Accelerator pedal position sensor 2. ECM

Ρ

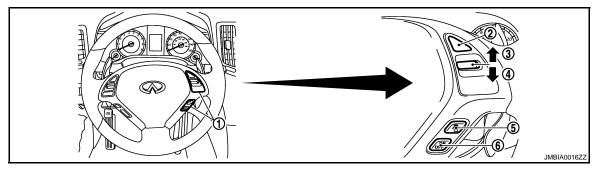
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VVEL SYSTEM

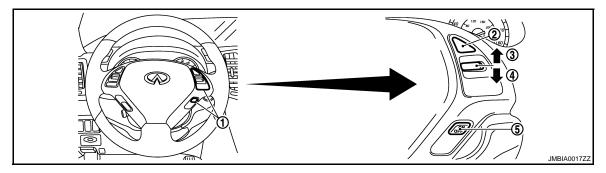
< SYSTEM DESCRIPTION >



Snow mode switch 1.



- ICC steering switch 1.
- CANCEL switch 2.
- SET/COAST switch 4.
- 5.
 - **DISTANCE** switch
- **RESUME/ACCELERATE** switch 3.
- 6. MAIN switch

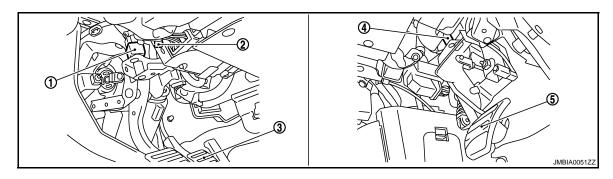


ASCD steering switch 1.

SET/COAST switch

4.

- CANCEL switch 2. 5. MAIN switch
- 3. RESUME/ACCELERATE switch



- Stop lamp switch 1.
- ASCD brake switch (ASCD models) 3. 2. Brake pedal ICC brake switch (ICC models)
- ASCD clutch switch (ASCD models) 5. 4. ICC clutch switch (ICC models)
- Clutch pedal

VVEL SYSTEM

< SYSTEM DESCRIPTION >

Component Description

INFOID:000000004250651

[VQ37VHR]

Component	Reference	
Accelerator pedal position sensor	EC-467, "Description"	EC
Crankshaft position sensor (POS)	EC-273, "Description"	
VVEL actuator motor	EC-384, "Description"	
VVEL actuator motor relay	EC-388, "Description"	
VVEL control module	EC-457, "Description"	
VVEL control shaft position sensor	EC-380, "Description"	D

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:000000004250652

[VQ37VHR]

INTRODUCTION

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service \$03 of SAE J1979
Freeze Frame data	Service \$02 of SAE J1979
System Readiness Test (SRT) code	Service \$01 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service \$07 of SAE J1979
1st Trip Freeze Frame data	-
Test values and Test limits	Service \$06 of SAE J1979
Calibration ID	Service \$09 of SAE J1979

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	SRT status	Test value
CONSULT-III	×	×	×	×	×	×	_
GST	×	×	×	—	×	×	×
ECM	×	×*	—	—	_	×	_

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel illuminates when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to <u>EC-560, "Fail safe"</u>.)

TWO TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time the DTC is stored. <2nd trip> The "trip" in the "Two Trip Detection Logic" means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

 \times : Applicable —: Not applicable

		М	IL		D.	тс	1st trip DTC		
ltems	1s ⁻	t trip	2nc	l trip	1st trip	2nd trip	1st trip	2nd trip	
	Blinking	Illuminat- ed	Blinking	Illuminat- ed	displaying	displaying	displaying	display- ing	
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	×	_	—	—	—	_	×	_	
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	_	_	×	_	_	×	_	_	
One trip detection diagnoses (Re- fer to <u>EC-564, "DTC Index"</u> .)	_	×	_	_	×	_	_	_	
Except above	_	—	_	×	—	×	×	_	

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

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The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.

If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL will not illuminate (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL illuminates. In other words, the DTC is saved in the ECM memory and the MIL illuminates when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is saved and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or illuminate the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

For malfunctions in which 1st trip DTCs are displayed, refer to "EMISSION-RELATED DIAGNOSTIC INFOR-MATION ITEMS". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.

1st trip DTC is specified in Service \$07 of SAE J1979. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to <u>EC-9</u>, "Work Flow". Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short-term fuel trim, long-term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST. Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is saved in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM has the following priorities to update the data.

Priority		Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0306 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175	L
2		Except the above items (Includes A/T related items)	
3	1st trip freeze frame d	ata	M

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was saved in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

How to Read DTC and 1st Trip DTC

With CONSULT-III

With GST

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P0850, P1148, etc. These DTCs are prescribed by SAE J2012.

EC-113

< SYSTEM DESCRIPTION >

(CONSULT-III also displays the malfunctioning component or system.)

No Tools

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 0850, 1148, etc.

These DTCs are controlled by NISSAN.

- 1st trip DTC No. is the same as DTC No.
- Output of a DTC indicates a malfunction. However, GST and the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.

DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

How to Erase DTC and 1st Trip DTC

(I) With CONSULT-III

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for A/T related items (see <u>EC-564</u>), skip step 1.
- 1. Erase DTC in TCM. Refer to TM-165, "Diagnosis Description".
- 2. Select "ENGINE" with CONSULT-III.
- 3. Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

With GST

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- 1. Select Service \$04 with GST (Generic Scan Tool).

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- 1. Erase DTC in ECM. Refer to How to Erase Diagnostic Test Mode II (Self-diagnostic Results).
- If the battery is disconnected, the emission-related diagnostic information will be cleared within 24 hours.
- The following data are cleared when the ECM memory is erased.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating "INCMP", use the information in this Service Manual to set the SRT to "CMPLT".

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate "CMPLT" for each application system. Once set as "CMPLT", the SRT status remains "CMPLT" until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate "INCMP" for these items.

NOTE:

< SYSTEM DESCRIPTION >

The SRT will also indicate "INCMP" if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "INCMP" for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:

If MIL illuminates during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to "CMPLT".

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420, P0430
EVAP SYSTEM	2	EVAP control system purge flow monitoring	P0441
-	1	EVAP control system	P0442
	2	EVAP control system	P0456
HO2S	2	Air fuel ratio (A/F) sensor 1	P0133, P0153
		Heated oxygen sensor 2	P0137, P0157
		Heated oxygen sensor 2	P0138, P0158
		Heated oxygen sensor 2	P0139, P0159

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-III.

SRT Set Timing

SRT is set as "CMPLT" after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

		Example							
Self-diagnosis result		Diagnosis	Diagnosis $\leftarrow ON \rightarrow OFF \leftarrow ON \rightarrow OFF \rightarrow OFF$						
			$\leftarrow ON \rightarrow$	$OFF \leftarrow ON \rightarrow O$	$DFF \leftarrow ON \rightarrow OI$	$FF \leftarrow ON \rightarrow$			
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)			
		P0402	OK (1)	— (1)	— (1)	OK (2)			
		P1402	OK (1)	OK (2)	— (2)	— (2)			
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"			
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)			
		P0402	— (0)	— (0)	OK (1)	— (1)			
		P1402	OK (1)	OK (2)	— (2)	— (2)			
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"			
NG exists	Case 3	P0400	OK	ОК	_	—			
		P0402	—	—	_	—			
	P1402	NG	_	NG	NG (Consecutive NG)				
		(1st trip) DTC	1st trip DTC	_	1st trip DTC	DTC (= MIL ON)			
		SRT of EGR	"INCMP"	"INCMP"	"INCMP"	"CMPLT"			

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

-: Self-diagnosis is not carried out.

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< SYSTEM DESCRIPTION >

When all SRT related self-diagnoses show OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". \rightarrow Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses have at least one OK result. \rightarrow Case 2 above

If one or more SRT related self-diagnoses show NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". \rightarrow Case 3 above

The table above shows that the minimum number of cycles for setting SRT as "INCMP" is the number one (1) for each self-diagnosis (Case 1 & 2) or the number two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

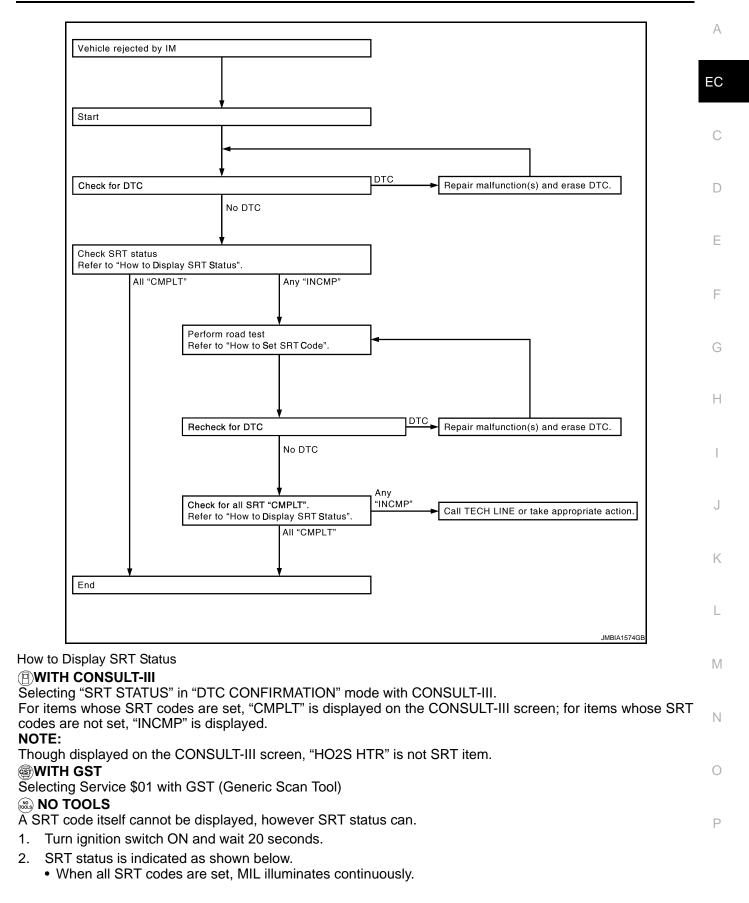
- The SRT will indicate "CMPLT" at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires "CMPLT" of the SRT only with OK self-diagnosis results.
- When, During SRT driving pattern, the 1st trip DTC (NG) is detected prior to "CMPLT" of SRT and the selfdiagnosis memory must be erased from the ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate "INCMP".
 NOTE:

SRT can be set as "CMPLT" together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates "CMPLT".

SRT Service Procedure

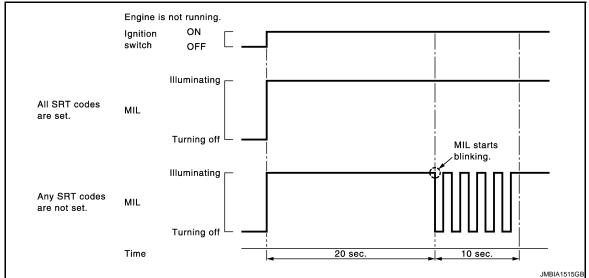
If a vehicle has failed the state emissions inspection due to one or more SRT items indicating "INCMP", review the flowchart diagnostic sequence on the next page.

< SYSTEM DESCRIPTION >



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• When any SRT codes are not set, MIL will blink periodically for 10 seconds.

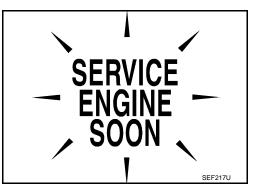


MALFUNCTION INDICATOR LAMP (MIL)

Description

The MIL is located on the combination meter.

- The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check. If the MIL does not illuminate, chekc MIL circuit. Refer to <u>EC-512</u>, "Component Function Check".
- 2. When the engine is started, the MIL should go off. If the MIL remains illuminating, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function

The on board diagnostic system has the following three functions.

< SYSTEM DESCRIPTION >

[VQ37VHR]

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function	А
Mode I	Ignition switch in ON position CON Engine stopped	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not illuminate, check MIL circuit.	EC C D
	Engine running	MALFUNCTION WARNING	 When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will illuminate to inform the driver that a malfunction has been detected. The following malfunctions will illuminate or blink the MIL in the 1st trip. Misfire (Possible three way catalyst damage) One trip detection diagnoses 	E
Mode II	Ignition switch in ON position CON Engine stopped	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.	G

Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to <u>EC-512, "Component Function Check"</u>.

Diagnostic Test Mode I — Malfunction Warning

MIL	Condition	Κ
ON	When the malfunction is detected.	
OFF	No malfunction.	L

This DTC number is clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

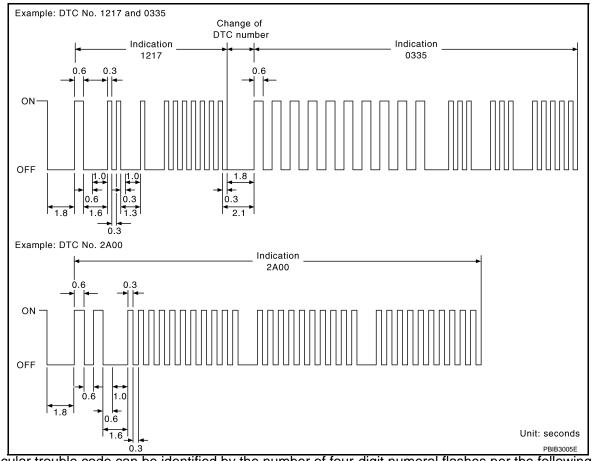
Diagnostic Test Mode II — Self-diagnostic Results

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These uniden

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tified codes can be identified by using the CONSULT-III or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes per the following.

Number	0	1	2	3	4	5	6	7	8	9	Α	В	С	D	E	F
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle. A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See <u>EC-564, "DTC Index"</u>)

How to Switch Diagnostic Test Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- ECM always returns to Diagnostic Test Mode I after the ignition switch is turned OFF. HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)
- 1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 2. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
- Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MIL starts blinking.
 - NOTE:

Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

EC-120

Diagnostic test mode II

(Self-diagnostic results)

starts

Approx. 10 sec

Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to "How to Set Diagnostic Test Mode II

More than

Erasing ECM memorv

Mode I

PBIB0092E

10 sec.

Mode II

Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.

Mode I

7 sec

Within

3 sec: 5 sec.

< SYSTEM DESCRIPTION >

NOTE:

Ignition

Accelerator

Diagnostic test mode

switch

pedal

1.

Fully release the accelerator pedal. 4.

Fully depressed

Fully

released

ON

OFF

ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



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HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

- (Self-diagnostic Results)". Fully depress the accelerator pedal and keep it depressed for more than 10 seconds. 2. The emission-related diagnostic information has been erased from the backup memory in the ECM. F 3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed. How to Erase Diagnostic Test Mode II (Self-diagnostic Results) The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)". If the battery is disconnected, the DTC will be cleared from the backup memory within 24 hours. Be careful not to erase the stored memory before starting trouble diagnoses. Н OBD SYSTEM OPERATION CHART Relationship Between MIL, 1st Trip DTC, DTC, and Detectable Items When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory. When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will illuminate. • The MIL will turn off after the vehicle is driven 3 times (driving pattern B) with no malfunction. A drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset. Κ The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern
 - C) without the same malfunction recurring. The "TIME" in "SELF-DIAGNOSTIC RESULTS" mode of CON-SULT-III will count the number of times the vehicle is driven.
 - The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

Summary Chart

Items	Fuel Injection System	Misfire	Other	
MIL (turns off)	3 (pattern B)	3 (pattern B)	3 (pattern B)	N
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)	
1st Trip DTC (clear)	1 (pattern C), * ¹	1 (pattern C), *1	1 (pattern B)	0
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)	

For details about patterns B and C under "Fuel Injection System" and "Misfire", see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

For details about patterns A and B under Other, see "EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM".

*1: Clear timing is at the moment OK is detected.

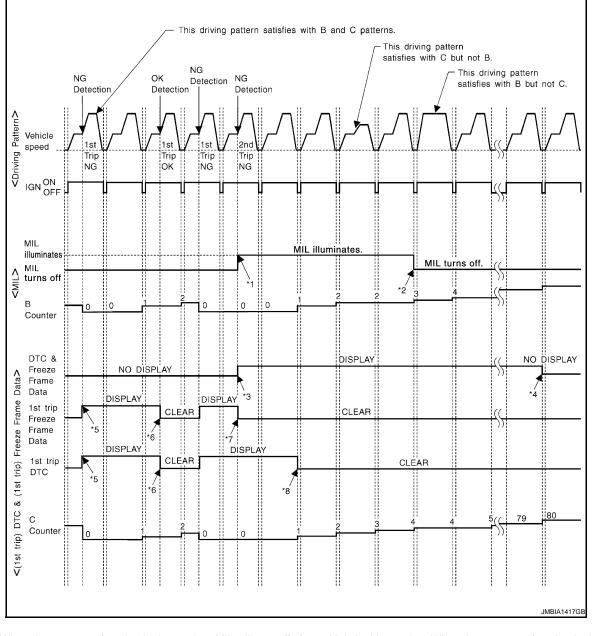
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns for "Misfire < Exhaust Quality Deterioration>",



< SYSTEM DESCRIPTION >

"Fuel Injection System"



- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

- *2: MIL will turn off after vehicle is driven 3 times (pattern B) without any malfunctions.
- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.
- *3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.
- *6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

Explanation for Driving Patterns for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System" <Driving Pattern B> Driving pattern B means the vehicle operation as per the following:

Revision: 2009 October

EC-122

2009 G37 Coupe

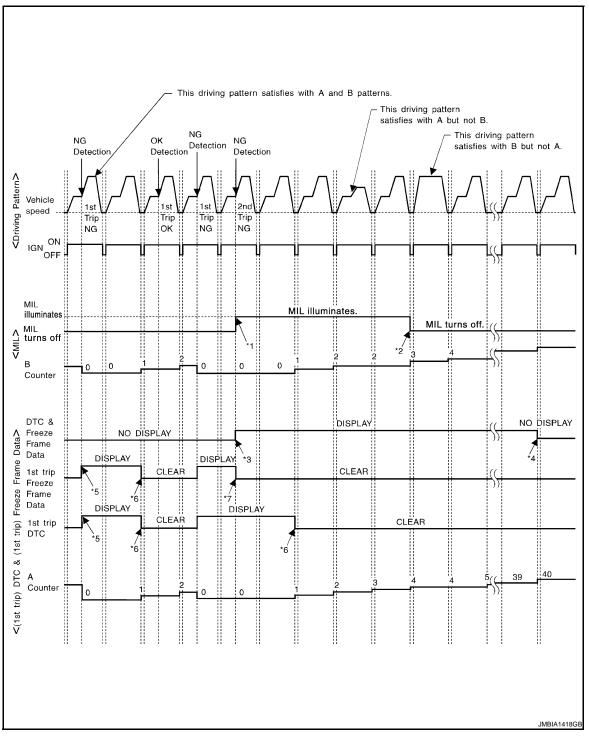
< SYSTEM DESCRIPTION >	[VQ37VHR]	
 All components and systems should be monitored at least once by the OBD system. The B counter will be cleared when the malfunction is detected once regardless of the driving The B counter will be counted up when driving pattern B is satisfied without any malfunction. The MIL will turn off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHAR 		А
<driving c="" pattern=""> Driving pattern C means operating vehicle as per the following:</driving>		EC
The following conditions should be satisfied at the same time:		
Engine speed: (Engine speed in the freeze frame data) ±375 rpm		
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%] Engine coolant temperature (T) condition:		С
 When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (15 When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than 70°C (158°F). Example: 		D
If the stored freeze frame data is as per the following:		
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F) To be satisfied with driving pattern C, the vehicle should run under the following conditions: Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: m		E
 (158°F) The C counter will be cleared when the malfunction is detected regardless of vehicle condition The C counter will be counted up when vehicle conditions above are satisfied without the sam 		F
 The DTC will not be displayed after C counter reaches 80. The 1st trip DTC will be cleared when C counter is counted once without the same malfunctio stored in ECM. 	n after DTC is	G
Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For "Misfire < Exhaust Qu tion>", "Fuel Injection System"	ality Deteriora-	Н
		I
		J
		К
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< SYSTEM DESCRIPTION >





- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *2: MIL will turn off after vehicle is driven *3: When the same malfunction is de-3 times (pattern B) without any malfunctions.
- tected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

< SYSTEM DESCRIPTION >

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction.
(The DTC and the freeze frame data still remain in ECM.)

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

- *5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.
- *6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

EC

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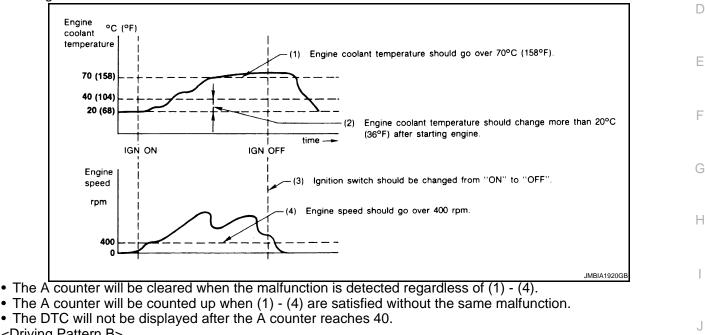
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Explanation for Driving Patterns Except for "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System" <Driving Pattern A>



<Driving Pattern B>

Driving pattern B means operating vehicle as per the following:

- All components and systems should be monitored at least once by the OBD system.
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will turn off when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).

CONSULT-III Function

FUNCTION

Diagnostic test mode	Function	
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the in- dications on the CONSULT-III unit.	Ν
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*	
Data monitor	Input/Output data in the ECM can be read.	C
CAN diagnostic support mon- itor	The results of transmit/receive diagnosis of CAN communication can be read.	_
Active test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.	ŀ
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.	
Function test	This mode is used to inform customers when their vehicle requires periodic maintenance.	
ECU part number	ECM part number can be read.	

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

• Diagnostic trouble codes

EC-125

2009 G37 Coupe

< SYSTEM DESCRIPTION >

- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

					DIAGNO	STIC TEST	MODE		
				AGNOSTIC SULTS	DATA		DTC 8 CONFIR		
	ltem		WORK SUPPORT	DTC*1	FREEZE FRAME DATA*2	DATA MONI- TOR	ACTIVE TEST	SRT STA- TUS	DTC WORK SUP- PORT
		Crankshaft position sensor (POS)		×	×	×			
		Camshaft position sensor (PHASE)		×	×	×			
		Mass air flow sensor		×		×			
		Engine coolant temperature sensor		×	×	×	×		
		Engine oil temperature sensor		×		×			
		Air fuel ratio (A/F) sensor 1		×		×		×	×
		Heated oxygen sensor 2		×		×		×	×
		Vehicle speed signal		×	×	×			
		Accelerator pedal position sensor		×		×			
		Throttle position sensor		×	×	×			
		Fuel tank temperature sensor		×		×	×		
RTS		EVAP control system pressure sensor		×		×			
A T		Intake air temperature sensor		×	×	×			
EN		Knock sensor		×					
NO		Refrigerant pressure sensor				×			
ENGINE CONTROL COMPONENT PARTS	INPUT	Closed throttle position switch (accel- erator pedal position sensor signal)				×			
ROL	≤	Air conditioner switch				×			
NT		Park/neutral position (PNP) signal		×		×			
ы С		Stop lamp switch		×		×			
UID.		Power steering pressure sensor		×		×			
Ž		Battery voltage				×			
		Load signal				×			
		Fuel level sensor		×		×			
		Battery current sensor		×		×			
		ICC steering switch		×		×			
		ASCD steering switch		×		×			
		ICC brake switch		×		×			
		ASCD brake switch		×		×			
		VVEL control shaft position sensor		×		×			
		Manifold absolute pressure (MAP) sensor		×					
		Brake booster pressure sensor		×					
-	1		1			1	l	I	

< SYSTEM DESCRIPTION >

[VQ37VHR]

				DIAGNO	STIC TEST	MODE			-
		WORK SUPPORT DTC*1 SUPPORT			DATA		DTC & SRT CONFIRMATION		A
	Item			MONI- TOR	ACTIVE TEST	SRT STA- TUS	DTC WORK SUP- PORT	EC	
	Fuel injector				×	×			С
	Power transistor (Ignition timing)				×	×			-
	Throttle control motor relay		×		×				-
ა	Throttle control motor		×						- D
r pari	EVAP canister purge volume control solenoid valve		×		×	×		×	
	Air conditioner relay				×				- L
PO	Fuel pump relay	×			×	×			-
PT N	Cooling fan control module		×		×	×			F
OL COM	Air fuel ratio (A/F) sensor 1 heater		×		×		×* ³		_
	Heated oxygen sensor 2 heater		×		×		×* ³		G
CO	EVAP canister vent control valve	×	×		×	×			
ENGINE CONTROL COMPONENT PARTS OUTPUT	Intake valve timing control solenoid valve		×		×	×			Н
۵ ۵	VVEL actuator motor relay		×						-
	VVEL actuator motor	×	×						-
	Alternator				×	×			-
	Calculated load value			×	×				-

 \times : Applicable

*1: This item includes 1st trip DTCs.

*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-III screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to <u>EC-112</u>, "<u>Diagnosis Description</u>".

*3: Always "CMPLT" is displayed.

WORK SUPPORT MODE

Work Item

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< SYSTEM DESCRIPTION >

[VQ37VHR]

WORK ITEM	CONDITION	USAGE
IDLE AIR VOL LEARN	THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
EVAP SYSTEM CLOSE	 CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. IGN SW ON ENGINE NOT RUNNING AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM FUEL TANK TEMP. IS MORE THAN 0°C (32°F). WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE" WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT- III WILL DISCONTINUE IT AND DISPLAY APPROPRI- ATE INSTRUCTION. NOTE: WHEN STARTING ENGINE, CONSULT-III MAY DIS- PLAY "BATTERY VOLTAGE IS LOW. CHARGE BAT- TERY", EVEN WHEN USING A CHARGED BATTERY. 	When detecting EVAP vapor leak in the EVAP system
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING "START" DUR- ING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEF- FICIENT.	When clearing mixture ratio self- learning value
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	IDLE CONDITION	When adjusting target ignition tim- ing
VIN REGISTRATION	• IN THIS MODE, VIN IS REGISTERED IN ECM.	When registering VIN in ECM
VVEL POS SEN ADJ PREP	 USE THIS ITEM ONLY WHEN REPLACING VVEL ACTU- ATOR SUB ASSEMBLY. IGNITION ON AND ENGINE STOPPED. 	When adjusting VVEL control shaft position sensor

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item Regarding items of DTC and 1st trip DTC, refer to <u>EC-564. "DTC Index"</u>.)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	 The engine control component part/control system has a trouble code that is displayed as PXXXX. (Refer to <u>EC-564, "DTC Index"</u>.)
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	"Long-term fuel trim" at the moment a malfunction is detected is displayed.
L-FUEL TRM-B2 [%]	 The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	"Short-term fuel trim" at the moment a malfunction is detected is displayed.
S-FUEL TRM-B2 [%]	• The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel sched- ule.

< SYSTEM DESCRIPTION >

[VQ37VHR]

Freeze frame data item*	Description	A
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed	
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed	EC
ABSOL TH-P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed	
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed	С
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed	
FUEL SYS-B1	• "Fuel injection system status" at the moment a malfunction is detected is displayed.	D
FUEL SYS-B2	 One of the following mode is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop 	E
INT MANI PRES [kPa]		F
COMBUST CONDI- TION	These items are displayed but are not applicable to this model.	I
*: The items are the sam	e as those of 1st trip freeze frame data.	G

DATA MONITOR MODE

Monitored Item

Monitored item	Unit	Description	Remarks	
ENG SPEED	rpm	 Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE). 	 Accuracy becomes poor if engine speed drops below the idle rpm. If the signal is interrupted while the engine is running, an abnormal value may be indicated. 	
MAS A/F SE-B1			• When the engine is stopped, a certain	
MAS A/F SE-B2	V	 The signal voltage of the mass air flow sensor is displayed. 	value is indicated.When engine is running, specification range is indicated in "SPEC".	
B/FUEL SCHDL	msec	"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running, specification range is indicated in "SPEC".	
A/F ALPHA-B1			• When the engine is stopped, a certain	
A/F ALPHA-B2	%	• The mean value of the air-fuel ratio feedback cor- rection factor per cycle is indicated.	 value is indicated. This data also includes the data for the air-fuel ratio learning control. When engine is running, specification range is indicated in "SPEC". 	
COOLAN TEMP/S	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.	
A/F SEN1 (B1)	V	• The A/F signal computed from the input signal of		
A/F SEN1 (B2)		the air fuel ratio (A/F) sensor 1 is displayed.		
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2		
HO2S2 (B2)	v	is displayed.		
HO2S2 MNTR (B1)		Display of heated oxygen sensor 2 signal:		
HO2S2 MNTR (B2)	RICH/LEAN	RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.	



< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
ACCEL SEN 1		• The accelerator pedal position sensor signal volt-	ACCEL SEN 2 signal is converted by COM internally. Thus, they differe
ACCEL SEN 2	V	age is displayed.	ECM internally. Thus, they differs from ECM terminal voltage signal.
TP SEN 1-B1	V	The throttle position sensor signal voltage is dis-	• TP SEN 2-B1 signal is converted by ECM internally. Thus, they differs
TP SEN 2-B1	V	played.	from ECM terminal voltage signal.
FUEL T/TMP SE	°C or °F	• The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES	V	The signal voltage of EVAP control system pres- sure sensor is displayed.	
FUEL LEVEL SE	V	• The signal voltage of the fuel level sensor is displayed.	
START SIGNAL	ON/OFF	 Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage. 	 After starting the engine, [OFF] is dis- played regardless of the starter sig- nal.
CLSD THL POS	ON/OFF	 Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal. 	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air condition- er switch as determined by the air conditioner sig- nal.	
P/N POSI SW	ON/OFF	 Indicates [ON/OFF] condition from the park/neu- tral position (PNP) signal. 	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL	ON/OFF	 Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and light- ing switch are OFF. 	
IGNITION SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	Indicates [ON/OFF] condition from the heater fan switch signal.	
BOOST VCUM SW	ON/OFF	 Always a certain value is displayed. This item is not efficient for CV36 models.	
BRAKE SW	ON/OFF	 Indicates [ON/OFF] condition from the stop lamp switch signal. 	
INJ PULSE-B1		Indicates the actual fuel injection pulse width	• When the engine is stopped, a certain
INJ PULSE-B2	msec	compensated by ECM according to the input sig- nals.	computed value is indicated.
IGN TIMING	BTDC	 Indicates the ignition timing computed by ECM according to the input signals. 	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	"Calculated load value" indicates the value of the current air flow divided by peak air flow.	

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
MASS AIRFLOW	g∙m/s	 Indicates the mass air flow computed by ECM ac- cording to the signal voltage of the mass air flow sensor. 	
PURG VOL C/V	%	 Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. The opening becomes larger as the value increases. 	
INT/V TIM (B1)	°CA	Indicates [°CA] of intake camshaft advance an-	
INT/V TIM (B2)		gle.	
INT/V SOL (B1)	%	 The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 	
TP SEN 1-B2		The throttle position sensor signal voltage is dis-	• TP SEN 2-B2 signal is converted by
TP SEN 2-B2	V	played.	ECM internally. Thus, they differs from ECM terminal voltage signal.
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (deter- mined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	 Indicates the fuel pump relay control condition determined by ECM according to the input sig- nals. 	
VENT CONT/V	ON/OFF	 The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open 	
THRTL RELAY	ON/OFF	 Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. 	
HO2S2 HTR (B1)		Indicates [ON/OFF] condition of heated oxygen	
HO2S2 HTR (B2)	ON/OFF	sensor 2 heater determined by ECM according to the input signals.	
I/P PULLY SPD	rpm	Indicates the engine speed computed from the in- put speed sensor signal.	
VEHICLE SPEED	km/h or mph	 The vehicle speed computed from the vehicle speed signal sent from TCM is displayed. 	
IDL A/V LEARN	YET/CMPLT	Displays the condition of Idle Air Volume Learn- ing YET: Idle air volume learning has not been per- formed yet. CMPLT: Idle air volume learning has already been performed successfully.	
SNOW MODE SW	ON/OFF	Indicates [ON/OFF] condition from snow mode switch signal.	
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.	
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	
A/F S1 HTR (B1)		 Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals 	
A/F S1 HTR (B2)	%	computed by ECM according to the input signals.The current flow to the heater becomes larger as the value increases.	
AC PRESS SEN	V	 The signal voltage from the refrigerant pressure sensor is displayed. 	

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
MAIN SW	ON/OFF	 Indicates [ON/OFF] condition from MAIN switch signal. 	
CANCEL SW	ON/OFF	 Indicates [ON/OFF] condition from CANCEL switch signal. 	
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from RESUME/AC- CELERATE switch signal.	
SET SW	ON/OFF	 Indicates [ON/OFF] condition from SET/COAST switch signal. 	
BRAKE SW1	ON/OFF	 Indicates [ON/OFF] condition from ASCD brake switch signal. 	
BRAKE SW2	ON/OFF	 Indicates [ON/OFF] condition of stop lamp switch signal. 	
DIST SW	ON/OFF	 Indicates [ON/OFF] condition from DISTANCE switch signal. 	
CRUISE LAMP	ON/OFF	 Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals. 	
BAT CUR SEN	mV	 The signal voltage of battery current sensor is displayed. 	
ALT DUTY SIG	ON/OFF	 The control condition of the power generation voltage variable control (determined by ECM ac- cording to the input signals) is indicated. ON: Power generation voltage variable control is active. OFF: Power generation voltage variable control is inactive. 	
A/F ADJ-B1 A/F ADJ-B2		• Indicates the correction of factor stored in ECM. The factor is calculated from the difference be- tween the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 sig- nal.	
FAN DUTY	%	 Indicates a command value for cooling fan. The value is calculated by ECM based on input sig- nals. 	
AC EVA TEMP	°C or °F	 Indicates A/C evaporator temperature sent from "unified meter and A/C amp.". 	
AC EVA TARGET	°C or °F	 Indicates target A/C evaporator temperature sent from "unified meter and A/C amp.". 	
ALTDUTY	%	 Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal. 	
ATOM PRES SEN	mV	Always a certain value is displayed.This item is not efficient for CV36 models.	
BRAKE BST PRES SE	mV	Always a certain value is displayed.This item is not efficient for CV36 models.	
VVEL SEN LEARN- B1 VVEL SEN LEARN- B2	V	Indicates the VVEL learning value.	

< SYSTEM DESCRIPTION >

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Monitored item	Unit	Description	Remarks	٥
VVEL POSITION SEN-B1	- V	The VVEL control shaft position sensor signal		A
VVEL POSITION SEN-B2		voltage is displayed.		EC
VVEL TIM-B1	deg	Indicates [deg] of VVEL control shaft angle.		
VVEL TIM-B2	deg			С
VVEL LEARN	YET/DONE	 Display the condition of VVEL learning YET: VVEL learning has not been performed yet. DONE: VVEL learning has already been per- formed successfully. 		D

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)		
VENT CON- TROL/V	 Ignition switch: ON (Engine stopped) Turn solenoid valve ON and OFF with the CONSULT-III and listen to operating sound. 	Solenoid valve makes an operating sound.	Harness and connectorsSolenoid valve		
ENG COOLANT TEMP	 Engine: Return to the original trouble condition Change the engine coolant tem- perature using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Engine coolant temperature sensor Fuel injector 		
FUEL INJEC- TION	 Engine: Return to the original trouble condition Change the amount of fuel injec- tion using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	 Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1 		
FUEL/T TEMP SEN	Change the fuel tank temperature using CONSULT-III.				
PURG VOL CONT/V	 Engine: After warming up, run engine at 1,500 rpm. Change the EVAP canister purge volume control solenoid valve opening percent using CON-SULT-III. 	Engine speed changes according to the opening percent.	Harness and connectorsSolenoid valve		
FUEL PUMP RE- LAY	 Ignition switch: ON (Engine stopped) Turn the fuel pump relay ON and OFF using CONSULT-III and listen to operating sound. 	Fuel pump relay makes the operat- ing sound.	Harness and connectorsFuel pump relay		
IGNITION TIM- ING	 Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT-III. 	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.		
FAN DUTY CON- TROL*	 Ignition switch: ON Change duty ratio using CON- SULT-III. 	Cooling fan speed changes.	 Harness and connectors Cooling fan motor Cooling fan relay Cooling fan control module IPDM E/R 		

< SYSTEM DESCRIPTION >

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
ALTERNATOR DUTY	Engine: Idle Change duty ratio using CON- SULT-III.	Battery voltage changes.	Harness and connectorsIPDM E/RAlternator
POWER BAL- ANCE	 Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N (A/T), Neutral (M/T) Cut off each injector signal one at a time using CONSULT-III. 	Engine runs rough or dies.	 Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-112, "Diagnosis Description".

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
	EVP SML LEAK P0442/P1442*	P0442	<u>EC-291</u>
	EVP SML LEAR P0442/P1442	P0455	<u>EC-327</u>
EVAPORATIVE SYSTEM	EVP V/S LEAK P0456/P1456*	P0456	EC-333
	PURG VOL CN/V P1444	P0443	<u>EC-297</u>
	PURG FLOW P0441	P0441	<u>EC-286</u>
	A/F SEN1 (B1) P1278/P1279	P0133	<u>EC-215</u>
A/F SEN1	A/F SEN1 (B1) P1276	P0130	<u>EC-205</u>
A/F SENT	A/F SEN1 (B2) P1288/P1289	P0153	<u>EC-215</u>
	A/F SEN1 (B2) P1286	P0150	<u>EC-205</u>
	HO2S2 (B1) P1146	P0138	<u>EC-226</u>
	HO2S2 (B1) P1147	P0137	<u>EC-220</u>
HO2S2	HO2S2 (B1) P0139	P0139	<u>EC-234</u>
NU232	HO2S2 (B2) P1166	P0158	<u>EC-226</u>
	HO2S2 (B2) P1167	P0157	<u>EC-220</u>
	HO2S2 (B2) P0159	P0159	<u>EC-234</u>

*: DTC P1442 and P1456 does not apply to CV36 models but appears in DTC Work Support Mode screens.

Diagnosis Tool Function

INFOID:000000004250654

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has several functions explained below.

ISO15765-4 is used as the protocol.

The name GST or Generic Scan Tool is used in this service manual.



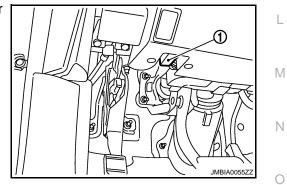
< SYSTEM DESCRIPTION >

FUNCTION

Diagnostic Service		Function	
Service \$01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including an- alog inputs and outputs, digital inputs and outputs, and system status information.	EC
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-564, "DTC Index".	
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.	С
Service \$04	CLEAR DIAG INFO	 This diagnostic service can clear all emission-related diagnostic information. This includes: Clear number of diagnostic trouble codes (Service \$01) Clear diagnostic trouble codes (Service \$03) Clear trouble code for freeze frame data (Service \$01) Clear freeze frame data (Service \$02) 	D
		 Reset status of system monitoring test (Service \$01) Clear on board monitoring test results (Service \$06 and \$07) 	
Service \$06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.	F
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission- related powertrain components/systems that are continuously monitored during normal driving conditions.	G
Service \$08	_	 This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. Low ambient temperature Low battery voltage Engine running Ignition switch OFF Low fuel temperature Too much pressure is applied to EVAP system 	H
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle infor- mation such as Vehicle Identification Number (VIN) and Calibration IDs.	

INSPECTION PROCEDURE

- 1. Turn ignition switch OFF.
- 2. Connect "GST" to data link connector (1), which is located under LH dash panel near the hood opener handle.



А

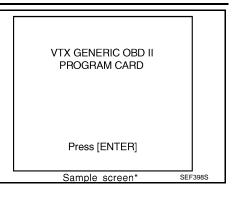
Κ

Ρ

< SYSTEM DESCRIPTION >

[VQ37VHR]

- 3. Turn ignition switch ON.
- Enter the program according to instruction on the screen or in the operation manual. (*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.

OBD II FUNCTIONS	
FO: DATA LIST	
F1: FREEZE DATA F2: DTCs	
F3: SNAPSHOT	
F4: CLEAR DIAG INFO	
F6: READINESS TESTS	
F7: ON BOARD TESTS	
F8: EXPAND DIAG PROT	
F9: UNIT CONVERSION	
Sample screen* SEF	416S

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS **TROUBLE DIAGNOSIS - SPECIFICATION VALUE**

Description

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" in "DATA MONI-TOR" mode of CONSULT-III during normal operation of the Engine Control System. When the value in "SPEC" in "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the С value in "SPEC" in "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one or more malfunctions. The SP value is used to detect malfunctions that may affect the Engine Control System, but will not illuminate D the MIL. The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correc-Ε tion)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1/B2 (The signal voltage of the mass air flow sensor)

Component Function Check

1.preconditioning	G
Make sure that all of the following conditions are satisfied. TESTING CONDITION	0
Vehicle driven distance: More than 5,000 km (3,107 miles)	
 Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm², 14.25 - 15.12 psi) 	Η
 Atmospheric temperature: 20 - 30°C (68 - 86°F) Engine coolant temperature: 75 - 95°C (167 - 203°F) 	
• Transmission: Warmed-up	I
 For A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP 1" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F). 	
- For M/T models: After the engine is warmed up to normal operating temperature, drive for 5 minutes.	J
 Electrical load: Not applied Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead. 	
• Engine speed: Idle	Κ
>> GO TO 2.	L
2.PERFORM SPEC IN DATA MONITOR MODE	
NOTE: Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.	Μ
 Perform <u>EC-13, "BASIC INSPECTION : Special Repair Requirement"</u>. 	
 Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2", "MAS A/F SE-B1" and "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode with CONSULT-III. 	Ν
3. Make sure that monitor items are within the SP value.	
Is the measurement value within the SP value?	
YES >> INSPECTION END	0
NO >> Go to EC-138, "Diagnosis Procedure".	
	Ρ

[VQ37VHR]

INFOID:000000004250655

INEOID:000000004250656

А

EC

F

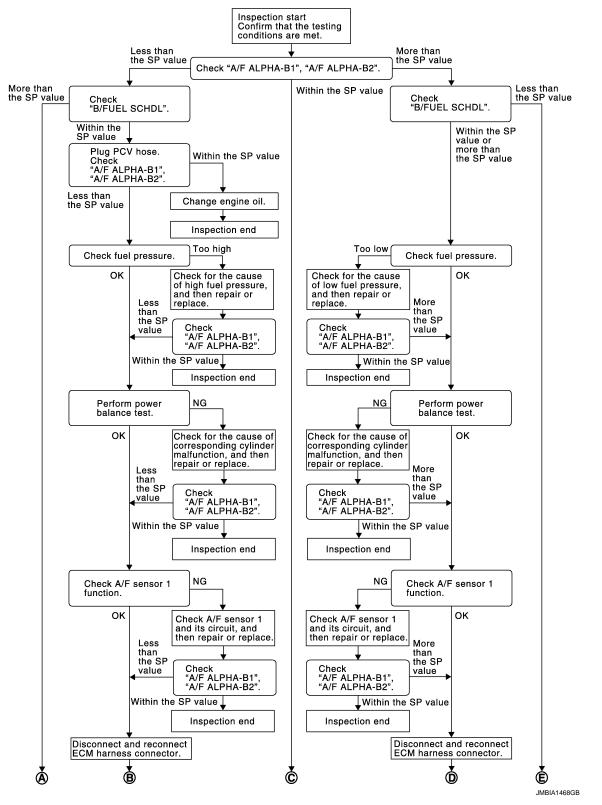
< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000004250657

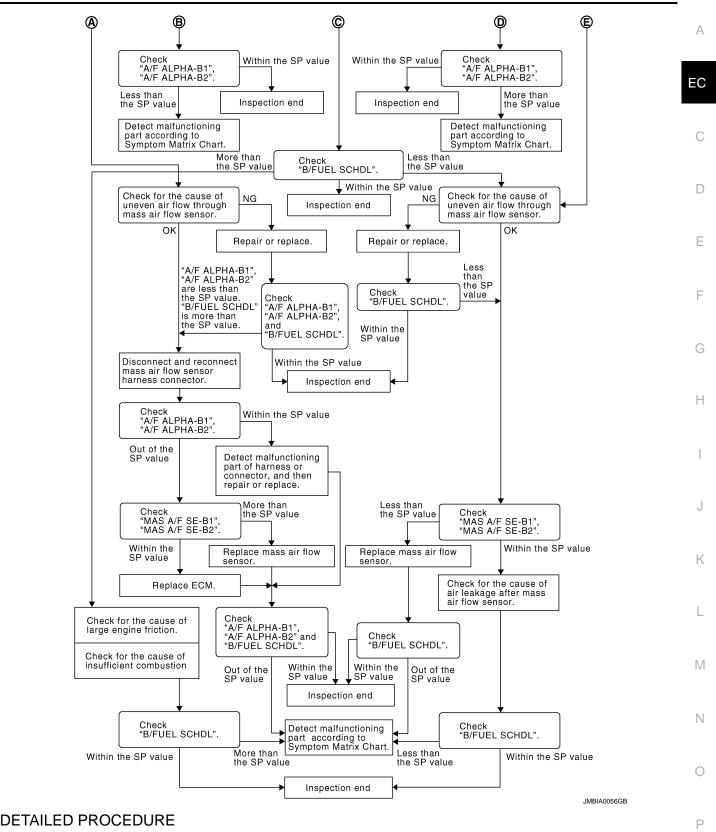
[VQ37VHR]

OVERALL SEQUENCE



< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]



1.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

With CONSULT-III

- 1. Start engine.
- Confirm that the testing conditions are met. Refer to <u>EC-137, "Component Function Check"</u>.
- 3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NOTE:

Check "A/F ALPHA-B1", "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

- YES >> GO TO 17.
- NO-1 >> Less than the SP value: GO TO 2.
- NO-2 >> More than the SP value: GO TO 3.

2.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.

NO >> More than the SP value: GO TO 19.

3.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 6.

NO-1 >> More than the SP value: GO TO 6.

NO-2 >> Less than the SP value: GO TO 25.

4.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

- 1. Stop the engine.
- 2. Disconnect PCV hose, and then plug it.
- 3. Start engine.
- 4. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.

NO >> GO TO 6.

5.CHANGE ENGINE OIL

- 1. Stop the engine.
- 2. Change engine oil.

NOTE:

This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving conditions.

>> INSPECTION END

6.CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-614, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> Fuel pressure is too high: Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO-2 >> Fuel pressure is too low: GO TO 7.

I.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly" and then GO TO 8.

NO >> Repair or replace and then GO TO 8.

8.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
 Start engine. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and each indication is within the SP value. 	d make sure that
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> GO TO 9.	E
9. PERFORM POWER BALANCE TEST	
 Perform "POWER BALANCE" in "ACTIVE TEST" mode. Make sure that the each cylinder produces a momentary engine speed drop. 	(
Is the inspection result normal?	[
YES >> GO TO 12. NO >> GO TO 10.	
10. DETECT MALFUNCTIONING PART	E
Check the following bellow.	
 Ignition coil and its circuit (Refer to <u>EC-507. "Component Function Check"</u>.) Fuel injector and its circuit (Refer to <u>EC-496, "Component Function Check"</u>.) 	F
 Intake air leakage Low comprosion processor (Refer to EM 22, "Increation") 	1
 Low compression pressure (Refer to <u>EM-23, "Inspection"</u>.) Is the inspection result normal? 	
YES >> Replace fuel injector and then GO TO 11.	(
NO >> Repair or replace malfunctioning part and then GO TO 11.	
11.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	ŀ
 Start engine. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and each indication is within the SP value. 	d make sure that
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> GO TO 12.	
12. CHECK A/F SENSOR 1 FUNCTION	
Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.	
 For DTC P0130, P0150, refer to <u>EC-205, "DTC Logic"</u>. For DTC P0131, P0151, refer to <u>EC-209, "DTC Logic"</u>. 	ŀ
 For DTC P0132, P0152, refer to EC-212, "DTC Logic". 	
 For DTC P0133, P0153, refer to <u>EC-215, "DTC Logic"</u>. For DTC P2A00, P2A03, refer to <u>EC-480, "DTC Logic"</u>. 	l
<u>Are any DTCs detected?</u>	
YES >> GO TO 13.	Ν
NO >> GO TO 15. 13 OUTO 14 OUTO 14 OUTO 14	
13.CHECK A/F SENSOR 1 CIRCUIT	
Perform Diagnosis Procedure according to corresponding DTC.	
>> GO TO 14.	(
14. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	
 Start engine. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and each indication is within the SP value. 	d make sure that
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> GO TO 15.	
15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR	
1. Stop the engine.	

< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.

2. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to <u>EC-602. "Symptom Table"</u>.

17.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO-1 >> More than the SP value: GO TO 18.

NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

- 1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
- 2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19.CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- · Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 21.

NO >> Repair or replace malfunctioning part, and then GO TO 20.

20.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> "B/FUEL SCHDL" is more, "A/F ALPHA-B1", "A/F ALPHA-B2" are less than the SP value: GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]
22. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	
 Start engine. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and ma each indication is within the SP value. 	ke sure that
Is the measurement value within the SP value?	
 YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to <u>EC-1</u> <u>sis Procedure</u>". Then GO TO 29. NO >> GO TO 23. 	<u>77, "Diagno-</u>
23. CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"	
Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode, and make s indication is within the SP value.	sure that the
Is the measurement value within the SP value?	
YES >> GO TO 24. NO >> More than the SP value: Replace malfunctioning mass air flow sensor, and then GO ⁻ 24. REPLACE ECM	FO 29.
 Replace ECM. Go to <u>EC-16, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Sp</u> <u>Requirement"</u>. 	ecial Repair
>> GO TO 29.	
25. CHECK INTAKE SYSTEM	
 Check for the cause of uneven air flow through mass air flow sensor. Refer to the following. Crushed air ducts Malfunctioning seal in air cleaner element Uneven dirt in air cleaner element Improper specification in intake air system 	
Is the inspection result normal?	
YES >> GO TO 27. NO >> Repair or replace malfunctioning part, and then GO TO 26. 26. CHECK "B/FUEL SCHDL"	
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication SP value.	is within the
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> Less than the SP value: GO TO 27.	
27.CHECK "MAS A/F SE-B1", "MAS A/F SE-B2"	
Select "MAS A/F SE-B1", "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode, and make su indication is within the SP value.	re that each
Is the measurement value within the SP value?	
YES >> GO TO 28. NO >> Less than the SP value: Replace malfunctioning mass air flow sensor, and then GO T 28.CHECK INTAKE SYSTEM	⁻ O 30.
 Check for the cause of air leak after the mass air flow sensor. Refer to the following. Disconnection, looseness, and cracks in air duct Looseness of oil filler cap Disconnection of oil level gauge Open stuck, breakage, hose disconnection, or cracks in PCV valve 	
 Disconnection or cracks in EVAP purge hose, stuck open EVAP canister purge volume control 	trol solenoid

- Malfunctioning seal in rocker cover gasket
- Disconnection, looseness, or cracks in hoses, such as a vacuum hose, connecting to intake air system parts

< DTC/CIRCUIT DIAGNOSIS >

• Malfunctioning seal in intake air system, etc.

>> GO TO 30.

29.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to <u>EC-602, "Symptom Table"</u>.

30.CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

- YES >> INSPECTION END
- NO >> Detect malfunctioning part according to <u>EC-602, "Symptom Table"</u>.

< DTC/CIR(CUIT DIAG		R SUPP	PLY AN	ID GROUND CIRCUIT	[VQ37VHR]	
POWER	SUPPL	YAND	GROUN	ND CIF	RCUIT		٨
Diagnosis	Proced	ure				INFOID:000000004460708	A
1.снеско	GROUND (CONNECTI	NC				EC
	nition switch		Defer to	Cround	nonaction in CL 44. "Circuit Inspection"		
2. Check of Is the inspect			. Relei lu	Giouna i	nspection in <u>GI-44, "Circuit Inspection"</u> .		С
	GO TO 2.	anlago grou		tion			
NO >> 2.CHECK	-	eplace grou			SHORT-I		D
1. Disconr	ect ECM h	arness coni	nector.		ector and ground.		E
. <u> </u>	ECM						
Connector	Termina	Grou al	und C	ontinuity			F
F101	8						
	123						G
M107	124	Grou	ind I	Existed			
	127 128						Н
<u>Is the inspec</u> YES >>	<u>ction result</u> GO TO 4. GO TO 3.						
	onnectors l or open or s	short betwee	en ECM ar	-			J
			•		arness or connectors.		L
2. Turn igr	nition switch			s connec	tor and ground.		Μ
	EC	CM		-			N
+		Connector	- Terminal	Volt	age		IN
Connector F102	Terminal 53	Connector M107	Terminal 128	Batterv	voltage		
Is the inspec		-	-				0
YES >>	GO TO 6. GO TO 5.		DART				Ρ
Check the fo	ollowing.						

- Harness connectors E3, F1
 IPDM E/R harness connector E7
- 10 A fuse (No. 44)
- Harness for open or short between ECM and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

6.CHECK ECM POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Check the voltage between ECM harness connector terminals as follows.

ECM			_		
Connector	+	-	Voltage		
Connector	Terminal	Terminal	-		
M107	125	128	After turning ignition switch OFF, battery volt- age will exist for a few seconds, then dropto approximately 0 V.		

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 9.

7.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON.

2. Check the voltage between IPDM E/R harness connector and ground.

IPDN	I E/R	Ground	Voltage	
Connector	Terminal	Oround	voltage	
E7	53	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace IPDM E/R.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-44, "Circuit Inspection".

>> INSPECTION END

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Check the voltage between ECM harness connector terminals as follows.

	+	-		Voltage
Connector	Terminal	Connector	Terminal	
F101	24	M107	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 10.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.

2. Disconnect IPDM E/R harness connector.

3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDI	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F101	24	E7	69	Existed

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCL				ID GROUI		[VQ37VHR]	
4. Also check			nd and short	to power			
Is the inspection		0		to porton			А
	O TO 12.						
	O TO 11.						
11.DETECT	MALFUNCT	IONING PART	Г				EC
Check the follo		0 54					
 Harness or c Harness con 							С
Harness for			M and IPDM	E/R			
>> R(anair onan ci	rcuit short to	around or she	ort to power in	n harness or connectors.		D
12.снеск 1			ground of she		rhamess of connectors.		
1. Disconnec	ct 15 A fuse (No. 50) from I	PDM E/R.				Е
2. Check 15	A fuse.						
Is the inspection		<u>mal?</u>					_
	O TO 15. eplace 15 A f	IISA					F
13.снеск в							
		ess connector.					G
		harness connector.					
3. Check the	continuity be	etween ECM ł	narness conn	ector and IPE	OM E/R harness connector.		Н
					-		
EC		IPDN Connector		Continuity			
Connector M107	Terminal 125	Connector E7	Terminal 49	Existed	-		
_	-	r short to grou			-		
Is the inspection			nu anu short	to power.			J
	0 TO 15.	<u></u>					
	O TO 14.						
14.DETECT	MALFUNCT	IONING PAR	Т				K
Check the follo	owing.						
Harness or c							L
 Harness for 	open or snor	t between EC	M and IPDM	E/R			
>> Re	epair open ci	rcuit_short to	around or sha	ort to power in	n harness or connectors.		D. 4
15.снеск і							Μ
Refer to GI-41							
Is the inspection							Ν
	eplace IPDM		, .				
NO >> Re	epair open ci	rcuit, short to	ground or sho	ort to power in	n harness or connectors.		0

U0101 CAN COMM CIRCUIT

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000004609927

INFOID:000000004609928

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0101	Lost communication with TCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) with TCM for 2 seconds or more.	 CAN communication line between TCM and ECM (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.

2. Check DTC.

Is DTC detected?

- YES >> EC-148, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-18. "Trouble Diagnosis Flow Chart".

U0113, U1003 CAN COMM CIRCUIT

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. ECM and VVEL control module are connected with two communication lines (CAN H line and CAN L line) and transmit/ receive data. ECM shares information and links with the VVEL control module during operation.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC U0113 or U1003 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-367</u>, "<u>DTC Logic</u>".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
U0113	Lost communication with VVEL control	CAN communication signal of OBD (emission related diagnosis) is not re- ceived VVEL control module and ECM for 2 seconds or more.	 Harness or connectors (VVEL CAN communication line is 	F
U1003	module	CAN communication signal other than OBD (emission related diagnosis) is not received between VVEL control module and ECM for 2 seconds or more.	open or shorted) ECM VVEL control module 	G

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 3 seconds.
- 2. Check DTC.
- Is DTC detected?
- YES >> Go to EC-149, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1. CHECK VVEL CAN COMMUNICATION CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect VVEL control module harness connector.
- 4. Check the continuity between ECM harness connector and VVEL control module harness connector.

E	CM	VVEL con	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F102	54	E15	24	Existed
1 102	55		11	LAISIEU

5. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 3.

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U0113, U1003 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

Harness connector E3, F1

• Harness for open or short between ECM and VVEL control module

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace.

4.REPLACE VVEL CONTROL MODULE

- 1. Replace VVEL control module.
- 2. Go to EC-17. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Erase DTC.
- 4. Perform DTC Confirmation Procedure. See <u>EC-149, "DTC Logic"</u>.
- 5. Check DTC.
- Is the DTC U0113 or U1003 displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-16, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> INSPECTION END

U0164 CAN COMM CIRCUIT

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle mul-EC tiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
U0164	Lost communication with Unified meter and A/C amp.	When ECM is not transmitting or receiving CAN com- munication signal of OBD (emission related diagno- sis) with Unified meter and A/C amp. for 2 seconds or more.	 CAN communication line between Unified meter and A/C amp. and ECM (CAN communication line is open o shorted) 	
DTC CON	FIRMATION PROC	EDURE		
1.PERFO	RM DTC CONFIRMAT	TION PROCEDURE		
		wait at least 3 seconds.		
2. Check				
<u>Is DTC det</u> YES >>	• <u>EC-151, "Diagnosis</u>	Procedure".		
	INSPECTION END	<u></u>		
Diagnosi	s Procedure		INFOID:00000004609931	
Go to <u>LAN-</u>	18, "Trouble Diagnosi	is Flow Chart".		

Revision: 2009 October

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U1001 CAN COMM CIRCUIT

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:000000004250663

INFOID:000000004250664

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001	CAN communication line	When ECM is not transmitting or receiving CAN com- munication signal other than OBD (emission related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 3 seconds.
- 2. Check DTC.

Is DTC detected?

- YES >> EC-152, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-18, "Trouble Diagnosis Flow Chart".

U1024 CAN COMM CIRCUIT

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. ECM and VVEL control module are connected with two communication lines (CAN H line and CAN L line) and transmit/ receive data. ECM shares information and links with the VVEL control module during operation.

DTC Logic

DTC DETECTION LOGIC NOTE:

If DTC U1024 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-367, "DTC Logic".

DTC No.	Trouble	e diagnosis nam	е	DTC detecting condition		Possible cause
U1024	VVEL CAN co	ommunication	t s • \ t	When VVEL control module of ransmit/receive can commun signal from ECM. When detecting error during to ial diagnosis of CAN controll /VEL control module.	eation he ini- ar of Harnes (CAN of shorte • ECM	ss or connectors communication line is open or d) control module
DTC CONF	IRMATION	I PROCEDI	JRE			
1.PRECON	DITIONING	ì				
Before perf	GO TO 2.	following p		confirm that battery ve	oltage is more	e than 10 V at idle.
2. Check I Is DTC dete YES >>	DTC. <u>cted?</u>	ON and wait				
	s Procedu					INFOID:000000004250673
1.снеск	VVEL CAN (COMMUNIC	TION CIR	CUIT		
1. Turn igr	nition switch	OFF.				
 Disconr Disconr 	nect ECM ha nect VVEL co	rness conne	harness c	onnector. s connector and VVEL o	ontrol module	harness connector.
E	СМ	VVEL cont	rol module	Continuity		
Connector	Terminal	Connector	Terminal	- Continuity		
F102	54	E15	24	Existed		
1102	55	210	11	EXISTOR		
5. Also ch	eck harness	for short to g	round and	power.		
s the inspe	ction result n	ormal?				
	GO TO 3. GO TO 2.					

2. DETECT MALFUNCTIONING PART

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U1024 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

Check the following.

- Harness connector E3, F1
- Harness for open or short between ECM and VVEL control module

>> Harness for open or short between ECM and VVEL control module

3.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace.

4.REPLACE VVEL CONTROL MODULE

- 1. Replace VVEL control module.
- 2. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Reconnect all harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Erase DTC.
- 4. Perform DTC Confirmation Procedure. See <u>EC-153, "DTC Logic"</u>.

Is the DTC U1024 displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.REPLACE ECM

1. Replace ECM.

2. Go to EC-16, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0011, P0021 IVT CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0011 or P0021 is displayed with DTC P0075 or P0081, first perform the trouble diagnosis for DTC P0075, P0081. Refer to <u>EC-165, "DTC Logic"</u>.
- If DTC P0011 or P0021 is displayed with DTC P0524, first perform the trouble diagnosis for DTC P0524. Refer to <u>EC-352, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause	D
P0011	Intake valve timing control performance (bank 1)		 Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve 	Ε
P0021	Intake valve timing control performance (bank 2)	There is a gap between angle of target and phase-control angle degree.	 Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for intake valve timing control 	F

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure H before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	100 - 120 km/h (63 - 75 mph)
ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 7.3 msec
Selector lever	D position (A/T) 5th position (M/T)

CAUTION:

Always drive at a safe speed.

4. Stop vehicle with engine running and let engine idle for 10 seconds.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-156. "Diagnosis Procedure"

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

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< DTC/CIRCUIT DIAGNOSIS >

- 1. Select "DATA MONITOR" mode with CONSULT-III.
- 2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:

- Always drive at a safe speed.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-156. "Diagnosis Procedure"</u> NO >> INSPECTION END

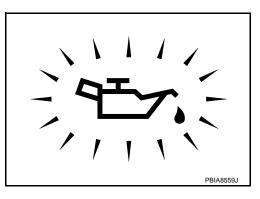
Diagnosis Procedure

1.CHECK OIL PRESSURE WARNING LAMP

- 1. Start engine.
- Check oil pressure warning lamp and confirm it is not illuminated.

Is oil pressure warning lamp illuminated?

- YES >> Go to LU-6, "Inspection".
- NO >> GO TO 2.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-157, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace malfunctioning intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-276, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-280, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning camshaft position sensor (PHASE).

5.CHECK CAMSHAFT (INTAKE)

Check the following.

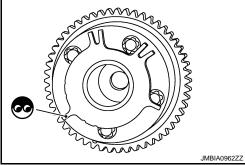
< DTC/CIRCUIT DIAGNOSIS >

- · Accumulation of debris on the signal plate of camshaft front end
- Chipping signal plate of camshaft front end

Is the inspection result normal?

YES	>> GO TO 6.
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NO >> Remove debris and clean the signal plate of camshaft front end or replace camshaft.



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6. CHECK TIMING CHAIN INSTALLATION

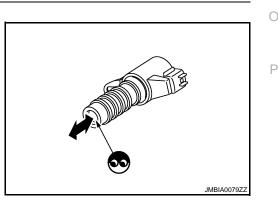
D. CHECK TIMING CHAIN INSTALLATION					
Check service records for any recent repairs that may cause timing chain misaligned.					
Are there any service records that may cause timing chain misaligned?					
	t timing chain installation. Refer to <u>EM-51, "Removal ar</u>	nd Installation".			
NO >> GO TO	-	_			
1. CHECK LUBRI		F			
•	n of Camshaft Sprocket (INT) Oil Groove". Refer to <u>EN</u>	I-104, "Inspection".			
Is the inspection re		G			
YES >> GO TO NO >> Clean	D 8. Iubrication line.				
~	MITTENT INCIDENT				
		Н			
Refer to <u>GI-41, "In</u>	termittent Incident".				
	ECTION END	I			
Component Inspection					
Component Ins	spection	INF0ID:000000004250676			
	Spection E VALVE TIMING CONTROL SOLENOID VALVE-I	INFOID:00000004250676			
1. CHECK INTAKI	· E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF.	J			
1. CHECK INTAKI 1. Turn ignition s 2. Disconnect int	E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF. ake valve timing control solenoid valve harness conne	J ctor. K			
1. CHECK INTAKI 1. Turn ignition s 2. Disconnect int	· E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF.	J ctor. K			
1. CHECK INTAKI 1. Turn ignition s 2. Disconnect int 3. Check resistar	E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF. ake valve timing control solenoid valve harness conner nce between intake valve timing control solenoid valve	J ctor. K			
1. CHECK INTAKI 1. Turn ignition s 2. Disconnect int 3. Check resistan Terminals	E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF. ake valve timing control solenoid valve harness conne- nce between intake valve timing control solenoid valve Resistance (Ω)	J ctor. K			
1. CHECK INTAKI 1. Turn ignition s 2. Disconnect int 3. Check resistan Terminals 1 and 2	E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF. ake valve timing control solenoid valve harness conner nce between intake valve timing control solenoid valve	J ctor. K			
1. CHECK INTAKI 1. Turn ignition s 2. Disconnect int 3. Check resistan Terminals	E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF. ake valve timing control solenoid valve harness conne- nce between intake valve timing control solenoid valve Resistance (Ω)	J ctor. K			
1. CHECK INTAKI 1. Turn ignition s 2. Disconnect int 3. Check resistan Terminals 1 and 2	E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF. ake valve timing control solenoid valve harness conner nce between intake valve timing control solenoid valve $\frac{Resistance (\Omega)}{7.0 - 7.7 [at 20^{\circ}C (68^{\circ}F)]}$	ctor. terminals as follows.			
1. CHECK INTAKI 1. Turn ignition s 2. Disconnect int 3. Check resistan Terminals 1 and 2 1 or 2 and ground Is the inspection resource YES >> GO TO	E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF. ake valve timing control solenoid valve harness connection between intake valve timing control solenoid valve $\frac{\text{Resistance } (\Omega)}{7.0 - 7.7 [\text{at } 20^{\circ}\text{C} (68^{\circ}\text{F})]}$ $(\text{Continuity should not exist})$ $\frac{1}{2} \text{ continuity should not exist}}$	ctor. terminals as follows.			
1. CHECK INTAKI 1. Turn ignition s 2. Disconnect int 3. Check resistar Terminals 1 and 2 1 or 2 and ground Is the inspection regression of the section regression of the section regression of the section regression of the section of the se	E VALVE TIMING CONTROL SOLENOID VALVE-I witch OFF. ake valve timing control solenoid valve harness conner nce between intake valve timing control solenoid valve Resistance (Ω) 7.0 - 7.7 [at 20°C (68°F)]	ctor. terminals as follows.			

- 1. Remove intake valve timing control solenoid valve.
- Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
 CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?



[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve.

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

Description

INFOID:000000004250677

[VQ37VHR]

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator	
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater	С
Mass air flow sensor Amount of intake air			neater	

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

DTC Logic

INFOID:000000004250678

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031	Air fuel ratio (A/F) sensor 1 heater (bank 1) control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) A/F sensor 1 heater
P0032	Air fuel ratio (A/F) sensor 1 heater (bank 1) control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is shorted.) A/F sensor 1 heater
P0051	Air fuel ratio (A/F) sensor 1 heater (bank 2) control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) A/F sensor 1 heater
P0052	Air fuel ratio (A/F) sensor 1 heater (bank 2) control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	 Harness or connectors (The A/F sensor 1 heater circuit is shorted.) A/F sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10.5 V and 16 V at $$^{
m N}$$ idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-160, "Diagnosis Procedure".

NG >> INSPECTION END

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P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000004250679

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.

2. Turn ignition switch ON.

3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
DIC	Bank	Connector	Terminal	Ground	vollage
P0031, P0032	31, P0032 1 F3 4		4	Ground	Battery voltage
P0051, P0052	2	F20	4	Ground	Dattery voltage

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E3, F1
- IPDM E/R harness connector E7
- 15 A fuse (No. 46)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1		ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0031, P0032	1	F3	3	F101	1	Existed
P0051, P0052	2	F20	3	FIUI	5	EXISTED

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK A/F SENSOR 1 HEATER

Refer to EC-161, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

 $\mathbf{6}$.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. CAUTION:

P0031, P0032, P0051, P0052 A/F SENSOR 1 HEATER

[VQ37VHR]

< DTC/CIRCUIT DI/	AGNOSIS >	[VQ37VHR]
 hard surface such Before installing Cleaner [commer 	n as a concrete floor; use a new new A/F sensor, clean exhau cial service tool (J-43897-18 o	d from a height of more than 0.5 m (19.7 in) onto a y one. Just system threads using Oxygen Sensor Thread or J-43897-12)] and approved Anti-seize Lubricant
(commercial serv	ice tool).	EC
>> INSPEC	TION END	
7.CHECK INTERMI	-	С
Perform GI-41, "Inter		
>> Repair o	r replace.	
Component Insp	pection	INFOID:00000004250680
1. CHECK AIR FUE	L RATIO (A/F) SENSOR 1	E
	tch OFF. sensor 1 harness connector. e between A/F sensor 1 terminals	as follows.
Terminal	Resistance (Ω)	G
3 and 4	1.8 - 2.44 [at 25°C (77°F)]	-
3 and 1, 2	∞	н
4 and 1, 2	(Continuity should not exist)	•
Is the inspection result YES >> INSPEC NO >> GO TO 2 2.REPLACE AIR FU	TION END	Ι
 CAUTION: Discard any A/F s hard surface such Before installing 	n as a concrete floor; use a new new A/F sensor, clean exhau commercial service tool (J-4389	d from a height of more than 0.5 m (19.7 in) onto a y one. Ust system threads using Heated Oxygen Sensor 17-18 or J-43897-12)] and approved Anti-seize Lubri-
>> INSPEC	TION END	Μ
		Ν
		0
		P
		F

P0037, P0038, P0057, P0058 HO2S2 HEATER

Description

INFOID:000000004250681

[VQ37VHR]

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator	
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2		
Engine coolant temperature sensor	Engine coolant temperature	heater control	Heated oxygen sensor 2 heater	
Mass air flow sensor	Amount of intake air			

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
 Below 3,600 rpm after the following conditions are met. Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	ON

DTC Logic

INFOID:000000004250682

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037	Heated oxygen sensor 2 heater (bank 1) control circuit low	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) Heated oxygen sensor 2 heater
P0038	Heated oxygen sensor 2 heater (bank 1) control circuit high	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) Heated oxygen sensor 2 heater
P0057	Heated oxygen sensor 2 heater (bank 2) control circuit low	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) Heated oxygen sensor 2 heater
P0058	Heated oxygen sensor 2 heater (bank 2) control circuit high	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	 Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at idle.

>> GO TO 2.

P0037, P0038, P0057, P0058 HO2S2 HEATER

2. PERFORM DTC CONFIRMATION PROCEDURE Start engine and warm it up to the normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 5. 6. Let engine idle for 1 minute. 7. Check 1st trip DTC. Is 1st tip DTC detected? YES >> Go to EC-163, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:000000004250683 1. CHECK GROUND CONNECTION Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK HO2S2 POWER SUPPLY CIRCUIT Disconnect heated oxygen sensor 2 (HO2S2) harness connector. 1. Turn ignition switch ON. Check the voltage between HO2S2 harness connector and ground. HO2S2 DTC Ground Voltage Bank Connector Terminal P0037, P0038 1 F54 2 Ground Battery voltage P0057, P0058 2 F53 2 Is the inspection result normal? YES >> GO TO 4. >> GO TO 3. NO ${\it 3.}$ detect malfunctioning part Check the following. Harness connectors E3, F1 IPDM E/R harness connector E7 15 A fuse (No. 46) Harness for open or short between heated oxygen sensor 2 and fuse >> Repair open circuit, short to ground or short to power in harness or connectors. 4.CHECK H02S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Turn ignition switch OFF. Disconnect ECM harness connector.

3. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0037, P0038	1	F54	3	F101	17	Existed
P0057, P0058	2	F53	3	1 101	33	LAISIEU

Also check harness for short to ground and short to power. 4

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

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P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-164, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. **CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

1.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.

- 2. Disconnect heated oxygen sensor 2 harness connector.
- 3. Check resistance between HO2S2 terminals as follows.

Terminal	Resistance (Ω)
2 and 3	3.4 - 4.4 [at 25°C (77°F)]
1 and 2, 3, 4	∞
4 and 1, 2, 3	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. **CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

P0075, P0081 IVT CONTROL SOLENOID VALVE

Description

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.

DTC Logic

DTC No.

P0075

P0081

DTC DETECTION LOGIC

Intake valve timing control solenoid valve (bank 2) circuit valve. • Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

Trouble diagnosis name Intake valve timing control so-

lenoid valve (bank 1) circuit

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

DTC detecting condition

through intake valve timing control solenoid

An improper voltage is sent to the ECM

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-165, "Diagnosis Procedure".

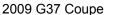
NO >> INSPECTION END

Diagnosis Procedure

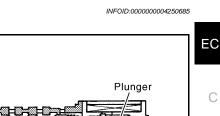
1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve timing (IVT) control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

DTC	IVT control solenoid valve			Ground	Voltage	
DIC	Bank	Connector	Terminal	Ground	voltage	
P0075	1	F28	2	Ground	Battery voltage	
P0081	2	F29	2	Ground	Dattery voltage	



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Coil PBIB1842E

Possible cause

(Intake valve timing control solenoid

valve circuit is open or shorted.)

Harness or connectors

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P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

 $\mathbf{3}$.check intake value timing control solenoid value output signal circuit for open and short

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector.

DTC	IVT control solenoid valve		ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0075	1	F28	1	F101	18	Existed
P0081	2	F29	1	1 101	29	LAISIEU

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-166, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000004250688

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.
- 3. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance (Ω)
1 and 2	7.0 - 7.7 [at 20°C (68°F)]
1 or 2 and ground	(Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning intake valve timing control solenoid valve.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

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 Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
 CAUTION:

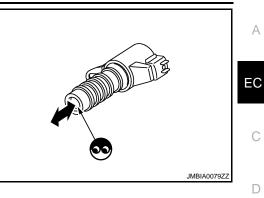
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve.



P0101, P010B MAF SENSOR

Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The greater air flow, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

A)

B)

A)

B)

DTC Logic

DTC No.

P0101

P010B

DTC DETECTION LOGIC

Trouble diagnosis name

Mass air flow sensor

Mass air flow sensor

DTC CONFIRMATION PROCEDURE

performance

(bank 2) circuit range/

performance

(bank 1) circuit range/

1.PRECONDITIONING If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

EC-168

Turn ignition switch OFF and wait at least 10 seconds. 1.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

Revision: 2009 October

DTC detecting condition

under light load driving condition.

A high voltage from the sensor is sent to ECM

O FBIA	49559J

Possible cause

· Harness or connectors (The sensor circuit is open or

· Mass air flow sensor F\/AP control system pressure

shorted.)

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INFOID:000000004250689

	sensor
A low voltage from the sensor is sent to ECM un- der heavy load driving condition.	 Harness or connectors (The sensor circuit is open or shorted.) Intake air leaks Mass air flow sensor EVAP control system pressure sensor Intake air temperature sensor
A high voltage from the sensor is sent to ECM under light load driving condition.	 Harness or connectors (The sensor circuit is open or shorted.) Mass air flow sensor EVAP control system pressure sensor
A low voltage from the sensor is sent to ECM un- der heavy load driving condition.	 Harness or connectors (The sensor circuit is open or shorted.) Intake air leaks Mass air flow sensor EVAP control system pressure sensor Intake air temperature sensor

[VQ37VHR]

2009 G37 Coupe

 CDTC/CIRCUIT DIAGNOSIS > [VQ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A Start engine and warm it up to normal operating temperature. NOTE: If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition sw instead of running engine at idle speed. Run engine for at least 10 seconds at idle speed. Check 1st trip DTC. 	37VHR]
 Start engine and warm it up to normal operating temperature. NOTE: If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition sw instead of running engine at idle speed. Run engine for at least 10 seconds at idle speed. 	
 NOTE: If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition swinstead of running engine at idle speed. Run engine for at least 10 seconds at idle speed. 	
Is 1st trip DTC detected? YES >> Go to EC-170, "Diagnosis Procedure". NO-1 >> With CONSULT-III: GO TO 3. NO-2 >> Without CONSULT-III: GO TO 5. 3.CHECK MASS AIR FLOW SENSOR FUNCTION 1. Turn ignition switch ON. 2. Start engine and warm it up to normal operating temperature.	vitch ON)
If engine cannot be started, go to <u>EC-170, "Diagnosis Procedure"</u> . 3. Select "DATA MONITOR" mode with CONSULT-III.	
4. Check the voltage of "MAS A/F SE-B1/B2" with "DATA MONI-	
 TOR". 5. Increases engine speed to about 4,000 rpm. 6. Monitor the linear voltage rise in response to engine speed increases. Is the inspection result normal? 	
YES >> GO TO 4.	
NO >> Go to EC-170, "Diagnosis Procedure".	
0.00	
NG V 5.00 2.50 1.25 0.00	
	PBIB3457E
4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B	
1. Maintain the following conditions for at least 10 consecutive seconds.	
ENG SPEED More than 1,400 rpm* ¹ More than 2,000 rpm* ²	
TP SEN 1-B1 More than 2 V	
TP SEN 2-B1 More than 2 V	
TP SEN 1-B2 More than 2 V	
TP SEN 2-B2 More than 2 V	
Selector lever Suitable position	
Driving location Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.	
 *1: ECM part number is follows. 23710 1ND4A 23710 1ND5A 	

- 23710 1ND6A
- 23710 1ND7A
- 23710 1ND8A
- 23710 1ND9A
- 23710 JU70A
- 23710 JU71A

*2: ECM part number is follows.

- 23710 1ND4B
- 23710 1ND5B
- 23710 1ND6B
- 23710 1ND7B
- 23710 1ND8B
- 23710 1ND9B
- 23710 JU70B
- 23710 JU71B

CAUTION:

Always drive vehicle at a safe speed.

2. Check 1st rip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-170, "Diagnosis Procedure".

NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to <u>EC-170, "Component Function Check"</u>.

NOTE:

Use component function check to check the overall function of the mass air flow sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-170, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select Service \$01 with GST.
- 3. Check the mass air flow sensor signal with Service \$01.
- 4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-170, "Diagnosis Procedure".

	CALC LOAD	20%	
	COOLANT TEMP	95°C	
	SHORT FT #1	2%	
	LONG FT #1	0%	
	SHORT FT #2	4%	
	LONG FT #2	0%	
	ENGINE SPD	2637RPM	
1	VEHICLE SPD	0MPH	
	IGN ADVANCE	41.0°	
	INTAKE AIR	41°C	
	MAF	14.1gm/sec	
	THROTTLE POS	3%	
- 1			
		SE	F534P

Diagnosis Procedure

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-168, "DTC Logic".

Which malfunction is detected?

A >> GO TO 3.

B >> GO TO 2.

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2.CHECK INTAKE SYSTEM					
Check the following for connection. • Air duct					
 Air duct Vacuum hoses 					
Intake air passage between air duct and intake manifold	E				
<u>Is the inspection result normal?</u> YES >> GO TO 3.					
NO >> Reconnect the parts.					
3. CHECK GROUND CONNECTION					
 Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in <u>GI-44, "Circuit Inspection"</u>. 					
Is the inspection result normal?					
YES >> GO TO 4.					
NO >> Repair or replace ground connection.					
4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT					
 Disconnect mass air flow (MAF) sensor harness connector. Turn ignition switch ON. 					
3. Check the voltage between MAF sensor harness connector and ground.					
MAF sensor					
DTC Bank Connector Terminal Ground Voltage					
P0101 1 F31 5 Orang Datagenetics					
P010B 2 F42 5 Ground Battery voltage					
Is the inspection result normal?					
YES >> GO TO 6. NO >> GO TO 5.					
5. DETECT MALFUNCTIONING PART					
Check the following.					
 Harness connectors E106, M6 Harness connectors M116, F103 					
 Harness for open or short between mass air flow sensor and ECM 					
 Harness for open or short between mass air flow sensor and IPDM E/R 					
>> Repair open circuit, short to ground or short to power in harness or connectors.					
6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT					
1. Turn ignition switch OFF.					
 Disconnect ECM harness connector. Check the continuity between MAF sensor harness connector and ECM harness connector. 					
DTC MAF sensor ECM Continuity					
Bank Connector Terminal Connector Terminal					
P0101 1 F31 4 68 Existed P010B 2 F42 4 F102 94 Existed					
P010B 2 F42 4 94 4. Also check harness for short to ground and short to power.					
Is the inspection result normal?					
YES >> GO TO 7.					
NO >> Repair open circuit, short to ground or short to power in harness or connectors.					
7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT					

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< DTC/CIRCUIT DIAGNOSIS >

DTC	MAF sensor		ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0101	1	F31	3	F102	77	Existed
P010B	2	F42	3	1102	79	LAISIEU

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

8.CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor.

Refer to EC-187, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor).

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-315, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace EVAP control system pressure sensor.

10.CHECK MASS AIR FLOW SENSOR

Refer to EC-172, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning mass air flow sensor.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.

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EC-172

< DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM			
0	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77 [MAF sensor (bank 1)	68	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	signal]	00	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
1102			Ignition switch ON (Engine stopped.)	Approx. 0.4
	79 MAE concor (book 2)	94	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 2) signal]	signal] 2,500 rpm (Engi	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
YES >: NO >:	ection result normal > INSPECTION EN > GO TO 2. FOR THE CAUSE	D	R FLOW THROUGH MASS AIR FLOW	' SENSOR
2. Check - Crusho - Malfur - Uneve	nition switch OFF. for the cause of un ed air ducts actioning seal of air n dirt of air cleaner per specification of i	cleaner element element	ugh mass air flow sensor. Refer to the	following.
	ection result normal	-		
YES >:	> GO TO 4. > GO TO 3.	<u>-</u>		
3.снеск	MASS AIR FLOW	SENSOR-II		

- With CONSULT-IIIRepair or replace malfunctioning part.
- Repair of replace manufactioning part.
 Start engine and warm it up to normal operating to
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT-III and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)	Ν
	Ignition switch ON (Engine stopped.)	Approx. 0.4	
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2	
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	0
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*	

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Check the voltage between ECM harness connector terminals under the following conditions.

Μ

< DTC/CIRCUIT DIAGNOSIS >

	ECM			
Connector	+ –		Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77 [MAF sensor (bank 1) signal]	68	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
		00	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
FIUZ			Ignition switch ON (Engine stopped.)	Approx. 0.4
	79 [MAF sensor (bank 2) signal]	94	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
		94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-III

()With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
_	Idle to about 4,000 rpm	0.8 - 1.1 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector terminals under the following conditions.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	ECM			
Connector	+	-	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77 IMAF sensor (bank 1) 68		Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
[MAF sensor (bank 1) signal]		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	
F102		79	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4
			Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
[MAF sensor (bank 2) signal]	Signal		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace malfunctioning mass air flow sensor.

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< DTC/CIRCUIT DIAGNOSIS >

P0102, P0103, P010C, P010D MAF SENSOR

Description

The mass air flow sensor (1) is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.

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INFOID:000000004250695

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	nosis DTC detecting condition Possible cause	
P0102	Mass air flow sensor (bank 1) circuit low input	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.) Intake air leaks Mass air flow sensor
P0103	Mass air flow sensor (bank 1) circuit high input	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.) Mass air flow sensor
P010C	Mass air flow sensor (bank 2) circuit low input	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.) Intake air leaks Mass air flow sensor
P010D	Mass air flow sensor (bank 2) circuit high input	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.) Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

Which DTC is detected?

P0102, P010C>>GO TO 2. P0103, P010D>>GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102 AND P010C

- 1. Start engine and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-177, "Diagnosis Procedure".

NO >> INSPECTION END

3. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103 AND P010D-I

1. Turn ignition switch ON and wait at least 5 seconds.

2. Check DTC.

EC-176

				, P0100	ت, P010D M	AF SENSOR	[\/_27\/UD]	
< DTC/CIRCU		GNOSIS >					[VQ37VHR]	
<u>Is DTC detect</u> YES >> G		<u>-177, "Diag</u>	nocie Proc	oduro"				А
	0 10 <u>LC</u> 0 TO 4		110515 F1000	<u>euure</u> .				1
4.PERFORM	I DTC C	ONFIRMA		CEDURE	FOR DTC P01	03 AND P010D-II		EC
1. Start engine 2. Check DT		wait at leas	t 5 seconds	6.				EC
Is DTC detect								
		-177, "Diag	nosis Proce	edure".				С
NO >> IN	ISPECT	TION END						
Diagnosis I	Proce	dure					INFOID:000000004250696	D
1.INSPECTIO	ON STA	RT						
Confirm the de	etected	DTC.						Ε
Which DTC is								
P0102, P010 P0103, P010								F
2.CHECK IN								
Check the follo			on.					G
• Air duct								
Vacuum hosIntake air pa		between air	duct to inta	ake mani [.]	fold			
Is the inspection	-							Н
	О ТО З							
NO >> R 3.CHECK GF		ct the parts.						
1. Turn igniti								
			95. Refer to	Ground	Inspection in G	GI-44, "Circuit Inspection	<u>1"</u> .	J
Is the inspection	on resu	It normal?						
	O TO 4			otion				Κ
NO >> R 4.CHECK MA		replace gro			Шт			I.V.
 Disconnee Turn igniti 		air flow (M. ch ON.	AF) sensor	narness	connector.			L
			MAF senso	r harnes:	s connector and	l ground.		
						-		M
DTC	Bank	MAF sens	or Terminal	Ground	Voltage			
P0102, P0103	_ Бапк 1	Connector F31	5			-		NI
P010C, P010D	2	F42	5	Ground	Battery voltage			Ν
Is the inspecti						-		
	0 TO 6							0
_	O TO 5							
5.DETECT N	1ALFUN		PART					Ρ
Check the follo								
Harness corHarness cor)3					

Harness for open or short between mass air flow sensor and ECM
Harness for open or short between mass air flow sensor and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

EC-177

< DTC/CIRCUIT DIAGNOSIS >

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between MAF sensor harness connector and ECM harness connector.

DTC	MAF sensor			EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0102, P0103	1	F31	4	F102	68	Existed
P010C, P010D	2	F42	4	1102	94	LAISIEU

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

7.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

DTC	MAF sensor			ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0102, P0103	1	F31	3	F102	77	Existed	
P010C, P010D	2	F42	3	F IUZ	79	EXISTED	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-178, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning mass air flow sensor.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK MASS AIR FLOW SENSOR-I

(B) With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2
MAS A/F SE-B2	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

< DTC/CIRCUIT DIAGNOSIS >

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77		Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
[MAF sensor (bank 1) signal]		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
F 102	79		Ignition switch ON (Engine stopped.)	Approx. 0.4
			Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
[MAF sensor (bank 2) signal]	94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.	
2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR	
 Turn ignition switch OFF. Check for the cause of uneven air flow through mass air flow sensor. Refer to the following. Crushed air ducts 	J
 Malfunctioning seal of air cleaner element Uneven dirt of air cleaner element Improper specification of intake air system parts 	К
Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 3.	L
3. CHECK MASS AIR FLOW SENSOR-II	M
 With CONSULT-III Repair or replace malfunctioning part. Start engine and warm it up to normal operating temperature. 	Ν

- 3. Connect CONSULT-III and select "DATA MONITOR" mode.
- 4. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
MAS A/F SE-B1 MAS A/F SE-B2	Ignition switch ON (Engine stopped.)	Approx. 0.4
	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

3. Check the voltage between ECM harness connector terminals under the following conditions.

ECM				
Connector	+	_	Condition	Voltage (V)
	Terminal	Terminal		
F102	77 [MAF sensor (bank 1) signal]		Ignition switch ON (Engine stopped.)	Approx. 0.4
		68	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
		68	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
	79 [MAF sensor (bank 2) signal]		Ignition switch ON (Engine stopped.)	Approx. 0.4
		94	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
		94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> GO TO 4.

4.CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

- T. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT-III and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

Monitor item	Condition	Indication (V)
MAS A/F SE-B1 MAS A/F SE-B2	Ignition switch ON (Engine stopped.)	Approx. 0.4
	Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
	Idle to about 4,000 rpm	0.8 - 1.1 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Check the voltage between ECM harness connector terminals under the following conditions.

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	ECM			
Connector	+ –		Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77 [MAF sensor (bank 1) signal]6879 [MAF sensor (bank 2) signal]94	68	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4
		Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2	
		94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace malfunctioning mass air flow sensor.

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P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

Description

The manifold absolute pressure (MAP) sensor is placed at intake manifold collector. It detects intake manifold pressure and sends the voltage signal to the ECM.

The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.

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DTC Logic

INFOID:000000004250699

DTC DETECTION LOGIC

NOTE:

If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-368, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P010A	Manifold absolute pressure sensor circuit	 An excessively low voltage from the sensor is sent to ECM. An excessively high voltage from the sensor is sent to ECM. 	 Harness or connectors (The sensor circuit is open or shorted.) Manifold absolute pressure (MAP) sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 10 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-182. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2. CHECK MAP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect manifold absolute pressure (MAP) sensor harness connector.

EC-182

INFOID:000000004250700

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

2. Turn ignition switch ON.

3. Check the voltage between MAP sensor harness connector and ground.

MAP sensor Connector Terminal		Ground	Voltage (V)

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

${ m 3.}$ CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between MAP sensor harness connector and ECM harness connector.

•	MAP	sensor	E	СМ	Continuity
-	Connector	Terminal	Connector	Terminal	Continuity
-	F50	3	F102	96	Existed

4. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

${f 4.}$ CHECK MAP SENSOR INTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAP sensor harness connector and ECM harness connector.

MAP sensor		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F50	2	F101	38	Existed

2. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK MAP SENSOR

Refer to EC-183, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace MAP sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to <u>GI-41, "Intermittent Incident"</u>.

>> INSPECTION END

Component Inspection

1.CHECK MAP SENSOR-I

1. Turn ignition switch OFF.

2. Start engine and warm it up to normal operating temperature.

3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.

4. Check the voltage between ECM harness connector terminals as follows.

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ECM				
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Connector	Terminal	Connector	Terminal	
F101	38	F102	96	

NOTE:

- To avoid the influence of intake manifold vacuum, check the voltage 1 or more minutes past after engine is stopped.
- Because the sensor is absolute pressure sensor, output value may differ depending on atmospheric pressure and altitude.
- 5. Measure the atmospheric pressure.

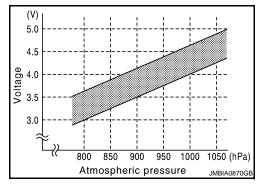
NOTE:

As the atmospheric pressure described on the synoptic chart is the value at sea level, compensate the pressure with the following chart.

Altitude (m)	Compensated pressure (hPa)
0	0
200	-24
400	-47
600	-70
800	-92
1000	-114
1500	-168
2000	-218
1000 1500	-114 -168

6. Check the manifold absolute pressure sensor value corresponding to the atmospheric pressure.

Atmospheric pressure (hPa)	Voltage (V)
800	3.1 – 3.7
850	3.3 – 3.9
900	3.5 – 4.1
950	3.8 - 4.3
1000	4.0 - 4.6
1050	4.2 - 4.8



Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace MAP sensor.

2.CHECK MAP SENSOR-II

- 1. Start engine and let it idle.
- 2. Check intake manifold vacuum.

3. Check the voltage between ECM harness connector terminals as per the following.

ECM				
+		_		
Connector	Terminal	Connector	Terminal	
F101	38	F102	96	

4. Confirm the difference of the voltage when engine is stopped and at idling is within the values shown in the following chart.

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Intake manifold vacuum	Voltage difference (V)
-40kPa (-300mmHg)	1.5 – 2.0
-53.3kPa (-400mmHg)	2.0 - 2.6
-66.7kPa (-500mmHg)	2.6 - 3.2
-80kPa (-600mmHg)	3.2 - 3.8

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace MAP sensor.

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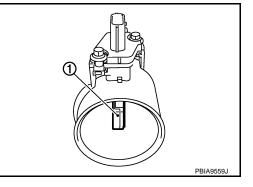
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P0112, P0113 IAT SENSOR

Description

The intake air temperature sensor is built-into the mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

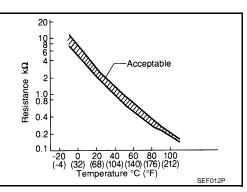
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the rise in temperature.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminals 67 (Intake air temperature sensor) and 68 (Sensor ground).



INFOID:000000004250703

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or short-
P0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	ed.) • Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-187, "Diagnosis Procedure".
- NO >> INSPECTION END

P0112, P0113 IAT SENSOR

	[VQ37VHR]
Diagnosis Procedure	INFOID:000000004250704
CHECK GROUND CONNECTION	
 Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in <u>GI-44, "Circuit Inspection</u> <u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace ground connection. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT 	<u>)"</u> .
Disconnect mass air flow (MAF) sensor (intake air temperature sensor is built-into) harr	ness connector
2. Turn ignition switch ON.	
3. Check the voltage between mass air flow sensor (bank 1) harness connector and grour	ia.
MAF sensor (bank 1) Ground Voltage (V)	
F31 2 Ground Approx. 5	
Is the inspection result normal? YES >> GO TO 3. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND 3	
1. Turn ignition switch OFF.	SHORT
 Disconnect ECM harness connector. Check the continuity between mass air flow sensor (bank 1) harness connector and I nector. 	ECM harness con-
MAF sensor (bank 1) ECM	
Continuity	
Connector Terminal Connector Terminal	
ConnectorTerminalConnectorTerminalF311F10268Existed	
Connector Terminal Connector Terminal F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal?	
Connector Terminal Connector Terminal F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4.	
Connector Terminal Connector Terminal F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4.	
Connector Terminal Connector Terminal F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK INTAKE AIR TEMPERATURE SENSOR Refer to EC-187, "Component Inspection".	
Connector Terminal Connector Terminal F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK INTAKE AIR TEMPERATURE SENSOR Refer to EC-187, "Component Inspection". Is the inspection result normal?	
Connector Terminal Connector Terminal F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK INTAKE AIR TEMPERATURE SENSOR Refer to EC-187, "Component Inspection".	
ConnectorTerminalConnectorTerminalF311F10268Existed4. Also check harness for short to ground and short to power.Is the inspection result normal?YES>> GO TO 4.NO>> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK INTAKE AIR TEMPERATURE SENSORRefer to EC-187, "Component Inspection".Is the inspection result normal?YES>> GO TO 5.NO>> Replace mass air flow sensor (bank 1) (with intake air temperature sensor).	
Connector Terminal Connector Terminal F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK INTAKE AIR TEMPERATURE SENSOR Refer to EC-187. "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor). 5.CHECK INTERMITTENT INCIDENT	
Connector Terminal Connector Terminal F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK INTAKE AIR TEMPERATURE SENSOR Refer to EC-187, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor). 5.CHECK INTERMITTENT INCIDENT	
Connector Terminal Continuity F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK INTAKE AIR TEMPERATURE SENSOR Refer to EC-187, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor). 5.CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident".	
Connector Terminal Connector Terminal F31 1 F102 68 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK INTAKE AIR TEMPERATURE SENSOR Refer to EC-187, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor). 5.CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". >> INSPECTION END	

3. Check resistance between mass air flow sensor (bank 1) terminals as follows.

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Terminals	Condition		Resistance (k Ω)
1 and 2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

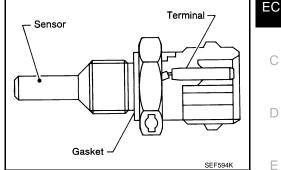
YES >> INSPECTION END

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor).

P0116 ECT SENSOR

Description

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



Acceptable

0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F)

20

Resistance k0 1.0 8.0 7 0.4 0.4

0.1

-20

<Reference data>

Engine coolant temperature	Voltage* (V)	Resistance (kΩ)
[°C (°F)] -10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminals 71 (Engine coolant temperature sensor) and 84 (Sensor ground).

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DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to <u>EC-191, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0116	Engine coolant temperature sensor circuit range/perfor- mance	COOLANT TEMPERATURE SENSOR DOES NOT TUICTUATE	 Harness or connectors (High or low resistance in the circuit) Engine coolant temperature sensor 	L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- TEST CONDITION:

Before performing the following procedure, do not add fuel.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Rev engine up to 2,000 rpm for more than 10 minutes.
- 3. Move the vehicle to a cool place, then stop engine.

EC-189

2009 G37 Coupe

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P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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INFOID-000000004609925

- 4. Check resistance between "fuel level sensor unit and fuel pump (main)" terminals 4 and 5.
- 5. Soak the vehicle until the resistance between "fuel level sensor unit and fuel pump (main)" terminals 4 and 5 becomes 0.5 k Ω higher than the value measured before soaking.

CAUTION: Never turn ignition switch ON during soaking. NOTE: Soak time changes depending on ambient air temperature. It may take several hours.

- 6. Start engine and let it idle for 20 minutes.
- 7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-190, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTIONS

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

- OK >> GO TO 2.
- NG >> Repair or replace ground connections.

2.check engine coolant temperature sensor

Refer to EC-190, "Component Inspection".

Is the inspection result normal?

- OK >> GO TO 3.
- NG >> Replace engine coolant temperature sensor.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

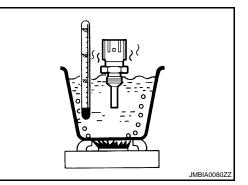
- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
		20 (68)	2.37 - 2.63
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.

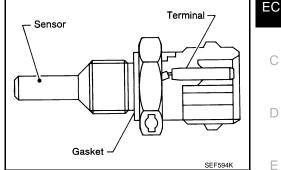


Revision: 2009 October

P0117, P0118 ECT SENSOR

Description

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

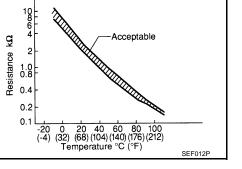


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<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminals 71 (Engine coolant temperature sensor) and 84 (Sensor ground).



DTC Logic

DTC DETECTION LOGIC

P0117 pera	ngine coolant tem- erature sensor cir-	An excessively low voltage from the sensor is		-
	iit low input	sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)	I
P0118 pera	ngine coolant tem- erature sensor cir- lit high input	An excessively high voltage from the sensor is sent to ECM.	Engine coolant temperature sensor	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following proceudre before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

- YES >> Go to EC-192, "Diagnosis Procedure".
- NO >> INSPECTION END

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Diagnosis Procedure

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1.CHECK GROUND CONNECTION

Turn ignition switch OFF. 1.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect engine coolant temperature (ECT) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECT sensor harness connector and ground.

ECT :	sensor	Ground	Voltage (V)
Connector	Terminal	Ciouna	voltage (v)
F17	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4. NO

>> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F106, F107

Harness for open or short between engine coolant temperature sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

Turn ignition switch OFF. 1.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ECT sensor harness connector and ECM harness connector.

ECT s	ensor	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F17	2	F102	84	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

${f 5.}$ CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace engine coolant temperature sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

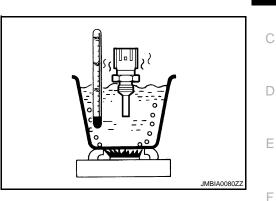
$1. {\sf CHECK} \ {\sf ENGINE} \ {\sf COOLANT} \ {\sf TEMPERATURE} \ {\sf SENSOR}$

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
		20 (68)	2.37 - 2.63
1 and 2	Temperature °C (°F)	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor.



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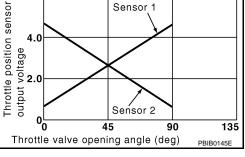
< DTC/CIRCUIT DIAGNOSIS >

P0122, P0123, P0227, P0228 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls throttle valve opening angle in response to driving conditions via the throttle control motor.



Throttle position sensor

Sensor 1

6.0

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DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0122, P0123, P0227 or P0228 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-368, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 (bank 1) circuit low in- put	An excessively low voltage from the TP sensor 2 is sent to ECM.	
P0123	Throttle position sensor 2 (bank 1) circuit high in- put	An excessively high voltage from the TP sensor 2 is sent to ECM.	 Harness or connectors (TP sensor 2 circuit is open or shorted.)
P0227	Throttle position sensor 2 (bank 2) circuit low in- put	An excessively low voltage from the TP sensor 2 is sent to ECM.	 Electric throttle control actuator (TP sensor 2)
P0228	Throttle position sensor 2 (bank 2) circuit high in- put	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

Turn ignition switch OFF and wait at least 10 seconds. 1.

2. Turn ignition switch ON.

Turn ignition switch OFF and wait at least 10 seconds. 3

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- Check DTC. 2.

Is DTC detected?

- YES >> Go to EC-195, "Diagnosis Procedure".
- NO >> INSPECTION END

DTC/CIRCU	JIT DIA	GNOSIS	>					[VQ37VHR]
iagnosis F	Proce	dure						INFOID:000000004250712
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Turn igniti								
			/195. Refe	r to Ground	d Inspecti	on in <u>GI-44</u>	<u>, "Circuit Inspec</u>	tion".
the inspection								
	O TO 2	r replace g	round cor	nection				
.CHECK TH	•						шт	
							511	
Turn igniti			control ac	tuator harr	iess conn	iector.		
			electric th	nrottle cont	rol actuat	or harness	connector and	ground.
DTC		ric throttle cor	1	Ground	Voltage ((V)		
0100 00100	Bank	Connector						
P0122, P0123 P0227, P0228	1	F6 F27	6	Ground	Approx.	5		
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	о то з		short to (around or s	hort to po		ness or connect	ore
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NO >> Re .CHECK TH . Turn igniti . Disconnee . Check the nector. DTC P0122, P0123 P0227, P0228 . Also chec the inspection YES >> G NO >> Re .CHECK TH . Check the nector. DTC P0122, P0123 P0227, P0228	IROTTI on swit ct ECM contin Electric Bank 1 2 k harne on resu O TO 4 epair of IROTTI contin Electric Bank 1 2 k harne contin	LE POSITI ch OFF. harness c uity betwe c throttle cont Connector F6 F27 ess for sho ilt normal? ben circuit, LE POSITI uity betwe c throttle cont Connector F6 F27 ess for sho	ON SENS connector. en electric rol actuator Terminal 3 4 rt to grour short to g ON SENS en electric rol actuator Terminal 5 3	SOR 2 GRO C throttle co Connector F101 and and sho ground or s SOR 2 INP c throttle co EC Connector	OUND CII ontrol act CM Terminal 40 48 rt to powe short to po UT SIGN/ ontrol act CM Terminal 34 35	RCUIT FOF uator harne Continuity Existed er. ower in harr AL CIRCUI ⁻ uator harne Continuity Existed	R OPEN AND S ess connector an ness or connect T FOR OPEN A	HORT nd ECM harness con- ors. ND SHORT

 $5. {\sf CHECK \ THROTTLE \ POSITION \ SENSOR}$

Refer to EC-196, "Component Inspection".

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.Replace electric throttle control actuator

1. Replace malfunctioning electric throttle control actuator.

2. Go to EC-196, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000004250713

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (A/T) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM					
Connector	+	-	Condition		Voltage (V)
Connector	Terminal	Terminal			
	30 [TP sensor 1 (bank 1)]	40		Fully released	More than 0.36
		40		Fully depressed	Less than 4.75
	31 [TP sensor 1 (bank 2)]	48		Fully released	More than 0.36
F101				Fully depressed	Less than 4.75
FIUI	24 (TD concer 2 (here)(4))	40	Accelerator pedal	Fully released	Less than 4.75
	34 [TP sensor 2 (bank 1)]		0	Fully depressed	More than 0.36
	35 [TP sensor 2 (bank 2)]	48		Fully released	Less than 4.75
	SS [1F SENSOLZ (DALK Z)]			Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.

2. Go to EC-196, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

EC-196

2009 G37 Coupe

< DTC/CIRCUIT DIAGNOSIS >

Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

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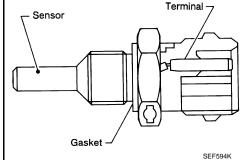
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P0125 ECT SENSOR

Description

The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance ($k\Omega$)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

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*: These data are reference values and are measured between ECM terminals 71 (Engine coolant temperature sensor) and 84 (Sensor ground).

DTC DETECTION LOGIC

NOTE:

DTC Logic

If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to <u>EC-191, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125	Insufficient engine cool- ant temperature for closed loop fuel control	 Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. Engine coolant temperature is insufficient for closed loop fuel control. 	 Harness or connectors (High resistance in the circuit) Engine coolant temperature sensor Thermostat

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode with CONSULT-III.
- 3. Check that "COOLAN TEMP/S" is above 10°C (50°F).
- Is the temperature above 10°C (50°F)?

EC-198

INFOID:000000004250715

YES >> INSPECTION END NO >> GO TO 3.
3. PERFORM DTC CONFIRMATION PROCEDURE
 Start engine and run it for 65 minutes at idle speed. If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine becau the test result will be OK. CAUTION: Be careful not to overheat engine. Check 1st trip DTC. Is 1st trip DTC detected? YES >> EC-199, "Diagnosis Procedure" NO >> INSPECTION END August 200 and 200 a
Diagnosis Procedure
1. CHECK GROUND CONNECTION
 Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in <u>GI-44, "Circuit Inspection"</u>. <u>Is the inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK ENGINE COOLANT TEMPERATURE SENSOR
Refer to EC-199, "Component Inspection".
Is the inspection result normal? YES >> GO TO 3. NO >> Replace engine coolant temperature sensor. 3. CHECK THERMOSTAT OPERATION
When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow. Is the inspection result normal? YES >> GO TO 4. NO >> Repair or replace thermostat. Refer to CO-21, "Removal and Installation". 4. CHECK INTERMITTENT INCIDENT
Refer to GI-41, "Intermittent Incident".
>> INSPECTION END
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR
 Turn ignition switch OFF. Disconnect engine coolant temperature sensor harness connector. Remove engine coolant temperature sensor.

P0125 ECT SENSOR

Revision: 2009 October

< DTC/CIRCUIT DIAGNOSIS >

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P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

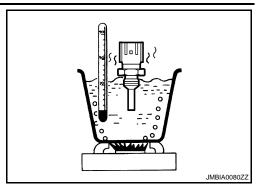
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
1 and 2		20 (68)	2.37 - 2.63
	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor.



P0127 IAT SENSOR

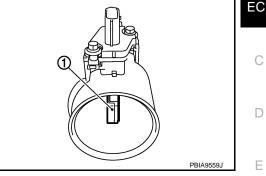
< DTC/CIRCUIT DIAGNOSIS >

P0127 IAT SENSOR

Description

The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.

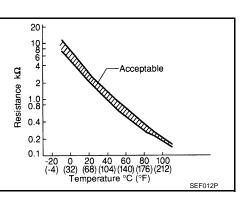
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminals 67 (Intake air temperature sensor) and 68 (Sensor ground).



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DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	 Harness or connectors (The sensor circuit is open or shorted) Intake air temperature sensor 	K

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure M before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Wait until engine coolant temperature is less than 90°C (194°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.

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P0127 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NOTE:

Perform the following steps before engine coolant temperature is above 90°C (194°F).

- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Start engine.
- 5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-202, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-202, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor).

3.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor (bank 1) harness connector.
- 3. Check resistance between mass air flow sensor (bank 1) terminals as follows.

Terminals	Condition		Resistance (k Ω)
1 and 2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor).

INFOID:000000004250721

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P0128 THERMOSTAT FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306, first perform the trouble diagnosis for P0300, P0301, P0302, P0303, P0304, P0305, P0306. Refer to <u>EC-264</u>. Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.

This is due to a leak in the seal or the thermostat being stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the en- gine has run long enough.	 Thermostat Leakage from sealing portion of thermostat Engine coolant temperature sensor 		
DTC CON	FIRMATION PROC	EDURE			
1.preco	NDITIONING				
ng the nex 1. Turn ig 2. Turn ig 3. Turn ig FESTING (• For best • For best	t test. Inition switch OFF and Inition switch ON. Inition switch OFF and CONDITION: results, perform at a results, perform at a	has been previously conducted, always p d wait at least 10 seconds. d wait at least 10 seconds. Ambient temperature of –10°C (14°F) o Engine coolant temperature of –10°C (ring procedure, do not add fuel.	r higher.		
	• GO TO 2.				
	RM DTC CONFIRMA	TION PROCEDURE			
	Turn A/C switch OFF. Turn blower fan switch OFF.				
. Select . Check	nition switch ON. "COOLAN TEMP/S" in the indication of "COO pelow 56°C (133°F), g		LT-III.		
If it is a 5. Start e	above 56°C (133°F), c ngine.	ool engine down to less than 56°C (133° tive minutes under the following conditio			
VHCL SPEE	ED SE	More than 50 km/h (35 mph)			
OFF b CAUTI	ecause the test resu ON:		in 10 minutes, turn ignition switch		
	s drive vehicle at saf 1st trip DTC.	re speed.			
YES >>	<u>)TC detected?</u> - Go to <u>EC-203. "Diag</u> - INSPECTION END	nosis Procedure".			
Jiagnosi	s Procedure		INFOID:000000004250724		
.CHECK	ENGINE COOLANT	TEMPERATURE SENSOR			

Refer to EC-204, "Component Inspection".

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P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor.

2.CHECK THERMOSTAT

Check thermostat. Refer to CO-21, "Inspection".

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace thermostat.
- Component Inspection

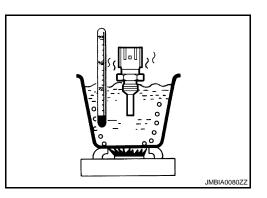
1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor.
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
1 and 2		()	2.37 - 2.63
	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
	(-)]	90 (194)	0.236 - 0.260

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor.



Revision: 2009 October

P0130, P0150 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor

outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

DTC Logic

DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible Cause	K
P0130	Air fuel ratio (A/F) sensor 1 (bank 1) circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.		L
	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	Harness or connectors (The A/F sensor 1 circuit is open		
P0150	Air fuel ratio (A/F) sensor 1	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.	or shorted.) • A/F sensor 1	M
	(bank 2) circuit	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.		Ν

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

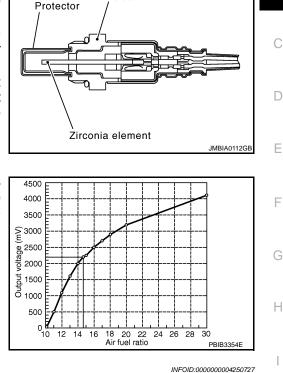
TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

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EC



Holder



P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let engine idle for 2 minutes.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-207, "Diagnosis Procedure".
- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> Without CONSULT-III: GO TO 7.

3.CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Does the indication fluctuate around 2.2 V?

YES >> GO TO 4.

NO >> Go to EC-207, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

- Select "A/F SEN1 (B1) P1276" (for DTC P0130) or "A/F SEN1 (B2) P1286" (for DTC P0150) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 2. Touch "START".
- 3. When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen.

ENG SPEED	1,100 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (A/T) 5th position (M/T)

If "TESTING" is not displayed after 20 seconds, retry from step 2. CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT-III screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 3.

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake when releasing the accelerator pedal.

Which does "TESTING" change to?

COMPLETED>>GO TO 6.

OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4.

6. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-207, "Diagnosis Procedure".

7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-207, "Component Function Check".

NOTE:

Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

P0130, P0150 A/F SENSOR 1

P0130, P0	130 A/F SEN				
< DTC/CIRCUIT DIAGNOSIS >		[VQ37VHR]			
YES >> INSPECTION END NO >> Go to <u>EC-207, "Diagnosis Procedure</u>	9" .	A	7		
Component Function Check		INFOID:000000004250728			
1.PERFORM COMPONENT FUNCTION CHEC	Ж	EC	С		
 With GST Start engine and warm it up to normal operation Drive the vehicle at a speed of 80 km/h (50 N) Shift the selector lever to D position (A/T) or until the vehicle speed decreases to 50 km/h 	MPH) for a few miner 5th position (M	inutes in the suitable gear position. igcup	2		
CAUTION: Always drive vehicle at a safe speed.		D)		
NOTE: Never apply brake when releasing the accele4. Repeat steps 2 and 3 for five times.		E	_		
 Stop the vehicle and turn ignition switch OFF Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 Restart engine. 		F	-		
 Repeat steps 2 and 3 for five times. Stop the vehicle and connect GST to the veh Check 1st trip DTC. 	nicle.	G	5		
Is 1st trip DTC detected? YES >> Go to <u>EC-207. "Diagnosis Procedure</u> NO >> INSPECTION END	<u>)"</u> .	Н	-		
Diagnosis Procedure		INFOID:000000004250729			
1.CHECK GROUND CONNECTION		I			
 Turn ignition switch OFF. Check ground connection M95. Refer to Gro Is the inspection result normal? 	und Inspection in	GI-44, "Circuit Inspection".	J		
YES >> GO TO 2. NO >> Repair or replace ground connection	1	K	<		
2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 F		CIRCUIT			
 Disconnect A/F sensor 1 harness connector. Turn ignition switch ON. 		L	-		
3. Check the voltage between A/F sensor 1 ha	rness connector a	and ground.			
A/F sensor 1 Ground	Voltage	M	/1		
Bank Connector Terminal	Voltago				
P0130 1 F3 4 Ground	Battery voltage	N	1		
P0150 2 F20 4					
<u>Is the inspection result normal?</u> YES >> GO TO 4.		0)		
NO >> GO TO 3.					
3. DETECT MALFUNCTIONING PART		P	2		
Check the following. • Harness connectors E3, F1 • IPDM E/R harness connector E7 • 15 A fuse (No. 46) • Harness for open or short between A/F sensor 1 and fuse					

>> Repair or replace harness or connectors.

P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC		A/F sensor	r 1 EC		CM	Continuity
DIC	Bank Connector		Terminal	Connector	Terminal	Continuity
P0130	1	F3	1		57	
F0130	I	Г	2	F102	61	Existed
P0150	2	F20	1	FIUZ	65	
F0150	2	F20	2		66	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	nk Connector Terminal		Giouna	Continuity
P0130	1	F3	1		
F0130	1	15	2	Ground	Not existed
P0150	2	F20	1	Giouna	
P0150	2	F20	2		

DTC		ECM			Continuity
DIC	Bank	Connector	Terminal	Ground	Continuity
P0120	1		57	- Ground	Not existed
P0130	· .	E400	61		
P0150	2	F102	65		
PU150	2	-	66		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace.

O.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0131, P0151 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor

outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

DTC Logic

DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	Κ
P0131	Air fuel ratio (A/F) sensor 1 (bank 1) circuit low voltage	• The A/F signal computed by ECM from the A/	Harness or connectors (The A/F sensor 1 circuit is open or	
P0151	Air fuel ratio (A/F) sensor 1 (bank 2) circuit low voltage	F sensor 1 signal is constantly approx. 0 V.	shorted.) • A/F sensor 1	L

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

- Start engine and warm it up to normal operating temperature. 1.
- Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III. 2.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication. 3.

Is the indication constantly approx. 0 V?

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PBIB3354E

INFOID:000000004250731

Holder

Zirconia element

Air fuel ratio

Protector

4500

4000

3500

€ 3000 2500 voltage 2000

Output 1500 1000

> 500 0 -10 12 14 16 18 20 22 24 26 28 30



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P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

YES >> Go to EC-210, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Restart engine.
- 5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine. CAUTION:

Always drive vehicle at a safe speed.

6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- Keep the accelerator pedal as steady as possible during cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 4, return to step

1.

7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-210, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000004460712

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F senso	1	Ground	Voltage
DIC	Bank	Connector	Terminal	Ciouna	voltage
P0130	1	F3	4	Ground	Battery voltage
P0150	2	F20	4	Ground	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

• IPDM E/R harness connector E7

• 15 A fuse (No. 46)

• Harness for open or short between A/F sensor 1 and fuse

P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

-	DTC	A/F sensor 1			EC	Continuity		
	DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
-	P0130	1	F3	1		57		
	F0130	1	15	2	F102	61	Existed	
-	P0150	2	F20	1	FIUZ	65	Existed	
	P0150	2	F20	2		66		

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor 1			Continuity
DIC	Bank	Bank Connector Ter		Ground	Continuity
P0130	1	F3	1		
F0130	I	ГJ	2	Ground	Not existed
P0150	2	F20	1	Ground	
F0150	2	F20	2		

DTC	ECM			Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0130	1		57	- Ground	Not existed
F 0130	I	Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г Г	61		
P0150	50 2	F102	65		
P0150	2		66		

5. Also check harness for short to power.

<u>Is the ir</u>	nspection result normal?
YES	>> GO TO 5.
NO	>> Repair open circuit, short to ground or short to power in harness or connectors.
5. сне	CK INTERMITTENT INCIDENT

Perform <u>GI-41, "Intermittent Incident"</u>. <u>Is the inspection result normal?</u> YES >> GO TO 6. NO >> Repair or replace. **6.**REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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P0132, P0152 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 (bank 1) circuit high voltage	• The A/F signal computed by ECM from the A/F	Harness or connectors (The A/F sensor 1 circuit is open or
P0152	Air fuel ratio (A/F) sensor 1 (bank 2) circuit high voltage	sensor 1 signal is constantly approx. 5 V.	shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

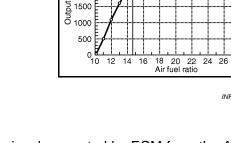
Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Is the indication constantly approx. 5V?

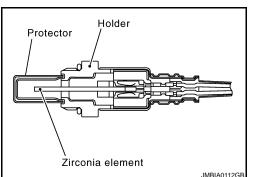


4500

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28 30

PBIB3354E

< DTC/CIF	RCUIT	DIAGNOS		32, P0	152 A/F SE	NSOR 1		[VQ37VHR]	
NO >	> GO T	O 3.	Diagnosis F						А
3.PERFC	DRM DT	C CONFIR	MATION P	ROCED	URE				
2. Turn i 3. Turn i	gnition gnition	switch ON. switch OFF	and wait a and wait a						EC
5. Drive CAUT	ION:	celerate vel			0 km/h (25 MPH	l) within 20 se	econds after re	starting engine.	С
			t a safe spe onditions for		0 consecutive s	econds.			D
ENG SPEE	D		1,000 - 3,200	rpm					
VHCL SPE			More than 40		mph)				Е
B/FUEL SC	HDL		1.5 - 9.0 mse		. ,				
Selector lev	ver		Suitable posit	ion					
NOTE			•						F
• If th 1.	is proc 1st trip	edure is n			s possible duri n 1 minute afte		engine at step	9 4, return to step	G
		EC-213, " ECTION E	<u>Diagnosis F</u> ND	Procedure	<u>e"</u> .				Η
Diagnos	is Pro	ocedure						INFOID:000000004460713	
1.CHECK	(GROL	JND CONN	IECTION						
2. Check	groun	switch OFF d connectio result norm	n M95. Ref	er to Gro	ound Inspection	in <u>GI-44, "Cir</u>	cuit Inspection	<u>.</u>	J
	> GO T								K
•	•	•	e ground co						
					POWER SUPPL	Y CIRCUIT			1
		/F sensor 1 switch ON.	harness c	onnector					
			en A/F ser	isor 1 ha	rness connecto	r and ground.			
		A/F senso	r 1						N
DTC	Bank	Connector	Terminal	Ground	Voltage				
P0130	1	F3	4						N
P0150	2	F20	4	Ground	Battery voltage				
		result norma	-						С
YES >	> GO T > GO T	04.							
3.DETEC	T MAL	FUNCTION	IING PART						Ρ
 IPDM E/ 15 A fuse 	connec R harne e (No. 4	ctors E3, F ² ess connec 46)	tor E7	Foonaa	1 and fuse				

• Harness for open or short between A/F sensor 1 and fuse

P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

>> Repair or replace harness or connectors.

4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1			EC	Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0130	1	F3	1	F102	57	Existed	
			2		61		
P0150	2 F	F20	1		65		
		F20	2		66		

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor	1	Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0130	1	F3	1		Not existed
F0130	1	15	2	Ground	
P0150	2	F 20	1	Giouna	
	2	F20	2		

DTC		ECM		Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	
P0130	1		57		Not existed
F 0130	I	F102	61	Ground	
P0150	2	F102	65		
P0150	Z		66		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. **CAUTION:**

- Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize Lubricant (commercial service tool).

>> INSPECTION END

P0133, P0153 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor

outputs a clear, continuous signal throughout a wide λ range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

DTC Logic

DTC DETECTION LOGIC

To judge malfunctions, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	
P0133	Air fuel ratio (A/F) sensor 1 (bank 1) circuit slow re- sponse		Harness or connectors (The A/F sensor 1 circuit is open or shorted.)	L
P0153	Air fuel ratio (A/F) sensor 1 (bank 2) circuit slow re- sponse	 The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time. 	 A/F sensor 1 A/F sensor 1 heater Fuel pressure Fuel injector Intake air leaks Exhaust gas leaks PCV Mass air flow sensor 	N

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure P before conducting the next test.

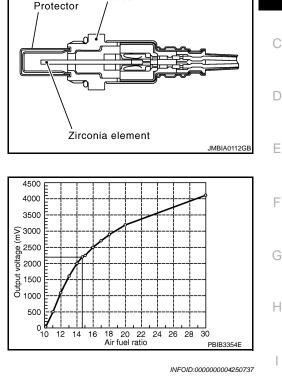
1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle. Do you have CONSULT-III?



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YES >> GO TO 2. NO >> GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 1 minute.
- Select "A/F SEN1(B1) P1278/P1279" (for DTC P0133) or "A/F SEN1(B2) P1288/P1289" (for DTC P0153) of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.

8. Touch "START".

Is "COMPLETED" displayed on CONSULT-III screen?

YES >> GO TO 3

NO >> GO TO 4.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III screen?

- OK >> INSPECTION END
- NG >> Go to EC-217, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. After perform the following procedure, "TESTING" will be displayed on the CONSULT-III screen.
- Increase the engine speed up to about 3,600 rpm and maintain that speed for 10 seconds.
- Fully release accelerator pedal and then let engine idle for about 10 seconds.
- If "TESTING" is not displayed after 10 seconds, go to EC-137, "Component Function Check".
- 2. Wait for about 20 seconds at idle under the condition that "TESTING" is displayed on the CONSULT-III screen.
- 3. Make sure that "TESTING" changes to "COMPLETED".
- If "TESTING" changed to "OUT OF CONDITION", go to EC-137, "Component Function Check".
- 4. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT-III screen?

- OK >> INSPECTION END
- NG >> Go to EC-217, "Diagnosis Procedure".

5.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

- T. Start engine and warm it up to normal operating temperature.
- 2. Select Service \$01 with GST.
- 3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.

Is the total percentage within ±15%?

YES >> GO TO 7. NO >> GO TO 6.

 \sim SO 10 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

P0133, P0153 A/F SENSOR 1

P0133, P0153 A/F SENSOR 1	
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
>> Repair or replace malfunctioning part.	
7.PERFORM DTC CONFIRMATION PROCEDURE	A
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute 	EC
 Let engine idle for 1 minute. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds. Fully release accelerator pedal and then let engine idle for about 1 minute. Check 1st trip DTC. 	C
Is 1st trip DTC detected? YES >> Go to <u>EC-217, "Diagnosis Procedure"</u> . NO >> INSPECTION END	D
Diagnosis Procedure	INFOID:000000004250738
1. CHECK GROUND CONNECTION	_
 Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in <u>GI-44. "Circuit Inspection"</u>. 	F
Is the inspection result normal? YES >> GO TO 2.	G
NO >> Repair or replace ground connection. 2.RETIGHTEN A/F SENSOR 1	
Loosen and retighten the A/F sensor 1. Refer to <u>EM-34, "Removal and Installation"</u> .	Н
>> GO TO 3. 3.CHECK EXHAUST GAS LEAK	I
 Start engine and run it at idle. Listen for an exhaust gas leak before three way catalyst 1. 	J
A/F sensor 1 To exhaust manifold To exhaust gas	K L BIB1922E
Is exhaust gas leak detected?	DID1322L
YES >> Repair or replace. NO >> GO TO 4.	Ν
4. CHECK FOR INTAKE AIR LEAK	
Listen for an intake air leak after the mass air flow sensor. Is intake air leak detected?	0
YES >> Repair or replace. NO >> GO TO 5.	Р
5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE	
 Clear the mixture ratio self-learning value. Refer to <u>EC-22, "MIXTURE RATIO SELF-LEAF</u> <u>CLEAR : Special Repair Requirement"</u>. Run engine for at least 10 minutes at idle speed. 	RNING VALUE

2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P172, P0174 or P0175 detected? Is it difficult to start engine?

P0133, P0153 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-240, "DTC Logic" or EC-244, "DTC Logic".
- NO >> GO TO 6.

6.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F senso	r 1	Ground	Voltage	
DIC	Bank	Connector	Terminal	Giouna	vollage	
P0133	1	F3	4	Ground	Battery voltage	
P0153	2	F20	4	Ground	Dattery voltage	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E3, F1
- IPDM E/R harness connector E7
- 15 A fuse (No. 46)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

$\mathbf{8}$.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC		A/F sensor	1	EC	Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0133	1	F3	1		57		
F0133	I		2	F102	61	Existed	
P0153	2	0 500	1	FIUZ	65	LAISIEU	
FU100	Z	F20	2		66	-	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank Connector Terminal		Giouna	Continuity	
P0133	1	F3	1		Not existed
F0133	I	15	2	Ground	
P0153	2	F20	1	Giouna	
F0155	2	F20	2		

[VQ37VHR]

P0133, P0153 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

		FOM				
DTC	Popk	ECM	Terminal	Ground	Continuity	
. <u> </u>	Bank	Connector	Terminal			
P0133	1		57 61			E
		F102	65	Ground	Not existed	
P0153	2		66			
	haalih	ornoon for				
5. Also c Is the insp				ower.		
	> GO 1		<u>iai :</u>			
-			cuit, short	to ground	or short to	oower in harness or connectors.
9.CHECK	AIR F	UEL RATI	0 (A/F) SE	ENSOR 1 I	HEATER	
Refer to E	C-161.	"Compone	ent Inspect	tion".		
Is the insp						
-	> GO 1					
	> GO 1					
		SS AIR FL				
Check bot					ank 2).	
Refer to E				<u>tion"</u> .		
<u>Is the insp</u> YES >	<u>ection</u> > GO 1		<u>ial?</u>			
		ace malfun	ctionina m	nass air flo	w sensor.	
11.снес						
Refer to E	C-518.	"Compone	ent Inspect	tion".		
Is the insp						
	> GO 1					
	•	air or replac				
12.CHE	CK INT	ERMITTEI	NT INCIDE	ENT		
Perform G	I-41, "I	ntermittent	Incident".			
<u>Is the insp</u>	ection	result norm	nal?			
	> GO 1					
	•	air or replac				
l ວ໌.REPI		AIR FUEL F	RATIO (A/	F) SENSO	R 1	
Replace m		tioning air f	uel ratio (A	A/F) sensc	or 1.	
CAUTION Discard		/E sonsor	which he	e haan di	ronned fro	n a height of more than 0.5 m (19.7 in) onto a
					a new one.	
 Before 	installi	ng new A	A/F senso	or, clean	exhaust s	stem threads using Oxygen Sensor Thread
				ol (J-4389	7-18 or J-4	3897-12)] and approved Anti-seize Lubricant
(comme	i cial S	ervice too	ı).			
		PECTION E	ND			
,	~ INOF					

< DTC/CIRCUIT DIAGNOSIS >

P0137, P0157 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 (bank 1) circuit low volt- age	The maximum voltage from the sensor does not	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2
P0157	Heated oxygen sensor 2 (bank 2) circuit low volt- age	reach the specified voltage.	Fuel pressureFuel injectorIntake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 5.

2. PRECONDITIONING

If DTC confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

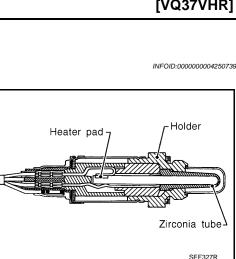
Turn ignition switch OFF and wait at least 10 seconds. 1.

- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.



ΟK

1V

0V

0.68V

INFOID:000000004250740

SEF259V

NG

< DTC/CIRCUIT DIAGNOSIS >

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
 Start engine and warm it up to the normal operating temperature.
 Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
- 10. Select "HO2S2 (B1) P1147" (for DTC P0137) or "HO2S2 (B2) P1167" (for DTC P0157) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Start engine and follow the instruction of CONSULT-III display. **NOTE:**
 - It will take at most 10 minutes until "COMPLETED" is displayed.
- 12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT-III screen?

- OK >> INSPECTION END
- NG >> Go to EC-222, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-221, "Component Function Check"</u>. **NOTE:**

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-222, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

		ECM				
DTC	Connector	+	-	Condition	Voltage	Ρ
	Connector	Terminal Termina				
P0137	F102	76	84	Revving up to 4,000 rpm under no load at	The voltage should be above 0.68 V at	
P0157	80		04	least 10 times	least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

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INFOID:000000004460714

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.

		ECM		ECM			
DTC	Connector	+	_	Condition Voltage			
	Connector	Terminal	Terminal				
P0137	F102	76	84	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at		
P0157	1102	80 84 K		Reeping engine at lue for to minutes	least once during this procedure.		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following condition.

		ECM				
DTC	Connector	+ –		Condition	Voltage	
	Connector	Terminal	Terminal			
P0137	F102	76 84		Coasting from 80 km/h (50 MPH) in D po-	The voltage should be above 0.68 V at	
P0157	1102	80	04	sition (A/T), 4th gear position (M/T)	least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-222, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000004250742

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-22</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0174 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to <u>EC-240, "DTC Logic"</u>.

NO >> GO TO 3.

$\mathbf{3}$. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		EC	Continuity	
DIC	Bank Connector		Terminal	Connector	Terminal	Continuity
P0137	1	F54	1	F102	84	Existed
P0157	2	F53	1	FIUZ	04	EXISIEU

				FU13/	, FUIS/	HUZ3Z			
< DTC/CIF	< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]								
5. Also check harness for short to ground and short to power.									
Is the insp	Is the inspection result normal?								
YES >									
NO >:	> Repa	ir open ciro	cuit, short	to ground	or short to	power in h	arness or connectors.		
4.CHECK	(HO2S	2 INPUT S	SIGNAL C	IRCUIT FO	OR OPEN	AND SHOP	RT	EC	
1. Check	the co	ntinuity be	tween HO	2S2 harne	ess connec	tor and EC	M harness connector.		
		-						С	
DTO		HO2S2		EC	CM	Orationity		0	
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity			
P0137	1	F54	4		76			D	
P0157	2	F53	4	F102	80	Existed			
2. Check	the co	ontinuity be	etween H	O2S2 har	ness conn	ector and	ground, or ECM harness conector and	-	
ground							g ,	E	
DTC		HO2S2		Ground	Continuity			F	
DIC	Bank	Connector	Terminal	Giouna	Ground Continuity				
P0137	1	F54	4	Ground					
P0157	2	F53	4	Ground	Not existed			G	
		L		l		_			
		ECM		- ·		-		Н	
DTC	Bank	Connector	Terminal	Ground	Continuity			П	
P0137	1		76	_		_			
P0157	2	F102	80	Ground	Not existed	1			
3. Also c	heck h	arness for	short to p	ower.		-			
		result norm	-						
	> GO T							J	
_NO >:	> Repa	ir open circ	cuit, short	to ground	or short to	power in h	arness or connectors.		
5.CHECK	(HEAT	ED OXYG	EN SENS	OR 2				K	
Refer to E	C-224.	"Compone	nt Inspec	tion".				1 \	
		-							
YES >	Is the inspection result normal? YES >> GO TO 7.							L	
NO >:									
6.REPLA	6.REPLACE HEATED OXYGEN SENSOR 2							П. Л.	
	Replace malfunctioning heated oxygen sensor 2.								
	CAUTION:								
	 Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one. 								
• Before i	nstalli	ng new he	eated oxy	/gen sens	or, clean	exhaust s	ystem threads using Oxygen Sensor		
Thread (Cleane	r [comme	rcial serv				7-12)] and approved Anti-seize Lubri-		
cant (co	mmerc	cial service	e tool).					0	

cant (commercial service tool).	0
>> INSPECTION END 7.CHECK INTERMITTENT INCIDENT	P
Refer to GI-41, "Intermittent Incident".	

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

1.INSPECTION START

Do you have CONSULT-III?

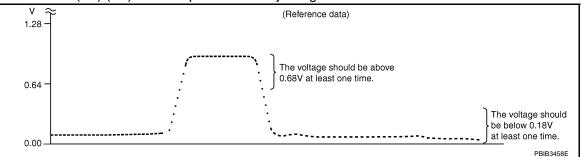
Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



"HO2S2 (B1)/(B2)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

	ECM				
Connector	+	-	Condition	Voltage	
CONNECTOR	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)]	84	Revving up to 4,000 rpm under no load at	The voltage should be above 0.68 V at least once during this procedure.	
1 102	80 [HO2S2 (bank 2)]	04	least 10 times	The voltage should be below 0.18 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	ECM			
Connector	+	_	Condition	Voltage
Connector	Terminal	Terminal		
F102	76 [HO2S2 (bank 1)] 80 [HO2S2 (bank 2)]	84	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
s the inspe	ection result r	normal?		
	> INSPECTIC > GO TO 5.	ON END		
	HEATED O	YGEN SEI	NSOR 2-III	
			arness connector terminals under the	o following condition
	vollage betwo			
	ECM			
Connector	+	_	Condition	Voltage
Connector	Terminal	Terminal		
F102	76 [HO2S2 (bank 1)] 80 [HO2S2 (bank 2)]	84	Coasting from 80 km/h (50 MPH) in D po- sition (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
-	ection result r			
YES >>	> INSPECTIC > GO TO 6.	ON END		
NO >>				
~	CE HEATED	OXYGEN S	SENSOR 2	
6. REPLAC	CE HEATED			
CAUTION: Discard b Discard in) onto b Before in	alfunctioning any heated a hard surfa nstalling nev	heated oxy oxygen ser ce such as w heated o	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust sys	tem threads using Oxygen Senso
CAUTION: Discard Discard Before in Thread O	alfunctioning any heated a hard surfa nstalling nev	heated oxy oxygen set ce such as w heated co mercial se	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust sys ervice tool (J-43897-18 or J-43897-	tem threads using Oxygen Senso
D.REPLAC Replace m CAUTION: Discard in) onto Before in Thread C cant (cor	alfunctioning any heated o a hard surfa nstalling new Cleaner [com mmercial se	heated oxy oxygen set ce such as w heated co mercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust sys ervice tool (J-43897-18 or J-43897-	m a height of more than 0.5 m (19.7 stem threads using Oxygen Senso 12)] and approved Anti-seize Lubri
D.REPLAC Replace m CAUTION: Discard in) onto Before in Thread C cant (cor	alfunctioning any heated a hard surfa nstalling new Cleaner [com	heated oxy oxygen set ce such as w heated co mercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust sys ervice tool (J-43897-18 or J-43897-	tem threads using Oxygen Senso
D.REPLAC Replace m CAUTION: Discard in) onto Before in Thread C cant (cor	alfunctioning any heated o a hard surfa nstalling new Cleaner [com mmercial se	heated oxy oxygen set ce such as w heated co mercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust sys ervice tool (J-43897-18 or J-43897-	tem threads using Oxygen Senso
D.REPLAC Replace m CAUTION: Discard in) onto Before in Thread C cant (cor	alfunctioning any heated o a hard surfa nstalling new Cleaner [com mmercial se	heated oxy oxygen set ce such as w heated co mercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust sys ervice tool (J-43897-18 or J-43897-	tem threads using Oxygen Senso
D.REPLAC Replace m CAUTION: Discard in) onto Before in Thread C cant (cor	alfunctioning any heated o a hard surfa nstalling new Cleaner [com mmercial se	heated oxy oxygen set ce such as w heated co mercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust sys ervice tool (J-43897-18 or J-43897-	tem threads using Oxygen Senso
D.REPLAC Replace m CAUTION: Discard in) onto Before in Thread C cant (cor	alfunctioning any heated o a hard surfa nstalling new Cleaner [com mmercial se	heated oxy oxygen set ce such as w heated co mercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust sys ervice tool (J-43897-18 or J-43897-	tem threads using Oxygen Senso
D.REPLAC Replace m CAUTION: Discard in) onto Before in Thread C cant (cor	alfunctioning any heated o a hard surfa nstalling new Cleaner [com mmercial se	heated oxy oxygen set ce such as w heated co mercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust sys ervice tool (J-43897-18 or J-43897-	tem threads using Oxygen Senso

< DTC/CIRCUIT DIAGNOSIS >

P0138, P0158 HO2S2

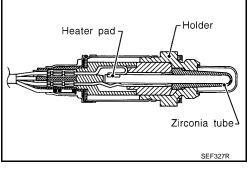
Description

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



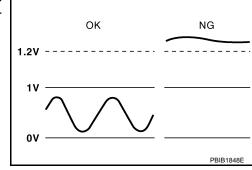
DTC Logic

INFOID:000000004250745

DTC DETECTION LOGIC

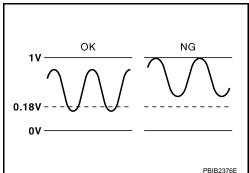
The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/ F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. **MALFUNCTION A**

To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during various driving conditions such as fuel cut.



MALFUNCTION B

To judge malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
	Heated oxygen sensor 2	A)	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2
P0138	(bank 1) circuit high volt- age	B)	The minimum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure Fuel injector

INFOID:000000004250744

[VQ37VHR]

P0138, P0158 HO2S2

< DTC/CIR	CUIT DIAGNOSIS >				
DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	
		A)	An excessively high voltage from the sen- sor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 	A
P0158	Heated oxygen sensor 2 (bank 2) circuit high volt- age	B)	The minimum voltage from the sensor is not reached to the specified voltage.	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 Fuel pressure 	EC
				Fuel injector	С

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procudure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 6. Let engine idle for 2 minuites.
- 7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-229, "Diagnosis Procedure".
- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> Without CONSULT-III: GO TO 5.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

- 1. Select "DATA MONITOR" mode with CONSULT-III.
- Start engine and warm it up to the normal operating temperature. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.
- Turn ignition switch ON. 4.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- Μ Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 6. Let engine idle for 1 minute.
- Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- Ν If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F). 9. Open engine hood.
- 10. Select "HO2S2 (B1) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in
 - "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Start engine and follow the instruction of CONSULT-III display. NOTE:
- It will take at most 10 minutes until "COMPLETED" is displayed.
- 12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

>> Go to EC-229, "Diagnosis Procedure". NG

CON NOT BE DIAGNOSED>>GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle). 1.

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P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

2. Perform DTC confirmation procedure again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-228, "Component Function Check".

NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to <u>EC-229</u>, "Diagnosis Procedure".

Component Function Check

INFOID:000000004460716

[VQ37VHR]

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

		ECM					
DTC	Connector	+	-	Condition	Voltage		
	Connector	Terminal	Terminal				
P0138	F102	76	84	Revving up to 4,000 rpm under no load at	The voltage should be below 0.18 V at		
P0158	1102	80	- 04	least 10 times	least once during this procedure.		

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.

		ECM				
DTC	Connector	+	-	Condition	Voltage	
	Connector	Terminal	Terminal			
P0138	F102	76	84	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at	
P0158	1102	80	04	Reeping engine at the for To minutes	least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following condition.

		ECM					
DTC	Connector	+	-	Condition	Voltage		
	Connector	Terminal	Terminal				
P0138	F102	76	84	Coasting from 80 km/h (50 MPH) in D po-	The voltage should be below 0.18 V at		
P0158	1 102	80	04	sition (A/T), 4th gear position (M/T)	least once during this procedure.		

DTC/CIF	RCUIT	DIAGNOS	SIS >						[VQ37VHR]	
		result norm								
		ECTION E <u>EC-229,</u> "		Procedur	<u>e"</u> .					
Diagnos	is Pro	cedure							INFOID:000000004250747	
.INSPEC		START								
			ction (A c	or B). Refei	r to EC-22	6, "DTC Logi	с".			
		n is detecte	•	,			_			
	> GO T > GO T									
		JND CONN	IECTION							
		switch OFF								
	-			efer to Gro	ound Inspe	ection in <u>GI-4</u>	<u>4. "Circuit Ins</u> t	<u>pection"</u> .		
	= GO T	r <u>esult norm</u> O 3	<u>ai<i>:</i></u>							
		ir or replac	•							
	•									
	•	2 GROUN	D CIRCU	IT FOR OF	PEN AND	SHORT				
CHECK	HO2S	eated oxyg	en senso	r 2 (HO2S		SHORT s connector.				
CHECK Discor	HO2S	eated oxyg	en senso s connec	r 2 (HO2S2 tor.	2) harness	s connector.	harness conr	nector.		
CHECK	HO2S	eated oxyg CM harnes ntinuity bet	en senso s connec	r 2 (HO2S: tor. 2S2 harne	2) harness ess connec	s connector.	harness conr	nector.		
CHECK Discor	HO2S Innect h Innect E I the co	eated oxyg CM harnes ntinuity bet HO2S2	en senso s connec ween HO	r 2 (HO2S: tor. 2S2 harne EC	2) harness ess connec	s connector.	harness conr	nector.		
CHECK Discor Discor Check	HO2S nnect h nect E the co Bank	eated oxyg CM harnes ntinuity bet HO2S2 Connector	en senso s connec ween HC Terminal	r 2 (HO2S: tor. 2S2 harne	2) harness ess connec	s connector. ctor and ECM	harness conr	nector.		
DISCOR DISCOR DISCOR Check DTC P0138	HO2S HO2S Here the the co Bank 1	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54	en senso s connec ween HC Terminal	r 2 (HO2S: tor. 2S2 harne EC	2) harness ess connec	s connector. ctor and ECM	harness conr	nector.		
CHECK Discor Discor Check DTC P0138 P0158	A HO2S nnect h nnect E the co Bank 1 2	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54 F53	en senso s connec ween HC Terminal 1 1	r 2 (HO2S2 tor. 2S2 harne Connector F102	2) harness ess connec CM Terminal 84	s connector. ctor and ECM Continuity Existed	harness conr	nector.		
CHECK Discor Discor Check DTC P0138 P0158	A HO2S nnect h nnect E the co Bank 1 2 heck h	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54	en senso s connec ween HC Terminal 1 1 short to gr	r 2 (HO2S2 tor. 2S2 harne Connector F102	2) harness ess connec CM Terminal 84	s connector. ctor and ECM Continuity Existed	harness conr	nector.		
CHECK Discor Discor Check DTC P0138 P0158 Also c the insper YES >:	A HO2S nnect h nnect E the co Bank 1 2 heck h ection 1 > GO T	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54 F53 arness for s result norm TO 4.	Terminal 1 short to gr	r 2 (HO2S2 tor. 2S2 harne Connector F102 round and	2) harness ess connec CM Terminal 84 short to po	s connector. ctor and ECM Continuity Existed Dwer.				
CHECK Discor Discor Check DTC P0138 P0158 Also c the inspo YES >: NO >:	HO2S nnect h nnect E the co Bank 1 2 heck h ection n > GO T > Repa	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54 F53 arness for s result norm TO 4. ir open circ	Terminal 1 short to gr al?	r 2 (HO2S2 tor. 2S2 harne Connector F102 round and to ground	2) harness ess connec CM Terminal 84 short to po or short to	s connector. ctor and ECM Continuity Existed ower. o power in har	rness or conn			
CHECK Discor Discor Check DTC P0138 P0158 Also c the inspor YES >: NO >: CHECK	A HO2S nnect h nnect E the co Bank 1 2 heck h ection f > GO T > Repa	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54 F53 arness for s result norm TO 4. ir open circ S2 INPUT S	Terminal 1 short to gr al? cuit, short	r 2 (HO2S2 tor. 2S2 harne Connector F102 round and to ground IRCUIT FC	2) harness ess connec CM Terminal 84 short to po or short to DR OPEN	s connector. ctor and ECM Continuity Existed ower. o power in har AND SHORT	rness or conne	ectors.		
CHECK Discor Discor Check DTC P0138 P0158 Also c Sthe inspor YES >: NO >: CHECK	A HO2S nnect h nnect E the co Bank 1 2 heck h ection f > GO T > Repa	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54 F53 arness for s result norm TO 4. ir open circ S2 INPUT S	Terminal 1 short to gr al? cuit, short	r 2 (HO2S2 tor. 2S2 harne Connector F102 round and to ground IRCUIT FC	2) harness ess connec CM Terminal 84 short to po or short to DR OPEN	s connector. ctor and ECM Continuity Existed ower. o power in har AND SHORT	rness or conn	ectors.		
CHECK Discor Discor Check DTC P0138 P0158 Also c the inspective YES >: NO >: CHECK CHECK Check	A HO2S nnect h nnect E the co Bank 1 2 heck h ection f > GO T > Repa	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54 F53 arness for s result norm TO 4. ir open circ S2 INPUT S	Terminal 1 short to gr al? cuit, short	r 2 (HO2S2 tor. 2S2 harne Connector F102 round and to ground IRCUIT FC 2S2 harne	2) harness ess connec CM Terminal 84 short to po or short to DR OPEN	s connector. ctor and ECM Continuity Existed ower. o power in har AND SHORT ctor and ECM	rness or conne	ectors.		
CHECK Discor Discor Check DTC P0138 P0158 Also c Sthe inspor YES >: NO >: CHECK	A HO2S nnect h nnect E the co Bank 1 2 heck h ection f > GO T > Repa	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54 F53 arness for s result norm TO 4. ir open circ S2 INPUT S ntinuity bet	Terminal 1 short to gr al? cuit, short	r 2 (HO2S2 tor. 2S2 harne Connector F102 round and to ground IRCUIT FC 2S2 harne	2) harness ess connec CM Terminal 84 short to po or short to DR OPEN ess connec	s connector. ctor and ECM Continuity Existed ower. o power in har AND SHORT	rness or conne	ectors.		
CHECK Discor Discor Check DTC P0138 P0158 Also c the inspective YES >: NO >: CHECK CHECK Check	A HO2S nnect h nnect E the co Bank 1 2 heck h ection 1 > GO T > Repa A HO2S the co	eated oxyg CM harnes ntinuity bet HO2S2 Connector F54 F53 arness for s result norm TO 4. ir open circ S2 INPUT S ntinuity bet HO2S2	Terminal 1 short to gr al? cuit, short GNAL C	r 2 (HO2S2 tor. 2S2 harne Connector F102 round and to ground IRCUIT FC 2S2 harne	2) harness ess connect CM Terminal 84 short to pe or short to DR OPEN ess connect CM	s connector. ctor and ECM Continuity Existed ower. o power in har AND SHORT ctor and ECM	rness or conne	ectors.		

DTC		HO2S2		Ground Continuity		
ыс	Bank	Connector	Terminal			
P0138	1	F54	4	Ground	Not existed	
P0158	2	F53	4	Ground	INUL EXISIEU	

DTC		ECM		Ground	Continuity
DIC	Bank	Connector	Terminal	Gibunu	Continuity
P0138	1	F102	76	Ground	Not existed
P0158	2	F102	80	Giouna	

EC-229

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P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace harness or connectors.

6.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-231, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

8.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

9.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair or replace ground connection.

10.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-22</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-244, "DTC Logic".

NO >> GO TO 11.

11. CHECK H02S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect heated oxygen sensor 2 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

DTC		HO2S2		EC		Continuity	
	Bank	Connector	Terminal	Connector	Terminal		
P0138	1	F54	1	F102	84	Existed	
P0158	2	F53	1				
		arness for s result norm	-	round and	snort to po	ower.	
	> GO T		<u>ai:</u>				
			uit, short	to ground	or short to	power in	harness or connectors.
12.сне		2S2 INPUT	SIGNAL	CIRCUIT	FOR OPE		IORT
							CM harness connector.
DTC		HO2S2		EC	CM	Continuity	
510	Bank	Connector	Terminal	Connector	Terminal	Containanty	
P0138	1	F54	4	F102	76	Existed	
P0158	2	F53	4	1102	80	LAISIEU	
2. Check	the co	ntinuity bet	ween HO	2S2 harne	ss conneo	ctor or ECN	I harness connector and ground.
		110000		50	<u></u>		
DTC		HO2S2		EC		Ground	Continuity
D 0400	Bank	Connector	Terminal	Connector	Terminal		
P0138	1	F54	4	F102	76	Ground	Not existed
P0158	2	F53 arness for s	4		80		
13.CHEO Refer to E Is the insp YES > NO > 14.REPL Replace m CAUTION Discard in) onto Before i Thread of cant (co	CK HE/ C-228, ection I > GO T - GO T - ACE H alfunct : any he a hard nstallin Cleane mmerc	ATED OXY <u>"Compone</u> result norm TO 15. TO 14. HEATED OX ioning heat eated oxyg surface s ng new he r [commer cial service	GEN SEN nt Function al? XYGEN S ted oxyge gen sense uch as a eated oxy rcial serv e tool).	SOR 2 on Check". ENSOR 2 n sensor 2 or which h concrete	nas been floor; use or, clean	dropped f a new on exhaust s	from a height of more than 0.5 m (19.7 e. system threads using Oxygen Sensor 97-12)] and approved Anti-seize Lubri-
·		ECTION E					
		ERMITTEN					
Refer to <u>G</u>	<u>I-41, "lı</u>	ntermittent	Incident".				
>	> INSP	ECTION E	ND				
Compon	ent Ir	nspectior	n				INF0ID:000000004460717
1.INSPEC	CTION	START					

< DTC/CIRCUIT DIAGNOSIS >

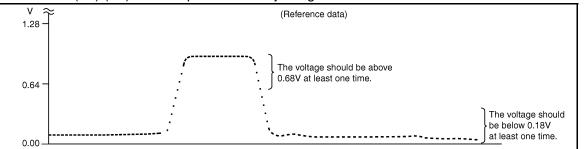
Do you have CONSULT-III? Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

BWith CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



"HO2S2 (B1)/(B2)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

YES >> INSPECTION END

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

- T. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

1	ECM			
Connector	+	-	Condition	Voltage
Connector	Terminal	Terminal		
F102	76 [HO2S2 (bank 1)]	84	Revving up to 4,000 rpm under no load at	The voltage should be above 0.68 V at least once during this procedure.
F 102	80 [HO2S2 (bank 2)]	04	least 10 times	The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

F102 (bank 1)] 80 [HO2S2 (bank 2)] 84 Keeping engine at idle for 10 minutes once during this procedure. The voltage should be below 0.18 V at lease once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 5. S.CHECK HEATED OXYGEN SENSOR 2-III Check the voltage between ECM harness connector terminals under the following condition. ECM Connector + - Connector + - Terminal Terminal Voltage 76 [HO2S2 (bank 1)] 84 Coasting from 80 km/h (50 MPH) in D posi- The voltage should be above 0.68 V at lease once during this procedure.		ECM					
Terminal Terminal 76 [HO252] (bank 1)] 84 F102 80 [HO252] (bank 1)] 80 [HO252] (bank 2)] 84 Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 5. 5. CHECK HEATED OXYGEN SENSOR 2-III Check the voltage between ECM harness connector terminals under the following condition. Connector 76 [HO252] (bank 1)] 84 Connector 76 [HO252] (bank 1)] 84 Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T) The voltage should be above 0.68 V at leas once during this procedure. The voltage should be above 0.68 V at leas once during this procedure. Tom (A/T), 4th gear position (M/T) The voltage should be above 0.68 V at leas once during this procedure. NO >SO TO 6. 6. REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: • Discard any heated oxygen s	Connector	+	-	Condition	Voltage		
F102 [H02S2 (bank 1)] 80 [H02S2 (bank 2)] 84 Keeping engine at idle for 10 minutes The voltage should be above 0.68 V at leas once during this procedure. The voltage should be above 0.18 V at leas once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 5. 5.CHECK HEATED OXYGEN SENSOR 2-III Condition Voltage Connector + - Condition Voltage Terminal Coasting from 80 km/h (50 MPH) in D posi- tion (A/T), 4th gear position (M/T) The voltage should be above 0.68 V at leas once during this procedure. F102 80 (H02S2 (bank 1)] 84 Coasting from 80 km/h (50 MPH) in D posi- tion (A/T), 4th gear position (M/T) The voltage should be above 0.68 V at leas once during this procedure. The voltage should be above 0.68 V at leas once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO SO TO 6. SO TO 6. 6. REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. 9. • Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool]. J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool]. <td>Connector</td> <td>Terminal</td> <td>Terminal</td> <td></td> <td></td>	Connector	Terminal	Terminal				
YES >> INSPECTION END NO >> GO TO 5. 5.CHECK HEATED OXYGEN SENSOR 2-III Check the voltage between ECM harness connector terminals under the following condition. \hline	F102	[HO2S2 (bank 1)] 80 [HO2S2	84	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at least		
NO >> GO TO 5. 5.CHECK HEATED OXYGEN SENSOR 2-III Check the voltage between ECM harness connector terminals under the following condition. Image: terminal connector terminal condition Connector terminal terminal terminal Image: terminal terminal terminal terminal Image: terminal terminal terminal terminal terminal Image: terminal	Is the insp	ection result r	normal?				
5. CHECK HEATED OXYGEN SENSOR 2-III Check the voltage between ECM harness connector terminals under the following condition. Image: Connector + Condition / Terminal Terminal / Terminal Terminal / Coasting from 80 km/h (50 MPH) in D position during this procedure. The voltage should be above 0.68 V at leas once during this procedure. The voltage should be below 0.18 V at leas once during this procedure. The voltage should be below 0.18 V at leas once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 6. 6. REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. • Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool).			ON END				
Check the voltage between ECM harness connector terminals under the following condition. ECM Voltage Connector + - Condition Voltage Terminal Terminal The voltage should be above 0.68 V at leas once during this procedure. The voltage should be below 0.18 V at leas once during this procedure. YES > INSPECTION END <td></td> <td></td> <td></td> <td></td> <td></td>							
ECM Condition Voltage Connector + - Condition Voltage Image: Terminal Terminal Terminal Terminal Terminal Voltage F102 102 102 102 The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 6. 6. REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: • Discard any heated oxygen sensor 2. • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. • Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool).							
Connector + - Condition Voltage Image: Terminal Terminal Terminal Terminal Voltage Image: Flo2 76 [HO2S2 (bank 1)] Coasting from 80 km/h (50 MPH) in D position (M/T) The voltage should be above 0.68 V at leas once during this procedure. The voltage should be below 0.18 V at leas once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 6. 6. REPLACE HEATED OXYGEN SENSOR 2 Explace malfunctioning heated oxygen sensor 2. CAUTION: • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool).	Check the	voltage betw	een ECIVI n	arness connector terminals under the	following condition.		
Connector Terminal Terminal F102 76 [HO2S2 (bank 1)] 76 [HO2S2 (bank 1)] The voltage should be above 0.68 V at leas once during this procedure. The voltage should be below 0.18 V at leas once during this procedure. The voltage should be below 0.18 V at leas once during this procedure. Is the inspection result normal? YES > INSPECTION END NO >> GO TO 6. 6.REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: • Discard any heated oxygen sensor 2. • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. • Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool).		ECM					
Terminal Terminal F102 76 [HO2S2 (bank 1)] 76 [HO2S2 (bank 1)] The voltage should be above 0.68 V at leas once during this procedure. The voltage should be below 0.18 V at leas once during this procedure. The voltage should be below 0.18 V at leas once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 6. 6.REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: CAUTION: • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. • Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool).	Connector	+	_	Condition	Voltage		
F102 [HO2S2 (bank 1)] 80 [HO2S2 (bank 2)] 84 Coasting from 80 km/h (50 MPH) in D position (M/T) The voltage should be above 0.68 V at leas once during this procedure. The voltage should be below 0.18 V at leas once during this procedure. Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 6. Sector 1000000000000000000000000000000000000	Connector	Terminal	Terminal				
(bank 2)] Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 6. 6.REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: • Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. • Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool).	F102	[HO2S2 (bank 1)] 80	84		The voltage should be below 0.18 V at least		
 YES >> INSPECTION END NO >> GO TO 6. 6.REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool). 		•					
 NO >> GO TO 6. 6.REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool). 		ection result r					
 6.REPLACE HEATED OXYGEN SENSOR 2 Replace malfunctioning heated oxygen sensor 2. CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool). 							
 Replace malfunctioning heated oxygen sensor 2. CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool). 	YES >:		ON END				
 CAUTION: Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19. in) onto a hard surface such as a concrete floor; use a new one. Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubr cant (commercial service tool). 	YES >: NO >:	> GO TO 6.					
>> INSPECTION END	YES > NO > 6.REPLA	> GO TO 6. CE HEATED	OXYGEN S				
	YES >: NO >: 6.REPLA Replace m CAUTION • Discard in) onto • Before i Thread 0	> GO TO 6. CE HEATED alfunctioning any heated a hard surfa nstalling ner Cleaner [con	OXYGEN S heated oxy oxygen se ce such as w heated on mercial se	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust syst ervice tool (J-43897-18 or J-43897-1	em threads using Oxygen Senso		
	YES >: NO >: 6.REPLA Replace m CAUTION • Discard in) onto • Before i Thread (cant (co	 GO TO 6. CE HEATED alfunctioning any heated a hard surfa nstalling nev Cleaner [con mmercial se 	OXYGEN S heated oxy oxygen se ce such as w heated o nmercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust syst ervice tool (J-43897-18 or J-43897-1	em threads using Oxygen Senso		
	YES >: NO >: 6.REPLA Replace m CAUTION • Discard in) onto • Before i Thread (cant (co	 GO TO 6. CE HEATED alfunctioning any heated a hard surfa nstalling nev Cleaner [con mmercial se 	OXYGEN S heated oxy oxygen se ce such as w heated o nmercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust syst ervice tool (J-43897-18 or J-43897-1	em threads using Oxygen Senso		
	YES >: NO >: 6.REPLA Replace m CAUTION • Discard in) onto • Before i Thread (cant (co	 GO TO 6. CE HEATED alfunctioning any heated a hard surfa nstalling nev Cleaner [con mmercial se 	OXYGEN S heated oxy oxygen se ce such as w heated o nmercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust syst ervice tool (J-43897-18 or J-43897-1	em threads using Oxygen Senso		
	YES >: NO >: 6.REPLA Replace m CAUTION • Discard in) onto • Before i Thread (cant (co	 GO TO 6. CE HEATED alfunctioning any heated a hard surfa nstalling nev Cleaner [con mmercial se 	OXYGEN S heated oxy oxygen se ce such as w heated o nmercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust syst ervice tool (J-43897-18 or J-43897-1	em threads using Oxygen Senso		
	YES >: NO >: 6.REPLA Replace m CAUTION • Discard in) onto • Before i Thread (cant (co	 GO TO 6. CE HEATED alfunctioning any heated a hard surfa nstalling nev Cleaner [con mmercial se 	OXYGEN S heated oxy oxygen se ce such as w heated o nmercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust syst ervice tool (J-43897-18 or J-43897-1	em threads using Oxygen Senso		
	YES >: NO >: 6.REPLA Replace m CAUTION • Discard in) onto • Before i Thread (cant (co	 GO TO 6. CE HEATED alfunctioning any heated a hard surfa nstalling nev Cleaner [con mmercial se 	OXYGEN S heated oxy oxygen se ce such as w heated o nmercial se rvice tool).	gen sensor 2. nsor which has been dropped from a concrete floor; use a new one. oxygen sensor, clean exhaust syst ervice tool (J-43897-18 or J-43897-1	em threads using Oxygen Senso		

< DTC/CIRCUIT DIAGNOSIS >

P0139, P0159 HO2S2

Description

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconi a generates voltage from approximately 1 V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

DTC Logic

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel cut.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 (bank 1) circuit slow re- sponse	It takes more time for the sensor to respond be-	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2
P0159	Heated oxygen sensor 2 (bank 2) circuit slow re- sponse	tween rich and lean than the specified time.	Fuel pressureFuel injectorIntake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 5.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

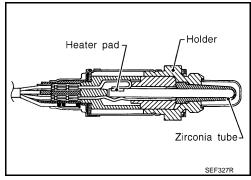
2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.



INFOID:000000004250749

INFOID:000000004250750

< DTC/CIRCUIT DIAGNOSIS >

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- Start engine and warm it up to the normal operating temperature. 2.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 7. Let engine idle for 1 minute.
- Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F). D 9. Open engine hood.
- 10. Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Start engine and follow the instruction of CONSULT-III display. NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT-III screen?

- OK >> INSPECTION END
- >> Go to EC-236, "Diagnosis Procedure". NG

CAN NOT BE DIAGNOSED>>GO TO 4.

${f 4}$. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

2. Perform DTC confirmation procedure again.

>> GO TO 3.

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-235, "Component Function Check". NOTE:

Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-236, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 3.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

	ECM					
DTC	Connector	+	_	Condition	Voltage	Ρ
	CONNECTOR	Terminal	Terminal			
P0139	F102	F102 76	84	Revving up to 4,000 rpm under no load at	A change of voltage should be more than	
P0159	1102	80	04	least 10 times	0.24 V for 1 second during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END А

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INFOID:000000004460718

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.

		ECM				
DTC	+	_	Condition	Voltage		
	Connector	Terminal	Terminal			
P0139	F102	76	84	Keeping engine at idle for 10 minutes	A change of voltage should be more than	
P0159	1 102	80	04	Reeping engine at fole for to minutes	0.24 V for 1 second during this procedure	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3. PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector terminals under the following condition.

		ECM				
DTC	Connector	+	-	Condition	Voltage	
		Terminal	Terminal			
P0139	F102	76	84	Coasting from 80 km/h (50 MPH) in D po-	A change of voltage should be more than	
P0159			04	sition (A/T), 4th gear position (M/T)	0.24 V for 1 second during this procedure	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-236</u>, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000004250752

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-22</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".
- 2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-240. "DTC Logic"</u> or <u>EC-244. "DTC Logic"</u>.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

DT0		HO2S2		EC	CM	0	
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0139	1	F54	1	F102	84	Existed	
P0159	2	F53	1	F IUZ	04	EXISIEU	
i. Also c	heck ha	arness for s	short to gi	ound and	short to po	ower.	
		esult norm	<u>al?</u>				
	> GO T		wit chart	to groupd	or chart to	nowor in k	arness or connectors.
4	•	•		0		AND SHO	
. Check	the co	ntinuity bei	ween HO	2S2 harne	ss connec	tor and EC	M harness connector.
		HO2S2		FC	CM		
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0139	1	F54	4	0011100101	76		
P0159	2	F53	4	F102	80	Existed	
			-	N2S2 harn		ector and a	round, or ECM harness connector and
ground		minuny De			633 60111		
9.0010							
570		HO2S2					
DTC	Bank	Connector	Terminal	Ground	Continuity	1	
P0139	1	F54	4	<u> </u>		_	
P0159	2	F53	4	Ground	Not existed	d	
					I		
DTO		ECM		0		_	
DTC	Bank	Connector	Terminal	Ground	Continuity		
P0139	1	E 400	76	0	NL C C C C	_	
P0159	2	F102	80	Ground	Not existed	2	
. Also c	heck ha	arness for s	short to po	ower.		_	
s the insp	ection I	esult norm	al?				
	> GO T						
	-	-		-	or short to	power in h	arness or connectors.
). CHECK	HEAT	ED OXYG	EN SENS	OR 2			
Refer to E	C-238,	"Compone	nt Inspect	tion".			
s the insp	ection I	esult norm	<u>al?</u>				
-	> GO T	-					
	> GO T						
D. REPLA	CE HE	ATED OXY	GEN SEI	NSOR 2			
		ioning hea [.]	ted oxyge	n sensor 2			
		ated avu	ion conce	or which k	nae hoon	dropped f	om a height of more than 0.5 m (19.7
DISCOLO							
	a hard	surface s	uch as a	concrete 1	floor: use	a new on	
in) onto Before i	nstalliı	ng new he	ated oxy	vgen sens	or, clean	exhaust s	

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

< DTC/CIRCUIT DIAGNOSIS >

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000004460719

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

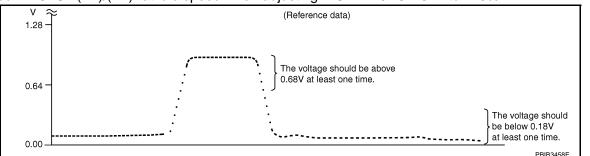
YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



"HO2S2 (B1)/(B2)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

ECM					
Connector	+ –		Condition	Voltage	
Connector	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)]	84	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.	
F102	80 [HO2S2 (bank 2)]	84		The voltage should be below 0.18 V at lease once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

	ECM				EC
	ECIVI		_		
Connector	+	-	Condition	Voltage	
Connector	Terminal	Terminal			С
F100	76 [HO2S2 (bank 1)]	84	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.	D
F102	80 [HO2S2 (bank 2)]	04	Reeping engine at lote for 10 minutes	The voltage should be below 0.18 V at least once during this procedure.	F

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

G

F

А

	ECM				
Connector	+	-	Condition	Voltage	Н
Connector	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)]	84	Coasting from 80 km/h (50 MPH) in D posi-	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	I
F 102	80 [HO2S2 (bank 2)]	- 04	tion (A/T), 4th gear position (M/T)		J
Is the insp	ection result i	normal?			
YES >> INSPECTION END					K

NO >> GO TO 6.

6

6.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new heated oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).

>> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000004250754

[VQ37VHR]

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too lean), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean (bank 1)		 Intake air leaks A/F sensor 1
P0174	Fuel injection system too lean (bank 2)	 Fuel injection system does not operate properly. The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) 	 Fuel injector Exhaust gas leaks Incorrect fuel pressure Lack of fuel Mass air flow sensor Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to <u>EC-22</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".

2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.

NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-241, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 5 minutes.

2. Check 1st trip DTC.

P0171, P0174 F	FUEL INJECTION SYSTEM FUNCTION	
< DTC/CIRCUIT DIAGNOSIS >		[VQ37VHR]
Is 1st trip DTC detected?		
YES >> Go to <u>EC-241, "Diagnosis</u> NO >> GO TO 5.		A
5. PERFORM DTC CONFIRMATION F	PROCEDURE-III	FO
1. Turn ignition switch OFF and wait a	at least 10 seconds.	EC
 Start engine. Maintain the following conditions for 	or at least 10 consecutive minutes	
Hold the accelerator pdal as stead		С
VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)	
CAUTION:		D
Always drive vehicle at a safe sp 4. Check 1st trip DTC.	beed.	
Is 1st trip DTC detected?		E
YES >> Go to EC-241, "Diagnosis	Procedure".	
NO >> INSPECTION END		F
Diagnosis Procedure		INFOID:000000004250755
1. CHECK EXHAUST GAS LEAK		0
1. Start engine and run it at idle.		G
2. Listen for an exhaust gas leak befor	pre three way catalyst 1.	
	Three way catalyst 1	Н
	Three way catalyst 1	
A/F sensor 1	HO2S2 / Muffler	1
To exhaust	┲─╢╴┫╴╹┲╶╻╴╸	
manifold ➡ : Exhaust gas		5
Is exhaust gas leak detected?		PBIB1922E
YES >> Repair or replace.		K
NO >> GO TO 2.		
2. CHECK FOR INTAKE AIR LEAK		L
1. Listen for an intake air leak after th	e mass air flow sensor.	
2. Check PCV hose connection.		Μ
<u>Is intake air leak detected?</u> YES >> Repair or replace.		101
NO $>>$ GO TO 3.		
3.CHECK A/F SENSOR 1 INPUT SIG	SNAL CIRCUIT	Ν
1. Turn ignition switch OFF.		
 Disconnect corresponding A/F sen Disconnect ECM harness connect 		0

4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

	A/F sensor 1			EC		
DTC		AVF Selisui	1	E(Continuity
2.0	Bank	Connector	Terminal	Connector	Terminal	Containing
P0171	1	F3	1	F102	57	Existed
FUTT	1	гэ	2		61	
P0174	2	F20	1	1 102	65	LAISIEU
F0174	2	2 F20	2 F20 2	66		

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< DTC/CIRCUIT DIAGNOSIS >

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC	A/F sensor 1		1	Ground	Continuity	
DIC	Bank	Connector	Terminal	Gibuliu	Continuity	
P0171	1	F3	1			
PUITI	I	гэ	2	Ground	Not existed	
P0174	2	E20	1	Ground		
P0174	2 F20	2				

DTC	ECM			Ground	Continuity
DIC	Bank	Connector	onnector Terminal		Continuity
P0171			57		
FUITI	I	F102	61	Ground	Not existed
P0174	2	FIUZ	65	Giouna	
P0174			66		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-614, "Inspection".

2. Install fuel pressure gauge and check fuel pressure. Refer to EC-614, "Inspection".

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly".

NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

(B) With CONSULT-III

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III. For specification, refer to <u>EC-619, "Mass Air Flow Sensor"</u>.

With GST

- 1. Install all removed parts.
- Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to <u>EC-619</u>, "Mass Air Flow Sensor".

Is the measurement value within the specification?

- YES >> GO TO 7.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-177, "Diagnosis Procedure"</u>.

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

1. Start engine.

[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

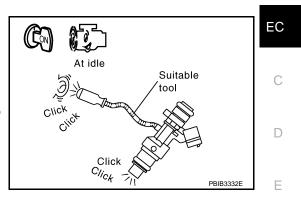
Without CONSULT-III

- 1. Start engine and let it idle.
- 2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-496, "Diagnosis Procedure"</u>.



8.CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- 3. Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to <u>EM-37</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. For DTC P0171, reconnect fuel injector harness connectors on bank 1. For DTC P0174, reconnect fuel injector harness connectors on bank 2.
- 6. Disconnect all ignition coil harness connectors.
- 7. Prepare pans or saucers under each fuel injector.
- Crank engine for about 3 seconds. For DTC P0171, make sure that fuel sprays out from fuel injectors on bank 1. For DTC P0174, make sure that fuel sprays out from fuel injectors on bank 2.

Fuel should be sprayed evenly for each fuel injector.

Is the inspection result normal?

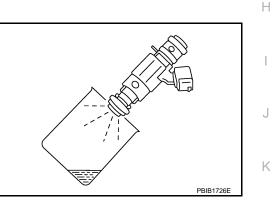
YES >> GO TO 9.

NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END



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[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:000000004250756

[VQ37VHR]

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (the actual mixture ratio is too rich), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich (bank 1)	Fuel injection system does not operate properly.	 A/F sensor 1 Fuel injector
P0175	Fuel injection system too rich (bank 2)	The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	 Exhaust gas leaks Incorrect fuel pressure Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Clear the mixture ratio self-learning value. Refer to <u>EC-22</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".
- 2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3. NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too. Crank engine while depressing accelerator pedal.

NOTE:

When depressing accelerator pedal three fourths (3/4)or more, hte control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-245, "Diagnosis Procedure".

NO >> Remove spark plugs and check for fouling, etc.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 10 minutes.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-245, "Diagnosis Procedure".

NO >> GO TO 5.

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > 5. PERFORM DTC CONFIRMATION PROCEDURE-III А 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Start engine. 3. Maintain the following conditions for at least 10 consecutive minutes... EC Hold the accelerator pedal as steady as possible. VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH) **CAUTION:** Always drive vehicle at a safe speed. 4. Check 1st trip DTC. D Is 1st trip DTC detected? >> Go to EC-245, "Diagnosis Procedure". YES >> INSPECTION END NO Ε Diagnosis Procedure INFOID:000000004250757 **1.**CHECK EXHAUST GAS LEAK F Start engine and run it at idle. 1. 2. Listen for an exhaust gas leak before three way catalyst 1. Three way catalyst 1 Three way catalyst 2 Muffler Н A/F sensor 1 HO2S2 To exhaust manifold ┢ : Exhaust gas PBIB1922E Is exhaust gas leak detected? YES >> Repair or replace. NO >> GO TO 2. 2.CHECK FOR INTAKE AIR LEAK Κ

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect corresponding A/F sensor 1 harness connector.

3. Disconnect ECM harness connector.

4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0172	1	F3	1	F102	57	Existed
FUITZ	1	ГJ	2		61	
P0175	2	F20	1	FIUZ	65	EXISTED
PU175 2	FZU	2		66	1	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

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< DTC/CIRCUIT DIAGNOSIS >

DTC		A/F sensor 1		Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0172	1	F3	1		Not existed
FUITZ	1	гэ	2	Ground	
D0175	2	E20	1	Giouna	NUL EXISTED
P0175	2 F20	2			

DTC	ECM			Ground	Continuity	
DIC	Bank	Connector Terminal		Giouna	Continuity	
P0172	1		57		Not existed	
FUITZ	1	F102	61	Ground		
P0175	2	F102	FIUZ	65	Giouna	NOT EXISTED
P0175			66	-		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-614, "Inspection".

2. Install fuel pressure gauge and check fuel pressure. Refer to EC-614, "Inspection".

At idling: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace "fuel filter and fuel pump assembly".

5.CHECK MASS AIR FLOW SENSOR

With CONSULT-III

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III. For specification, refer to <u>EC-619, "Mass Air Flow Sensor"</u>.

With GST

- 1. Install all removed parts.
- Check mass air flow sensor signal in "Service \$01" with GST. For specification, refer to <u>EC-619</u>, "Mass Air Flow Sensor".

Is the measurement value within the specification?

- YES >> GO TO 6.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-177, "Diagnosis Procedure"</u>.

6.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Start engine and let it idle.

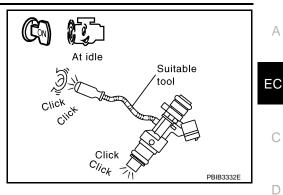
< DTC/CIRCUIT DIAGNOSIS >

2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-496, "Diagnosis Procedure"</u>.



[VQ37VHR]

7. CHECK FUELINJECTOR 1. Remove fuel injector assembly. Refer to EM-37, "Removal and Installation". Keep fuel hose and all fuel injectors connected to fuel tube. Ε 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. Disconnect all fuel injector harness connectors. 3. 4. Disconnect all ignition coil harness connectors. 5. Prepare pans or saucers under each fuel injector. F 6. Crank engine for about 3 seconds. Make sure fuel that does not drip from fuel injector. Is the inspection result normal? YES >> GO TO 8. NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one. 8. CHECK INTERMITTENT INCIDENT Н Refer to GI-41, "Intermittent Incident". >> INSPECTION END Κ L

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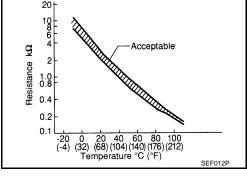
< DTC/CIRCUIT DIAGNOSIS >

P0181 FTT SENSOR

Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. <Reference data>

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



*: These data are reference values and are measured between ECM terminals 106 (Fuel tank temperature sensor) and 128 (ECM ground).

DTC Logic

INFOID:000000004250759

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181	Fuel tank temperature sensor circuit range/per- formance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and in- take air temperature sensor.	 Harness or connectors (The sensor circuit is open or shorted) Fuel tank temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

Turn ignition switch OFF and wait at least 10 seconds. 1.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 10 seconds.

Check 1st trip DTC. 2.

Is 1st trip DTC detected?

YFS >> Go to EC-249, "Diagnosis Procedure".

NO >> GO TO 3.

 ${f 3}.$ CHECK ENGINE COOLANT TEMPERATURE

1. Select "COOLAN TEMP/S" in "DATA MONITOR" with CONSULT-III.

Check "COOLAN TEMP/S" value. 2.

"COOLAN TEMP/S" less than 60°C (140°F)?

YES >> INSPECTION END

NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F). 1.

Wait at least 10 seconds. 2

EC-248

INFOID:000000004250758

P0181 FTT SENSOR

				P0181 FTT	SENSOR	
< DTC/CIR		GNOSIS	>			[VQ37VHR]
3. Check	1st trip DT	C.				
<u>Is 1st trip D</u>						
	Go to EC- INSPECT			<u>ocedure"</u> .		-
-		-				
Diagnosis	s Proced	lure				INFOID:000000004250760
1.снеск	GROUND	CONNEC	CTION			
	nition swite					
	-			r to Ground Ins	pection in <u>GI-44, "Circuit</u>	Inspection".
Is the inspe	GO TO 2.					
	Repair or		round cor	nnection.		
~	•			R AND A/C AM	"	
				(METER/M&A		
ls the inspe					-	
YES >>	GO TO 3.					
-				Function Check		
J .CHECK	FUEL TAN	IK TEMPE	ERATURE	E SENSOR PO	ER SUPPLY CIRCUIT	
		1 0				
1. Turn igi 2. Disconi 3. Turn igi	nition switc nect "fuel le nition switc	evel sens ch ON.			ness connector.	un and successful
1. Turn igi 2. Disconi 3. Turn igi	nition switc nect "fuel le nition switc	evel sens ch ON.			ness connector. d fuel pump" harness co	onnector and ground.
1. Turn igi 2. Disconi 3. Turn igi	nition switc nect "fuel la nition switc the voltage	evel sens ch ON.		el sensor unit ar		onnector and ground.
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YES >> GO TO 7. NO >> GO TO 6.

P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M7, B1
- Harness for open or short between "fuel level sensor unit and fuel pump" and "unified meter and A/C amp."

>> Repair open circuit, short to ground or short to power in harness or connector.

7.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-250, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace "fuel level sensor unit and fuel pump".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000004250761

1.CHECK FUEL TANK TEMPERATURE SENSOR

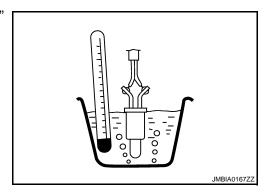
- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit.
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
4 and 5	Tomporaturo [°C (°E)]	20 (68)	2.3 - 2.7
4 010 0	Temperature [°C (°F)]	50 (122)	0.79 - 0.90

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump".



P0182, P0183 FTT SENSOR

Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. <**Reference data>**

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)	
20 (68)	3.5	2.3 - 2.7	
50 (122)	2.2	0.79 - 0.90	

*: These data are reference values and are measured between ECM terminals 106 (Fuel tank temperature sensor) and 128 (ECM ground).

DTC Logic

INFOID:000000004250763

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.) 	
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-251. "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

- NO >> Repair or replace ground connection.
- 2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."



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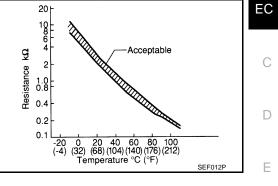
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P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Refer to MWI-37, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to MWI-53, "Component Function Check".

$\mathbf{3}$. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage (V)	
Connector	Terminal			
B22	4	Ground	Approx. 5	

Is the inspection result normal?

YES	>> GO TO 5.
NO	>> GO TO 4.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M7, B1
- Harness for open or short between ECM and "fuel level sensor unit and fuel pump"

>> Repair open circuit, short to ground or short to power in harness or connector.

5.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect "unified meter and A/C amp." harness connector.
- 3. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and "unified meter and A/C amp." harness connector.

Fuel level s and fue		Unified meter and A/C amp.		Continuity
Connector	Terminal	Connector	Terminal	•
B22	5	M67	58	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

Ó.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M7, B1

• Harness for open or short between "fuel level sensor unit and fuel pump" and "unified meter and A/C amp."

>> Repair open circuit, short to ground or short to power in harness or connector.

7.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-253, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace "fuel level sensor unit and fuel pump".

8.CHECK INTERMITTENT INCIDENT

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK FUEL TANK TEMPERATURE SENSOR

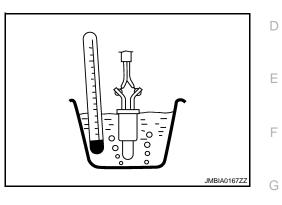
- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit.
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (kΩ)
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7
4 anu 5		50 (122)	0.79 - 0.90

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump".



Revision: 2009 October

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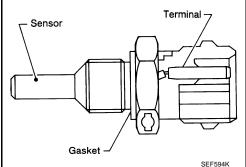
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P0196 EOT SENSOR

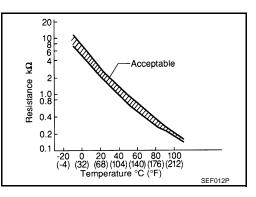
Description

The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance ($k\Omega$)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153



*: These data are reference values and are measured between ECM terminals 78 (Engine oil temperature sensor) and 84 (Sensor ground).

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0196 is displayed with P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to <u>EC-257, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0196	Engine oil temperature sensor range/perfor- mance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and in- take air temperature sensor.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.

EC-254

INFOID:000000004250766

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 secor Start engine and let it idle for 5 minutes and 10 sec Check 1st trip DTC. 	
<u>Is 1st trip DTC detected?</u> YES >> <u>EC-255, "Diagnosis Procedure"</u> . NO >> GO TO 3.	
3. PERFORM DTC CONFIRMATION PROCEDURE-II	
 Select "DATA MONITOR" mode with CONSULT-III. Check that "COOLAN TEMP/S" indicates above 80 If it is above 80°C (176°F), go to the following steps 	^о °С (176°F).
 Turn ignition switch OFF and soak the vehicle in a Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 secor Turn ignition switch ON. 	
NOTE: Do not turn ignition switch OFF until step 10. Select "DATA MONITOR" mode with CONSULT-III. Check the following.	
COOLAN TEMP/S	Below 40°C (104°F)
INT/A TEMP SE	Below 40°C (104°F)
Difference between "COOLAN TEMP/S" and "INT/A TEMP SE"	Within 6°C (11°F)
lowing steps. NOTE: • Do not turn ignition switch OFF. • If it is supposed to need a long period of time 9. Start engine and let it idle for 5 minutes. 9. Check 1st trip DTC. <u>s 1st trip DTC detected?</u> YES >> <u>EC-255, "Diagnosis Procedure"</u> . NO >> INSPECTION END	cle to meet the above conditions. Then perform the fol-
Diagnosis Procedure	INFOID:000000004250768
.CHECK GROUND CONNECTION	
Turn ignition switch OFF. Turn ignition switch OFF. Check ground connection M95. Refer to Ground In <u>s the inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace ground connection. 2. CHECK ENGINE OIL TEMPERATURE SENSOR	spection in <u>GI-44, "Circuit Inspection"</u> .
Refer to EC-256, "Component Inspection".	
s the inspection result normal? YES >> GO TO 3. NO >> Replace engine oil temperature sensor.	
3. CHECK INTERMITTENT INCIDENT	
Refer to GI-41, "Intermittent Incident".	

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Component Inspection

INFOID:000000004250769

[VQ37VHR]

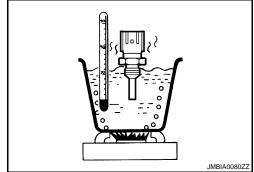
1.CHECK ENGINE OIL TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine oil temperature sensor harness connector.
- 3. Remove engine oil temperature sensor.
- 4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
		20 (68)	2.1 - 2.9
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace engine oil temperature sensor.

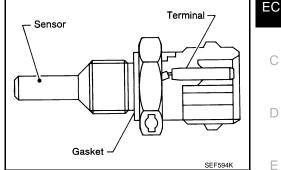


< DTC/CIRCUIT DIAGNOSIS >

P0197, P0198 EOT SENSOR

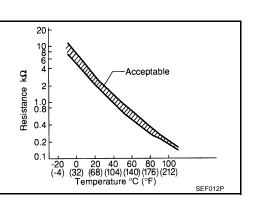
Description

The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (k Ω)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153



*: These data are reference values and are measured between ECM terminals 78 (Engine oil temperature sensor) and 84 (Sensor ground).

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause	Κ
P0197	Engine oil tempera- ture sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)	L
P0198	Engine oil tempera- ture sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine oil temperature sensor	M

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

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P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK EOT SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect engine oil temperature (EOT) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between EOT sensor harness connector and ground.

EOT :	sensor	Ground	Voltage (V)
Connector	Terminal	Giodila	voltage (v)
F38	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

${f 3.}$ CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between EOT sensor harness connector and ECM harness connector.

EOT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F38	2	F102	84	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-258, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace engine oil temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ENGINE OIL TEMPERATURE SENSOR

1. Turn ignition switch OFF.

- 2. Disconnect engine oil temperature sensor harness connector.
- 3. Remove engine oil temperature sensor.

EC-258

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P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

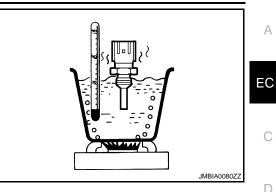
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k Ω)
		20 (68)	2.1 - 2.9
1 and 2	Temperature °C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor.



[VQ37VHR]

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< DTC/CIRCUIT DIAGNOSIS >

P0222, P0223, P2132, P2133 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0222, P0223, P2132 or P2133 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-368, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 (bank 1) circuit low in- put	An excessively low voltage from the TP sensor 1 is sent to ECM.	
P0223	Throttle position sensor 1 (bank 1) circuit high in- put	An excessively high voltage from the TP sensor 1 is sent to ECM.	 Harness or connectors (TP sensor 1 circuit is open or shorted.)
P2132	Throttle position sensor 1 (bank 2) circuit low in- put	An excessively low voltage from the TP sensor 1 is sent to ECM.	 Electric throttle control actuator (TP sensor 1)
P2133	Throttle position sensor 1 (bank 2) circuit high in- put	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

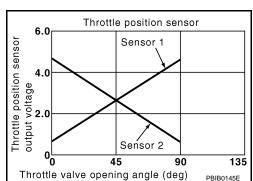
>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

- YES >> Go to EC-261, "Diagnosis Procedure".
- NO >> INSPECTION END



P0222, P0223, P2132, P2133 TP SENSOR

[VQ37VHR]

Diagnosis F .CHECK GF	JULO		>				[VQ37VHR]
	1000	dure					INF01D:00000004250776
Turn ianiti	ROUNE		TION				
Check gro the inspection YES >> Go NO >> Ro	ound co <u>on resu</u> O TO 2 epair oi	onnection M <u>Ilt normal?</u> 2. r replace gi	round cor	nection.	-		, "Circuit Inspection".
CHECK TH	IROTTI	LE POSITI	ON SENS	SOR 1 POV	VER SUP	PLY CIRCU	UIT
. Turn igniti	on swit						connector and ground.
DTO	Electi	ric throttle cor	ntrol actuato		Maltar	. 0.0	
DTC	Bank	Connector	Termina	Ground	Voltage	e (V)	
P0222, P0223	1	F6	6	Ground	٨٥٥٢٥	x 5	
P2132, P2133	2	F27	1	Ground	Appro	X. U	
the inspection	on resu	<u>ilt normal?</u>		·			
							ness or connectors. R OPEN AND SHORT
. Turn igniti . Disconneo	ct ECM	harness c		c throttle c	ontrol acti	uator harne	ess connector and FCM harness con-
. Turn igniti 2. Disconnec 3. Check the nector.	ct ECM	harness c	en electri	c throttle co			ess connector and ECM harness con-
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5. CHECK THROTTLE POSITION SENSOR

Refer to EC-262, "Component Inspection".

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.Replace electric throttle control actuator

1. Replace malfunctioning electric throttle control actuator.

2. Go to EC-262, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000004250777

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.

3. Perform EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

- 4. Turn ignition switch ON.
- 5. Set selector lever to D (A/T) or 1st (M/T) position.

6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM					
Connector	+	_	Condition		Voltage (V)
	Terminal				
	30 [TP sensor 1 (bank 1)]	40		Fully released	More than 0.36
			Accelerator pedal	Fully depressed	Less than 4.75
	31 [TP sensor 1 (bank 2)]	48		Fully released	More than 0.36
F101				Fully depressed	Less than 4.75
FIUI	34 [TP sensor 2 (bank 1)]	40		Fully released	Less than 4.75
-				Fully depressed	More than 0.36
	25 [TD concor 2 (bank 2)]	48		Fully released	Less than 4.75
	35 [TP sensor 2 (bank 2)]			Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.

2. Go to EC-262, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

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< DTC/CIRCUIT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

DTC Logic

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[VQ37VHR]

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)

On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.

When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.

When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off. If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink. When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain illumi-

nating.

If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

2. Two Trip Detection Logic (Exhaust quality deterioration)

For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only illuminate when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.

A misfire malfunction can be detected in any one cylinder or in multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfires detected	Multiple cylinders misfire.	Improper spark plug
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	 Insufficient compression Incorrect fuel pressure
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	• The fuel injector circuit is open or shorted
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	 Fuel injector Intake air leak
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	• The ignition signal circuit is open or short-
P0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	ed • Lack of fuel
P0306	No. 6 cylinder misfire detected	No. 6 cylinder misfires.	 Signal plate A/F sensor 1 Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Restart engine and let it idle for about 15 minutes.
- 6. Check 1st trip DTC.



P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Is 1st trip DTC detected? А YES >> Go to EC-265, "Diagnosis Procedure". NO >> GO TO 3. 3.PERFORM DTC CONFIRMATION PROCEDURE-II EC 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at least 10 seconds. 4. Start engine and drive the vehicle under similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below. Hold the accelerator pedal as steady as possible. Similar conditions to (1st trip) Freeze Frame Data mean that the following conditions should be satisfied at D the same time. **CAUTION:** Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when Е driving.

Engine speed	Engine speed in the freeze frame data \pm 400 rpm	F
Vehicle speed Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)		F
Base fuel schedule	Base fuel schedule in the freeze frame data \times (1 \pm 0.1)	
Engine coolant temperature (T)	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).	G
condition	When the freeze frame data shows higher than or equal to 70 $^{\circ}$ C (158 $^{\circ}$ F), T should be higher than or equal to 70 $^{\circ}$ C (158 $^{\circ}$ F).	Н

Driving time varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes
5. Check 1st trip DTC.	

<u>Is 1st trip DTC detected?</u> YES >> Go to EC-265, "Diagno

YES >> Go to <u>EC-265. "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE M 1. Start engine and run it at idle speed. 2. Listen for the sound of the intake air leak. 3. Check PCV hose connection. Ν Is intake air leak detected? YES >> Discover air leak location and repair. NO >> GO TO 2. 2.CHECK FOR EXHAUST SYSTEM CLOGGING Stop engine and visually check exhaust tube, three way catalyst and muffler for dents. Ρ Is the inspection result normal? YES-1 >> With CONSULT-III: GO TO 3. YES-2 >> Without CONSULT-III: GO TO 4. >> Repair or replace it. NO

3.PERFORM POWER BALANCE TEST

With CONSULT-III

1. Start engine.

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< DTC/CIRCUIT DIAGNOSIS >

- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 4.

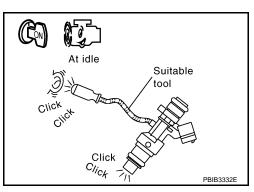
4.CHECK FUNCTION OF FUEL INJECTOR-I

- 1. Start engine and let it idle.
- 2. Listen to each fuel injector operation sound.

Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-496, "Diagnosis Procedure"</u>.



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

- 1. Turn ignition switch OFF.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

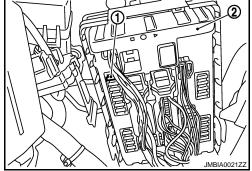
CAUTION:

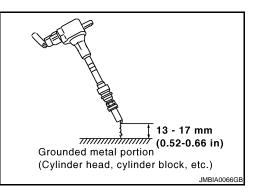
- Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES	>> GO TO 9.
NO	>> GO TO 6.





EC-266

[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

6.CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a non-malfunctioning spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.

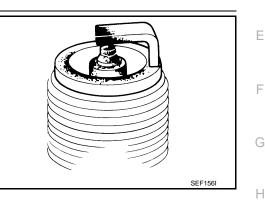
NO >> Check ignition coil, power transistor and their circuits. Refer to <u>EC-507, "Diagnosis Procedure"</u>.

7.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-17, "Inspection"</u>.
- NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the	inspection	result	normal?
	mopoolion	result	nonnai.

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-16, "Removal</u> <u>and Installation"</u>.

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-17, "Inspection".	L
Is the inspection result normal?	
YES >> GO TO 10. NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets. 10.CHECK FUEL PRESSURE	Μ
 Install all removed parts. Release fuel pressure to zero. Refer to <u>EC-614, "Inspection"</u>. Install fuel pressure gauge and check fuel pressure. Refer to <u>EC-614, "Inspection"</u>. 	Ν
At idle: Approximately 350 kPa (3.57 kg/cm ² , 51 psi)	0
Is the inspection result normal?	
YES >> GO TO 12. NO >> GO TO 11.	Ρ
11. DETECT MALFUNCTIONING PART	

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly".

NO >> Repair or replace.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

12. CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to <u>EC-13, "BASIC INSPECTION : Special Repair Requirement"</u>. For specification, refer to <u>EC-619, "Idle Speed"</u> and <u>EC-619, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-13, "BASIC INSPECTION : Special Repair Requirement".

13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity	
Bank	Connector	Terminal	Connector	Terminal	Continuity
1	F3 F20	1	F102	57	
I		2		61	Existed
2		1		65	LAISIEU
		2		66	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity	
Bank	Connector	Terminal	Ground	Continuity
1	F3	1	Ground	
I		2		Not existed
2	E20	1		
2	F20	2		

ECM		Ground	Continuity	
Bank	Connector	Terminal	Giouna	Continuity
1		57	Ground	Not existed
1	F102	61		
2		65		
		66		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

14.CHECK A/F SENSOR 1 HEATER

Refer to EC-161, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace (malfunctioning) A/F sensor 1.

15.CHECK MASS AIR FLOW SENSOR

With CONSULT-III

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-III.

For specification, refer to EC-619, "Mass Air Flow Sensor".

With GST

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PU300, PU301, PU302, PU303, PU304, PU305, PU306 MISFIRE	
< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]	
Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to <u>EC-619, "Mass Air Flow Sensor"</u> .	А
Is the measurement value within the specification?	
 YES >> GO TO 16. NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to <u>EC-177, "Diagnosis Procedure"</u>. 	EC
16.CHECK SYMPTOM TABLE	
Check items on the rough idle symptom in EC-602. "Symptom Table".	С
Is the inspection result normal?	
YES >> GO TO 17.	
NO >> Repair or replace.	D
17. ERASE THE 1ST TRIP DTC	
Some tests may cause a 1st trip DTC to be set.	Е
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>EC-112</u> , " <u>Diagnosis Descrip-</u> tion".	_
>> GO TO 18.	F
18. CHECK INTERMITTENT INCIDENT	
	G
Refer to GI-41, "Intermittent Incident".	
>> INSPECTION END	Η
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< DTC/CIRCUIT DIAGNOSIS >

P0327, P0328, P0332, P0333 KS

Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

DTC Logic

INFOID:000000004250782

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor (bank 1) circuit low input	An excessively low voltage from the sensor is sent to ECM.	
P0328	Knock sensor (bank 1) circuit high input	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted.)
P0332	Knock sensor (bank 2) circuit low input	An excessively low voltage from the sensor is sent to ECM.	Knock sensor
P0333	Knock sensor (bank 2) circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and run it for at least 5 seconds at idle speed.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-270, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect knock sensor harness connector and ECM harness connector.
- 2. Check the continuity between knock sensor harness connector and ECM harness connector.

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P0327, P0328, P0332, P0333 KS

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

		Knock sens	or	EC	CM		А
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0327, P0328	1	F203	2	E 400	70		EC
P0332, P0333	2	F202	2	F102	72	Existed	EC
3. Also chec	k harn	ess for sho	rt to grour	nd and sho	rt to powe	er.	
Is the inspecti	on resu	<u>ult normal?</u>					С
	O TO 4						
^	ОТОЗ						D
3.DETECT M		NCTIONIN	G PART				L
Check the foll		- E0 E201					
Harness corHarness for			ween kno	ck sensor a	and ECM		E
	•						
>> R	epair o	pen circuit	or short to	o power in	harness o	or connectors.	F
4.CHECK KN	IOCK S	SENSOR II	NPUT SIG	SNAL CIRC	UIT FOR	OPEN AND SHORT	Г
1. Check the	e contir	uity betwee	en knock	sensor har	ness coni	nector and ECM harness connector.	
							G
DTC		Knock sens	or	EC	M	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	- Continuity	ŀ
P0327, P0328	1	F203	1	F102	73	Eviptod	
P0332, P0333	2	F202	1	F IUZ	69	Existed	
2. Also chec	k harn	ess for sho	rt to grour	nd and sho	rt to powe	er.	
Is the inspection	on resi	ult normal?					
	O TO 6						
_	O TO S						0
5.DETECT M			J PARI				
Check the followHarness cor		s F9 F201					k
 Harness for 			ween EC	A and knoo	ck sensor		
							1
-	•	•	short to g	ground or s	short to po	ower in harness or connectors.	
6.CHECK KN	IOCK S	SENSOR					
Refer to EC-2	71, "Co	omponent li	nspection	"			N
Is the inspecti	on resi	ult normal?	-				
	ОТОТ			_			Ν
	-	malfunctio	-	k sensor.			Ľ
7.CHECK IN							
Refer to GI-41	<u>, "Inter</u>	mittent Inci	<u>dent"</u> .				С
	_	_					
>> IN	ISPEC	TION END					-
Componen	t Insp	ection				INFOID:00000004250784	ŀ
1. Turn igniti		tch OFF. k sensor h:	arnaee co	nnector			

2. Disconnect knock sensor harness connector.

3. Check resistance between knock sensor terminals as per the following. **NOTE:**

< DTC/CIRCUIT DIAGNOSIS >

It is necessary to use an ohmmeter which can measure more than 10 M $\!\Omega.$

Terminals	Posistanas (kO)
Terminais	Resistance (kΩ)
1 and 2	Approx. 532 - 588 [at 20°C (68°F)]

CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning knock sensor.

< DTC/CIRCUIT DIAGNOSIS >

P0335 CKP SENSOR (POS)

Description

The crankshaft position sensor (POS) is located on the cylinder block facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

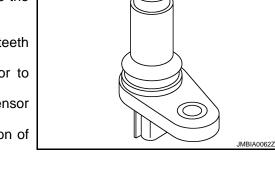
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure. Crankshaft angle

> Camshaft position sensor (PHASE) (bank 1) Camshaft position sensor (PHASE) (bank 2)

Crankshaft position

sensor (POS)



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[VQ37VHR]



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DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sen- sor (POS) circuit	 The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. The crankshaft position sensor (POS) signal is not in the normal pattern during engine run- ning. 	 Harness or connectors [CKP sensor (POS) circuit is open or shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted) Crankshaft position sensor (POS) Accelerator pedal position sensor EVAP control system pressure sensor Refrigerant pressure sensor Brake booster pressure sensor Brake booster pressure sensor Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

Ρ If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

Turn ignition switch OFF and wait at least 10 seconds. 1.

- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

< DTC/CIRCUIT DIAGNOSIS >

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>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for at least 5 seconds. If engine does not start, crank engine for at least 2 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-274, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

- 1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between CKP sensor (POS) harness connector and ground.

CKP sen	sor (POS)	Ground	Voltage (V)
Connector	Terminal	Giodila	voltage (v)
F2	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

${f 3.}$ CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch ON.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sens	or (POS)	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F2	1	F101	46	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

E	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F101	45	Brake booster pressure sensor	E48	1
1 101	46	CKP sensor (POS)	F2	I

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

E	CM			Sensor			
Connector	Terminal		Name		Connector	Terminal	
	103	APP senso	r		E112	6	
M107	107	EVAP contr	ol system p	ressure sensor	B30	3	
	107	Refrigerant	pressure se	ensor	E77	3	
Is the insp	ection res	ult normal?					
	> GO TO :						
_	•	-	und or sh	ort to power in	harness or	connectors	
5.CHECK	COMPO	NENTS					
Check the							
				o <u>EC-361, "Co</u>			tion")
				(Refer to <u>EC-3</u> EC-520, "Diag			<u></u>
•	•	ult normal?				<u>.)</u>	
	> GO TO (
		malfunctio	ning com	ponent.			
6.CHECH		ISOR					
Refer to E	C-469. "Co	omponent l	nspectior	"			
		ult normal?					
•	> GO TO						
	> GO TO						
7.repla	CE ACCE	LERATOR	PEDAL A	SSEMBLY			
1. Repla	ce acceler	ator pedal	assembly				
		Special Re					
~		TION END					
8.CHECK	CKP SE	NSOR (PO	S) GROU	ND CIRCUIT	FOR OPEN	AND SHOP	RT
1. Turn i	gnition swi	tch OFF.					· · · · · · · · · · · · · · · · · · ·
		I harness o					
3. Check	the contir	nuity betwe	en CKP s	ensor (POS) I	harness con	nector and	ECM harness connector.
	sor (POS)	EC		Continuity			
Connector	Terminal	Connector	Terminal				
F2	2	F101	47	Existed			
			-	nd and short to	o power.		
•		ult normal?					
	> GO TO S		chart to	around or abo	rt to power :	o hornooc o	r connectore
•	•	•		ground or sho	•		
9. CHECK	CKP SEI	NSOR (PO	S) INPUT	SIGNAL CIR	CUIL FOR (PEN AND	SHORI
1. Check	the contir	nuity betwe	en CKP s	ensor (POS) I	harness con	nector and	ECM harness connector.
CKP sen	sor (POS)	EC	М	Continuity			
Connector	Terminal	Connector	Terminal	Sommuny			

2. Also check harness for short to ground and short to power.

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F101

Is the inspection result normal?

3

YES >> GO TO 10.

F2

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

Existed

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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10. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-276. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace crankshaft position sensor (POS).

11.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace the signal plate.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

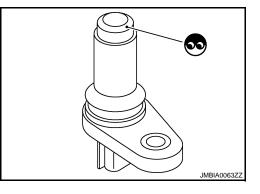
Component Inspection

1.CHECK CRANKSHAFT POSITION SENSOR (POS)-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace crankshaft position sensor (POS).



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance (Ω)
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ [at 25°C (77°F)]
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace crankshaft position sensor (POS).

< DTC/CIRCUIT DIAGNOSIS >

P0340, P0345 CMP SENSOR (PHASE)

Description

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

Crankshaft angle Camshaft position sensor (PHASE) (bank 1) Camshaft position sensor (PHASE) (bank 2)

Crankshaft position sensor (POS)

When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes. ECM receives the signals as shown in the figure.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0340 or P0345 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-368, "DTC Logic".

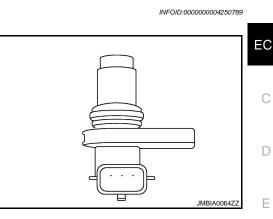
NOTE: Camshaft position sensor (PHASE) signal timing varies with intake valve timing control

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0340	Camshaft position sen- sor (PHASE) (bank 1) circuit	 The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. The cylinder No. signal is not sent to ECM 	 Harness or connectors [CMP sensor (PHASE) (bank 1) circuit is open or shorted.] Camshaft position sensor (PHASE) (bank 1) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery 	L
P0345	Camshaft position sen- sor (PHASE) (bank 2) circuit	 during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	 Harness or connectors [CMP sensor (PHASE) (bank 2) circuit is open or shorted.] Camshaft position sensor (PHASE) (bank 2) Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery 	C

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.



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< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

Start engine and let it idle for at least 5 seconds.
 If engine does not start, crank engine for at least 2 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-278</u>, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-278, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.

NO >> Check starting system. (Refer to <u>EC-9, "Work Flow"</u>.)

2. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.

2. Turn ignition switch ON.

3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

DTC	C	MP sensor (P	HASE)	Ground	Voltage (V)
DIC	Bank	Connector	Terminal	Giouna	voltage (v)
P0340	1	F5	1	Ground	Approx. 5
P0345	2	F18	1	Ground	Αρριολ. 3

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

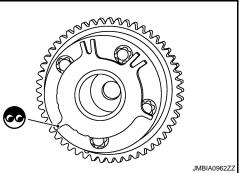
EC-278

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

DTC	CI	MP sensor (P	HASE)	EC	M	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0340	1	F5	2	F102	96	Existed	
P0345	2	F18	2	1102	92	LAISted	
		arness for s	-	ound and	short to po	ower.	
-		result norm	<u>al?</u>				
	> GO 1 > GO 1						
-		FUNCTION		т			
Check the							
		ctors F107,	F106				
Harness	for ope	en or short	between	CMP sense	or (PHASE	E) and ECM	1
	Done	ir opop oir	wit obort	to groupd	or obort to	nower in h	ornaaa ar aannaatara
~	•	•		•		•	arness or connectors. OPEN AND SHORT
							nector and ECM harness connector.
I. Check				F Sensor (FHASE) I	Iamess coi	mector and ECM namess connector.
	CI	MP sensor (P	HASE)	EC	CM		
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0340	1	F5	3	E100	59		
P0345	2	F18	3	F102	63	Existed	
2. Also c	heck h	arness for s	short to gi	ound and	short to po	ower.	
		result norm	<u>al?</u>				
	> GO 1 > GO 1						
-		U7. FUNCTION		ъ			
			NING PAR				
Check the Harness		ng. ctors F107,	F106				
				CMP sense	or (PHASE	E) and ECM	I
	-			(
^	•	air open circ SHAFT PO		•		power in r	arness or connectors.
J.CHECK				•	TASE)		
	J-280.			<u>lion"</u> .			
Refer to <u>E(</u>			<u>al :</u>				
s the insp	ection					(5) 14 6	
s the insp YES >:	ection > GO 1		ctioning c	amshaft po	sition sen	isor (PHAS	E).
S the insp YES >: NO >:	ection > GO 1 > Repla	O 9. ace malfun	-	amshaft po	sition sen	isor (PHAS	E).
S the insp YES >: NO >: 9.CHECK	ection > GO T > Repla (CAMS	O 9. ace malfun SHAFT (IN	-	amshaft po	osition sen	isor (PHAS	E).
S the inspo YES >: NO >: O.CHECK Check the Accumul	ection > GO T > Repla (CAM followi ation o	O 9. ace malfun GHAFT (IN ng. f debris to t	TAKE)	plate of ca			E).
S the inspective YES >: NO >: O.CHECK Check the Accumul Chipping	ection > GO T > Repla (CAMS followi ation o I signal	O 9. ace malfun GHAFT (IN GHAFT (IN ng. f debris to t plate of ca	TAKE) the signal mshaft fro	plate of ca			E).
S the insponent YES >: NO >: O.CHECK Check the Accumul Chipping S the insponent	ection > GO T > Repla (CAMS followi ation o I signal	O 9. ace malfun SHAFT (IN ng. f debris to t plate of ca result norm	TAKE) the signal mshaft fro	plate of ca			E).

front end or replace camshaft.



< DTC/CIRCUIT DIAGNOSIS >

10. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Component Inspection

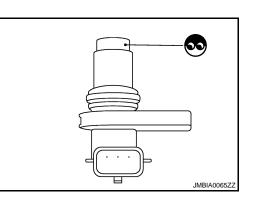
1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor (PHASE) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning camshaft position sensor (PHASE).



2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

Terminals (Polarity)	Resistance (Ω)
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ [at 25°C (77°F)]
2 (+) - 3 (-)	•

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning camshaft position sensor (PHASE).

Revision: 2009 October

< DTC/CIRCUIT DIAGNOSIS >

P0420, P0430 THREE WAY CATALYST FUNCTION

DTC Logic

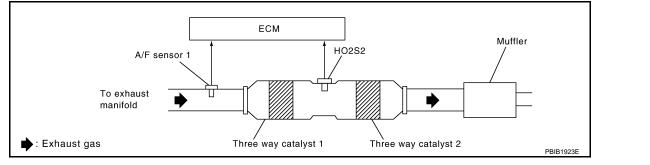
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[VQ37VHR]

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2. A three way catalyst 1 with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst 1 malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0420	Catalyst system efficiency below threshold (bank 1)	Three way catalyst (manifold) does not op-	Three way catalyst (manifold)Exhaust tube	Н
P0430	Catalyst system efficiency below threshold (bank 2)	 Three way catalyst (manifold) does not op- erate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity. 	 Intake air leaks Fuel injector Fuel injector leaks Spark plug Improper ignition timing 	I

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 7.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.

6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

7. Let engine idle for 1 minute.

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< DTC/CIRCUIT DIAGNOSIS >

- 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F). 9. Open engine hood.
- 10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III.
- 11. Rev engine up to about 2,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
- 12. Check the indication of "CATALYST".

Which is displayed on CONSULT-III screen?

CMPLT >> GO TO 6. INCMP >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Wait 5 seconds at idle.
- Rev engine up to about 2,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes).

Does the indication change to "CMPLT"?

YES >> GO TO 6.

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).

2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6.PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-283, "Diagnosis Procedure".

NO >> INSPECTION END

7.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-282, "Component Function Check".

NOTE:

Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-283, "Diagnosis Procedure".

Component Function Check

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1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

- T. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Open engine hood.
- 6. Check the voltage between ECM harness connector terminals under the following condition.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

		ECM			
DTC			Condition	Voltage	
Connector	Terminal	Terminal		. en age	
P0420 P0430	F102	76 [HO2S2 (bank 1)] 80 [HO2S2 (bank 2)]	84	Keeping engine speed at 2,500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. • 1 cycle: $0.6 - 1.0 \rightarrow 0 - 0.3 \rightarrow 0.6 - 1.0$
Is the in	spection re	sult normal?	I		
YES NO		CTION END EC-283, "Dia		edure".	
Diagn	osis Proc				INF01D:000000004250795
1. CHE	CK EXHAU	IST SYSTEM	Λ		
-		aust tubes a		r dents.	
Is the in YES NO	- >> GO TC	<u>sult normal?</u>) 2. or replace.			
-		IST GAS LE	AK		
		nd run it at id			
				e three way catalyst 1.	
	🕩 : Exhaust	A/F ser To exhau manifold t gas		Three way catalyst 1 HO2S2	Atalyst 2 Muffler
<u>Is exha</u>	ust gas leak	detected?			F DID 1922E
YES NO	>> Repair >> GO TC	or replace. 3.			
3. CHE	CK INTAKE	E AIR LEAK			
Listen fo	or an intake	air leak afte	r the mass a	air flow sensor.	
YES		or replace.			
		74. PEED AND I		MINC	
-				PECTION : Special Repair Requ	uirement"
				ed" and EC-619, "Ignition Timin	
	•	sult normal?			
YES NO	>> GO TC >> Follow		BASIC INSI	PECTION : Special Repair Requ	uirement".
_		NJECTORS			
		nd then turn i	anition swite	h ON.	

1. Stop engine and then turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals as per the following.

< DTC/CIRCUIT DIAGNOSIS >

ECM			
F	-	-	Voltage
Terminal	Connector	Terminal	
81			
82	M107	128	Battery voltage
85			
86			
89			
90			
	+ Terminal 81 82 85 86 89	+ Connector 81 82 85 86 89	Terminal Connector Terminal 81 82 85 86

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform EC-496, "Diagnosis Procedure".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

- Turn ignition switch OFF. 1.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pres-2. sure.

NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 -0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

 Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.

 It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

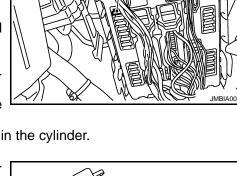
When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

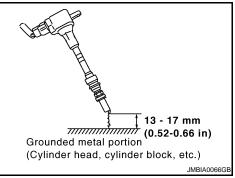
Is the inspection result normal?

>> GO TO 10. YES NO >> GO TO 7.

7.CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.





< DTC/CIRCUIT DIAGNOSIS >

- 2. Disconnect spark plug and connect a non-malfunctioning spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and A the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.

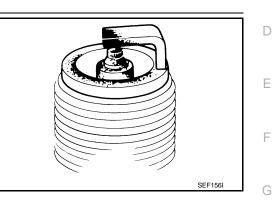
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-507, "Diagnosis Procedure".

8.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-17, "Inspection"</u>.
- NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

- Reconnect the initial spark plugs.
 Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.
 Spark should be generated.

 Is the inspection result normal?
 YES >> INSPECTION END
 NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-16. "Removal and Installation".</u>
- 10. CHECK FUEL INJECTOR
- 1. Turn ignition switch OFF.
- Remove fuel injector assembly. Refer to <u>EM-37, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.

3. Disconnect all ignition coil harness connectors.

- 4. Reconnect all fuel injector harness connectors disconnected.
- 5. Turn ignition switch ON.
- 6. Check that fuel does not drip from fuel injector.

Does fuel drip from fuel injector?

- YES >> Replace the fuel injector(s) from which fuel is dripping. NO >> GO TO 11.
- 11. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result nomal?

- YES >> Replace three way catalyst assembly.
- NO >> Repair or replace harness or connector.

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[VQ37VHR]

P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P0441 EVAP CONTROL SYSTEM

DTC Logic

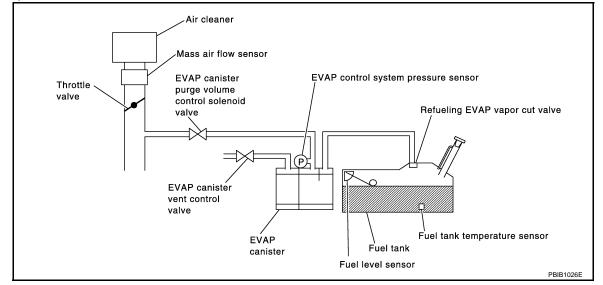
DTC DETECTION LOGIC

NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441	EVAP control system in- correct purge flow	EVAP control system does not operate proper- ly, EVAP control system has a leak between in- take manifold and EVAP control system pressure sensor.	 EVAP canister purge volume control solenoid valve stuck closed EVAP control system pressure sensor and the circuit Loose, disconnected or improper connection of rubber tube Blocked rubber tube Cracked EVAP canister EVAP canister purge volume control solenoid valve circuit Accelerator pedal position sensor Blocked purge port EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 6.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

EC-286

P0441 EVAP CONTROL SYSTEM [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 3. А **TESTING CONDITION:** Always perform test at a temperature of 5°C (41°F) or more. EC >> GO TO 3. 3. perform dtc confirmation procedure-i (R)With CONSULT-III 1. Start engine and warm it up to normal operating temperature. Turn ignition switch OFF and wait at least 10 seconds. 2. D Turn ignition switch ON. 3. 4. Turn ignition switch OFF and wait at least 10 seconds. 5. Start engine and let it idle for at least 70 seconds. 6. Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-E SULT-III. Touch "START". 7. Is "COMPLETED" displayed on CONSULT-III screen? F YES >> GO TO 5. NO >> GO TO 4. 4.PERFORM DTC CONFIRMATION PROCEDURE-II When the following conditions are met, "TESTING" will be displayed on the CONSULT-III screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.) Н Selector lever Suitable position VHCL SPEED SE 32 - 120 km/h (20 - 75 mph) ENG SPEED 500 - 3,000 rpm **B/FUEL SCHDL** 1.3 - 9.0 msec COOLAN TEMP/S More than 0°C (32°F) **CAUTION:** Always drive vehicle at a safe speed. Is "COMPLETED" displayed on CONSULT-III screen? Κ YES >> GO TO 5. NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 3. 5. PERFORM DTC CONFIRMATION PROCEDURE-III L Touch "SELF-DIAG RESULTS". Which is displayed on CONSULT-III screen? M OK >> INSPECTION END NG >> Go to EC-288, "Diagnosis Procedure". **6.**PERFORM COMPONENT FUNCTION CHECK Ν Perform component function check. Refer to EC-287, "Component Function Check". NOTE: Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed. Is the inspection result normal? Ρ YES >> INSPECTION END NO >> Go to EC-288, "Diagnosis Procedure". Component Function Check INFOID:000000004250797 **1.**PERFORM COMPONENT FUNCTION CHECK Without CONSULT-III

Lift up drive wheels.
 Revision: 2009 October

P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

- 2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and wait at least 70 seconds.
- 7. Set voltmeter probes to ECM harness connector terminals as per the following.

	ECM	
Connector	+	_
Connector	Terminal	Terminal
M107	102 (EVAP control system pressure sensor signal)	112

8. Check EVAP control system pressure sensor value at idle speed and note it.

9. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than P, N or R

10. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 8) for at least 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-288, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000004250798

- 1.CHECK EVAP CANISTER
- 1. Turn ignition switch OFF.
- 2. Check EVAP canister for cracks.

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 2.
- YES-2 >> Without CONSULT-III: GO TO 3.
- NO >> Replace EVAP canister.

2. CHECK PURGE FLOW

With CONSULT-III

- 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- 4. Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL C/V" opening and check vacuum existence.

PURG VOL C/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

YES	>> GO TO 7.
NO	

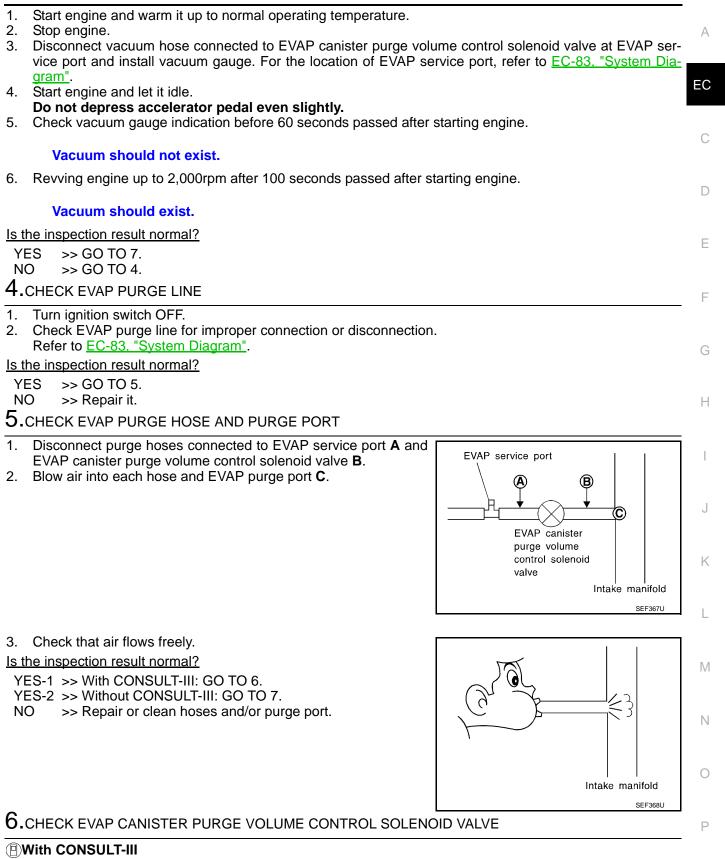
NO >> GO TO 4.

3.CHECK PURGE FLOW

Without CONSULT-III

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]



1. Start engine.

2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 8.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-300, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve.

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor.

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-316, "DTC Logic" for DTC P0452, EC-321, "DTC Logic" for DTC P0453.

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Replace EVAP control system pressure sensor.

10. CHECK RUBBER TUBE FOR CLOGGING

- 1. Disconnect rubber tube connected to EVAP canister vent control valve.
- 2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Clean the rubber tube using an air blower.

11.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-307, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 12.
- NO >> Replace EVAP canister vent control valve.
- **12.**CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks. Refer to EC-83, "System Diagram".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace it.

13.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0442 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

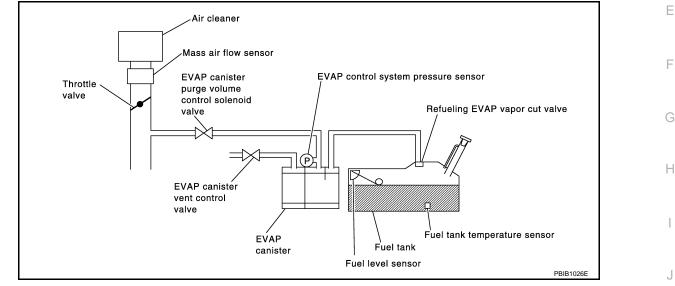
NOTE:

If DTC P0442 is displayed with DTC P0456, first perform the trouble diagnosis for DTC P0456. Refer to <u>EC-333, "DTC Logic"</u>.

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following "Vacuum test" conditions.

The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate prop- erly.	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or fails to close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line (pipe and rubber tube) EVAP canister vent control valve and the circuit Loose or disconnected rubber tube EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control valve is missing or damaged EVAP control system pressure sensor Fuel level sensor and the circuit Refueling EVAP vapor cut valve ORVR system leaks

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.
- If the fuel filler cap is not tightened properly, the MIL may illuminate.

EC-291

INFOID:000000004250799

А

< DTC/CIRCUIT DIAGNOSIS >

• Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 0 to 30°C (32 to 86°F).
- NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- Make sure that the following conditions are met. COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
 - INT/A TEMP SE: 0 30°C (32 86°F)
- 5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instructions displayed on CONSULT-III screen.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to <u>EC-13, "BASIC INSPECTION : Special Repair Requirement"</u>.

Which is displayed on CONSULT-III screen?

- OK >> INSPECTION END
- NG >> Go to <u>EC-292</u>, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE

With GST

NOTE:

Be sure to read the explanation of Driving Pattern in EC-569, "How to Set SRT Code" before driving vehicle.

- 1. Start engine.
- 2. Drive vehicle according to Driving Pattern,
- 3. Stop vehicle.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Check 1st trip DTC.

Is 1st trip DTC displayed?

YES-1 >> P0441: Go to EC-288, "Diagnosis Procedure".

YES-2 >> P0442: Go to EC-292, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

INFOID:000000004250800

< DTC/CIRCUIT DIAGNOSIS >

Check for genuine NISSAN fuel filler cap design.

2.

[VQ37VHR]

А Is the inspection result normal? YES >> GO TO 2. NO >> Replace with genuine NISSAN fuel filler cap. EC NISSAN SEF915L D 2.CHECK FUEL FILLER CAP INSTALLATION Check that the cap is tightened properly by rotating the cap clockwise. Is the inspection result normal? Е YES >> GO TO 3. NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Retighten until ratcheting sound is heard. F ${f 3}.$ CHECK FUEL FILLER CAP FUNCTION Check for air releasing sound while opening the fuel filler cap. Is the inspection result normal? YES >> GO TO 5. NO >> GO TO 4. Н **4.**CHECK FUEL TANK VACUUM RELIEF VALVE Refer to EC-296, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace fuel filler cap with a genuine one. **5.**CHECK FOR EVAP LEAK Refer to EC-615, "Inspection". Is there any leak in EVAP line? Κ YES >> Repair or replace. NO >> GO TO 6. 6.CHECK EVAP CANISTER VENT CONTROL VALVE L Check the following. EVAP canister vent control valve is installed properly. Refer to EC-617, "Removal and Installation". Μ EVAP canister vent control valve. Refer to EC-307, "Component Inspection". Is the inspection result normal? Ν YES >> GO TO 7. NO >> Repair or replace EVAP canister vent control valve and O-ring. **1.**CHECK IF EVAP CANISTER IS SATURATED WITH WATER 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Ρ

< DTC/CIRCUIT DIAGNOSIS >

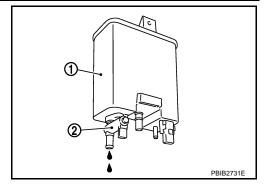
[VQ37VHR]

2. Check if water will drain from EVAP canister (1).

2 : EVAP canister vent control valve

Does water drain from the EVAP canister?

- YES >> GO TO 8.
- NO-1 >> With CONSULT-III: GO TO 10.
- NO-2 >> Without CONSULT-III: GO TO 11.



8. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 10. YES-2 >> Without CONSULT-III: GO TO 11. NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

- 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL C/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

- YES >> GO TO 13.
- NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

- T. Start engine and warm it up to normal operating temperature.
- 2. Stop engine.
- 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-83, "System Diagram".

EC-294

P0442 EVAP CONTROL SYSTEM	[VQ37VHR]
< DTC/CIRCUIT DIAGNOSIS >	
Is the inspection result normal? YES >> GO TO 13.	A
NO >> Repair or reconnect the hose.	
13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	50
Refer to EC-300, "Component Inspection".	EC
Is the inspection result normal?	
YES >> GO TO 14. NO >> Replace EVAP canister purge volume control solenoid valve.	С
14.CHECK FUEL TANK TEMPERATURE SENSOR	
Refer to EC-250, "Component Inspection".	D
Is the inspection result normal?	
YES >> GO TO 15.	F
NO >> Replace fuel level sensor unit.	E
15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to EC-315. "Component Inspection".	F
Is the inspection result normal?	
YES >> GO TO 16. NO >> Replace EVAP control system pressure sensor.	G
16. CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper Refer to <u>EC-83, "System Diagram"</u> .	r connection. H
Is the inspection result normal?	
YES >> GO TO 17.	1
NO >> Repair or reconnect the hose.	I
17.CLEAN EVAP PURGE LINE	
Clean EVAP purge line (pipe and rubber tube) using air blower.	J
>> GO TO 18.	
18.CHECK EVAP/ORVR LINE	K
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, loosenes	s and improper
connection. For location, refer to <u>EC-513, "Description"</u> . <u>Is the inspection result normal?</u>	L
YES >> GO TO 19.	
NO >> Repair or replace hoses and tubes.	M
19. CHECK RECIRCULATION LINE	
Check recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, improper connection.	looseness and N
Is the inspection result normal?	
YES >> GO TO 20.	\bigcirc
NO >> Repair or replace hose, tube or filler neck tube.	0
20.CHECK REFUELING EVAP VAPOR CUT VALVE	
Refer to EC-516, "Component Inspection".	Р
Is the inspection result normal?	
YES >> GO TO 21. NO >> Replace refueling EVAP vapor cut valve with fuel tank.	
21. CHECK FUEL LEVEL SENSOR	
Refer to MWI-54, "Component Inspection".	

Revision: 2009 October

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 22. NO >> Replace fuel level sensor unit.

22. CHECK INTERMITTENT INCIDENT

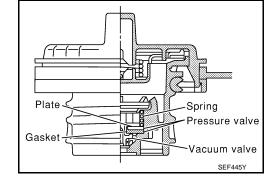
Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK FUEL TANL VACUUM RELIEF VALVE

- 1. Turn ignition switch OFF.
- 2. Remove fuel filler cap.
- 3. Wipe clean valve housing.



Vacuum/Pressure gauge

One-way valve

Fuel filler

Fuel filler cap adapter

cap

1

4. Check valve opening pressure and vacuum.

 Pressure:
 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

 Vacuum:
 -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END



2009 G37 Coupe

INFOID:000000004250801

Vacuum/

Pressure

SEF9435

pump

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS >

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

DTC Logic

DTC DETECTION LOGIC

DTC No. DTC detecting condition Possible cause Trouble diagnosis name · EVAP control system pressure sensor · EVAP canister purge volume control solenoid valve The canister purge flow is detected during the EVAP canister purge Н (The valve is stuck open.) specified driving conditions, even when EVAP · EVAP canister vent control valve P0443 volume control solenoid canister purge volume control solenoid valve is valve EVAP canister completely closed. Hoses (Hoses are connected incorrectly or clogged.) DTC CONFIRMATION PROCEDURE 1.PRECONDITIONING If DTC Confirmation Procedure has been previously conducted, always perform the following procedure Κ before conducting the next test. 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. 3. L **TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

Do you have CONSULT-III

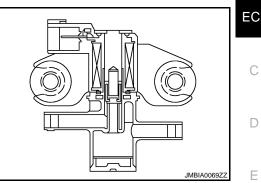
- YES >> GO TO 2. NO >> GO TO 3.
- 2. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- Turn ignition switch ON. 3.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 7. Touch "START".
- Start engine and let it idle until "TESTING" on CONSULT-III changes to "COMPLETED". (It will take 8 approximately 10 seconds.)
 - If "TESTING" is not displayed after 5 minutes, retry from step 2.
- Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT-III screen?

EC-297



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INFOID:000000004250802

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P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

OK >> INSPECTION END NG >> Go to EC-298, "Diagnosis Procedure".

3. PERFORM DTC CONFIRMATION PROCEDURE

With GST

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- 3. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. 4.
- 5. Start engine and let it idle for at least 20 seconds.
- 6. Check 1st trip DTC.

Is 1st trip DTC displayed?

- >> Go to EC-298, "Diagnosis Procedure". YES
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000004250804

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volum	Ground	Voltage	
Connector	Terminal	Ground voltage	
F7	1	Ground	Battery voltage

Is the inspection result normal?

YFS >> GO TO 3. NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- Harness connectors M116, F103
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF. 1.
- Disconnect ECM harness connector. 2.
- 3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volum	ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F7	2	F101	21	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]
 Check the following. Harness connectors F104, F105 Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
>> Repair open circuit, short to ground or short to power in harness or connectors. $5.$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR
 Disconnect EVAP control system pressure sensor harness connector. Check connectors for water.
Water should not exist.
Is the inspection result normal?
YES >> GO TO 6.
NO >> Replace EVAP control system pressure sensor.
6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR
Refer to EC-315, "Component Inspection".
Is the inspection result normal?
YES-1 >> With CONSULT-III: GO TO 7. YES-2 >> Without CONSULT-III: GO TO 8.
NO >> Replace EVAP control system pressure sensor.
7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
(P)With CONSULT-III
1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
 Start engine. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.
Does engine speed vary according to the valve opening?
YES >> GO TO 9.
NO >> GO TO 8.
8.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Refer to EC-300, "Component Inspection".
Is the inspection result normal?
YES >> GO TO 9. NO >> Replace EVAP canister purge volume control solenoid valve.
9. CHECK RUBBER TUBE FOR CLOGGING
 Disconnect rubber tube connected to EVAP canister vent control valve. Check the rubber tube for clogging.
Is the inspection result normal?
YES >> GO TO 10.
NO >> Clean the rubber tube using an air blower.
10. CHECK EVAP CANISTER VENT CONTROL VALVE
Refer to EC-307, "Component Inspection".
Is the inspection result normal?
YES >> GO TO 11.
NO >> Replace EVAP canister vent control valve.
11.CHECK IF EVAP CANISTER IS SATURATED WITH WATER
 Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

attached.

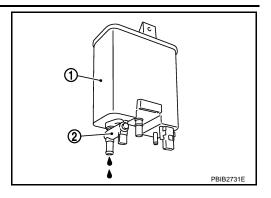
P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

- 2. Check if water will drain from EVAP canister (1).
 - 2 : EVAP canister vent control valve

Does water drain from the EVAP canister?

YES >> GO TO 12. NO >> GO TO 14.



[VQ37VHR]

12.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

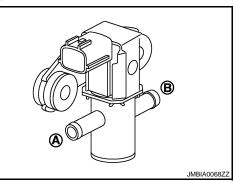
INFOID:000000004250805

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)	
100%	Existed	
0%	Not existed	



Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.



P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following 4. conditions.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

>> INSPECTION END YES

NO >> Replace EVAP canister purge volume control solenoid valve EC

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P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

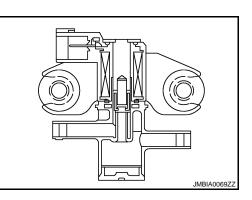
[VQ37VHR]

INFOID:000000004250806

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



INFOID:000000004250807

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	 Harness or connectors (The solenoid valve circuit is open or shorted.) EVAP canister purge volume control so- lenoid valve
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	 Harness or connectors (The solenoid valve circuit is shorted.) EVAP canister purge volume control so- lenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- **TESTING CONDITION:**

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 13 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-302, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000004250808

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.

EC-302

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Check the voltage between EVAP canister purge volume control solenoid valve harness connector and 4 ground. А EVAP canister purge volume control solenoid valve EC Ground Voltage Connector Terminal F7 1 Ground Battery voltage Is the inspection result normal? YES >> GO TO 3. NO >> GO TO 2. D 2.DETECT MALFUNCTIONING PART Check the following. Harness connectors E106, M6 Е Harness connectors M116, F103 Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R Harness for open or short between EVAP canister purge volume control solenoid valve and ECM >> Repair open circuit, short to ground or short to power in harness or connectors. 3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. Н Disconnect ECM harness connector. 2. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and 3. ECM harness connector. EVAP canister purge vol-ECM ume control solenoid valve Continuity Terminal Connector Connector Terminal 2 F101 F7 21 Existed 4. Also check harness for short to ground and short to power. Κ Is the inspection result normal? YES-1 >> With CONSULT-III: GO TO 5. YES-2 >> Without CONSULT-III: GO TO 6. NO >> GO TO 4. 4. DETECT MALFUNCTIONING PART Check the following. Μ Harness connectors F104, F105 Harness for open or short between EVAP canister purge volume control solenoid valve and ECM Ν >> Repair open circuit, short to ground or short to power in harness or connectors. 5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION With CONSULT-III Reconnect all harness connectors disconnected. 1. 2. Start engine. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed var-Ρ 3. ies according to the valve opening. Does engine speed vary according to the valve opening? YES >> GO TO 7. NO >> GO TO 6. **O**.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-304, "Component Inspection".

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

INFOID:000000004250809

<u>Is the inspection result normal?</u> YES >> GO TO 7.

NO >> Replace EVAP canister purge volume control solenoid valve.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

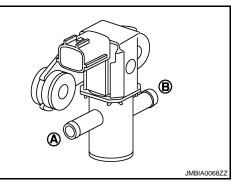
Component Inspection

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)	
100%	Existed	
0%	Not existed	



Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve

< DTC/CIRCUIT DIAGNOSIS >

P0447 EVAP CANISTER VENT CONTROL VALVE

Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

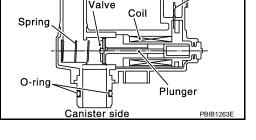
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid value is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.

DTC Logic

DTC DETECTION LOGIC



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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0447	EVAP canister vent con- trol valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	 Harness or connectors (The valve circuit is open or shorted.) EVAP canister vent control valve 	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE



2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-305, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-III

1. Turn ignition switch OFF and then ON.

2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-III.

EC-305

2009 G37 Coupe

INFOID:000000004250812

[VQ37VHR]

INFOID:000000004250810

Terminal

< DTC/CIRCUIT DIAGNOSIS >

4. Check for operating sound of the valve.

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect EVAP canister vent control valve harness connector.

- 3. Turn ignition switch ON.
- 4. Check the voltage between EVAP canister vent control valve harness connector and ground.

EVAP canister vent con- trol valve		Ground	Voltage
Connector	Terminal		
B31	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

• Harness connectors F103, M116

- Harness connectors M7, B1
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP canister vent control valve harness connector and ECM harness connector.

EVAP can control		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B31	2	M107	121	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B1, M7

Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

7.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Clean the rubber tube using an air blower.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-307, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

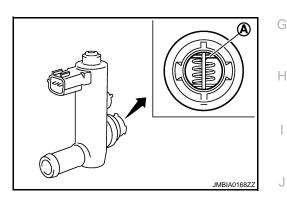
Component Inspection

1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- 3. Check portion (A) of EVAP canister vent control valve for rust.

Is it rusted?

- YES >> Replace EVAP canister vent control valve.
- NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-III

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

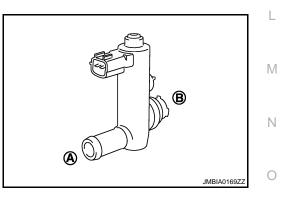
- 1. Disconnect EVAP canister vent control valve harness connector.
- 2. Check air passage continuity and operation delay time under the following conditions.

Make sure that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?



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[VQ37VHR]

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< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
- NO >> Replace EVAP canister vent control valve.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 3. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

Make sure that new O-ring is installed properly.

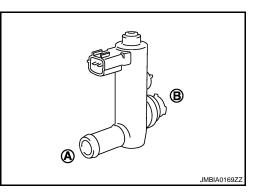
Condition	Air passage continuity between (A) and (B)	
12 V direct current supply between terminals 1 and 2	Not existed	
OFF	Existed	

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve.



< DTC/CIRCUIT DIAGNOSIS >

P0448 EVAP CANISTER VENT CONTROL VALVE

Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

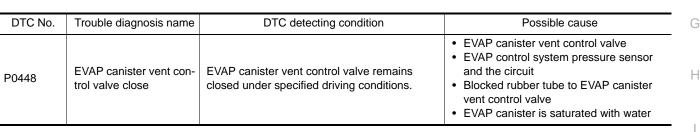
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid value is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.

DTC Logic

DTC DETECTION LOGIC



DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

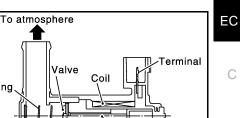
2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and let it idle for at least 1 minute.
- 4. Repeat next procedures five times.
- Increase the engine speed up to between 3,000 and 3,500 rpm and maintain that speed for 2 minutes.
- Fully released accelerator pedal and keep engine idle for about 5 seconds.
- 5. Repeat next procedure 27 times.
- Quickly increase the engine speed up to between 3,000 and 3,500 rpm and maintain that speed for 25 to 30 seconds.
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INFOID:000000004250814



Plunger

Spring

O-ring

Canister side

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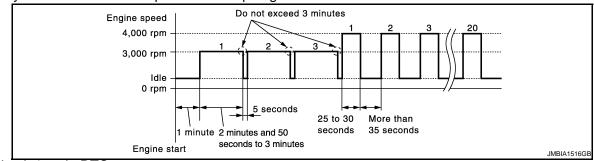
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< DTC/CIRCUIT DIAGNOSIS >





6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-310, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000004250816

[VQ37VHR]

1.CHECK RUBBER TUBE

- 1. Turn ignition switch OFF.
- 2. Disconnect rubber tube connected to EVAP canister vent control valve.
- 3. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Clean rubber tube using an air blower.

2. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-311. "Component Inspection".

Is the inspection result normal?

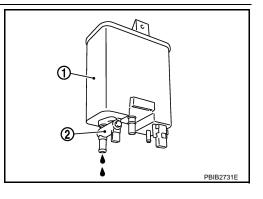
- YES >> GO TO 3.
- NO >> Replace EVAP canister vent control valve.

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve (2) and EVAP control system pressure sensor attached.
- 2. Check if water will drain from the EVAP canister (1).

Does water drain from EVAP canister?

YES >> GO TO 4. NO >> GO TO 6.



4.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

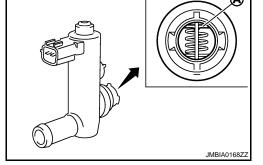
Check the following.

EVAP canister for damage

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]	
>> Repair hose or replace EVAP canister.	•
6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	А
 Disconnect EVAP control system pressure sensor harness connector. Check connectors for water. 	EC
Water should not exist.	
<u>Is the inspection result normal?</u> YES >> GO TO 7.	С
NO >> Replace EVAP control system pressure sensor. 7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	D
Refer to EC-315, "Component Inspection". Is the inspection result normal? YES >> GO TO 8. NO >> Replace EVAP control system pressure sensor.	E
8. CHECK INTERMITTENT INCIDENT	F
Refer to GI-41, "Intermittent Incident".	
>> INSPECTION END	G
Component Inspection INFOID:00000004250817	7
1. CHECK EVAP CANISTER VENT CONTROL VALVE-I	Н
 Turn ignition switch OFF. Remove EVAP canister vent control valve from EVAP canister. Check portion (A) of EVAP canister vent control valve for being rusted. 	
Is it rusted? YES >> Replace EVAP canister vent control valve. NO >> GO TO 2	J

NO >> GO TO 2.



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2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-III

- ĭ. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- Perform "VENT CONTROL/V" in "ACTIVE TEST" mode. 3.
- 4. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

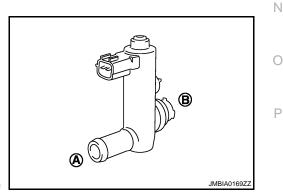
Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

- Disconnect EVAP canister vent control valve harness connector. 1.
- Check air passage continuity and operation delay time under the 2. following conditions.

Make sure that new O-ring is installed properly.



< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Condition	Air passage continuity between (A) and (B)
/ direct current supply between	

12 V direct current supply terminals 1 and 2

OFF

Not existed

Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 3. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

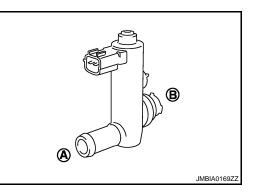
Condition VENT CONT/V	Air passage continuity between (A) and (B)	
ON	Not existed	
OFF	Existed	

Operation takes less than 1 second.

Without CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

Make sure that new O-ring is installed properly.



Condition	Air passage continuity between (A) and (B)	
12 V direct current supply between terminals 1 and 2	Not existed	
OFF	Existed	

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

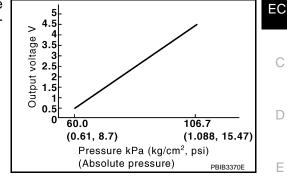
NO >> Replace EVAP canister vent control valve.

< DTC/CIRCUIT DIAGNOSIS >

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451	EVAP control system pressure sensor perfor- mance	ECM detects a sloshing signal from the EVAP control system pressure sensor	 Harness or connectors (EVAP control system pressure sensor circuit is shorted.) [CKP sensor (POS) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Brake booster pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

- 2.PERFORM DTC CONFIRMATION PROCEDURE
- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and wait at least 40 seconds. **NOTE:**

Do not depress accelerator pedal even slightly.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-313, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

EC-313

2009 G37 Coupe

INFOID:000000004250820

INFOID:000000004250818

INFOID:000000004250819

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< DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.check evap control system pressure sensor connector for water

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

 ${
m 3.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage (V)
Connector	Terminal		
B30	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F101	45	Brake booster pressure sensor	E48	1
FIUI	46	CKP sensor (POS)	F2	1
	103	APP sensor	E112	6
M107	107	EVAP control system pressure sensor	B30	3
	107	Refrigerant pressure sensor	E77	3

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-276, "Component Inspection".)
- Brake booster pressure sensor (Refer to <u>EC-361, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to <u>EC-520, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-469, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

[VQ37VHR]

. . . .

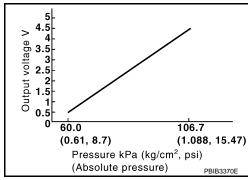
	P04	451 EVA	P CONTROL SYSTEM	PRESSURE SENSOR		
< DTC/CIF	RCUIT DIA	GNOSIS >	>		[VQ37VHR]	
NO >>	> GO TO 7					
7.REPLA	CE ACCEL	ERATOR F	PEDAL ASSEMBLY			А
1. Replac 2. Go to l			issembly air Requirement".		E	C
•	> INSPECT					
Ö. CHECK	EVAP CO	NTROL SY	STEM PRESSURE SENSOR			С
Refer to E			nspection".			
<u>Is the inspector</u> YES >>	<u>ection resu</u> > GO TO 9					D
			rol system pressure sensor.			
9. CHECK	INTERMI		CIDENT			E
Refer to G	-41, "Interr	mittent Inci	dent".			
>:	> INSPECT	TION END				F
Compon	ent Insp	ection			INFOID:000000004250821	
1. снеск	EVAP CO	NTROL SY	STEM PRESSURE SENSOR			G
	nition swite					
			em pressure sensor with its harr h a new one.	ness connector.		Н
3. Install	a vacuum j	pump to E	/AP control system pressure se			
	nition swit		I check output voltage betweer	n ECM harness connector term	inals under the	1
lonown		10.				
	ECM					
Connector	+	_	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)		J
	Terminal	Terminal				
M107	102	112	Not applied	1.8 - 4.8		Κ
			-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value		
CAUT	-	ite the vac	uum pump gauge when using	n it		L
			kPa (-0.952 kg/cm ² , -13.53 ps		(1.033 kg/cm ² ,	
14.6	9 psi).			, I		
Is the inspe					l	Μ
	> INSPEC1 > Replace		rol system pressure sensor			
	-					Ν
						0
						_
						Ρ

< DTC/CIRCUIT DIAGNOSIS >

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

DTC DETECTION LOGIC

INFOID:000000004250823

[VQ37VHR]

INFOID:000000004250822

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low in- put	An excessively low voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Brake booster pressure sensor Brake booster pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT-III.
- 7. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
- 8. Start engine and wait at least 20 seconds.
- 9. Check 1st trip DTC.

EC-316

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector terminals as per the following.

		ECM		E
Connector	+		-	
Connector	Termina	I	Terminal	
M107	106 (Fuel tank temperature	e sensor signal)	128 (ECM gound)	(
. Turn ig . Turn ig	sure that the voltage gnition switch OFF a gnition switch ON.	nd wait at least	10 seconds.	[
. Start e . Check	gnition switch OFF a engine and wait at lea 1st trip DTC. DTC detected?		10 seconds.	I
YES >:	> Go to <u>EC-317, "Dia</u> > INSPECTION END		<u>ure"</u> .	
iagnos	is Procedure		INFOID:0000000042508	24 (
.CHECK	GROUND CONNE	CTION		
. Check	gnition switch OFF. ground connection ection result normal?		round Inspection in GI-44, "Circuit Inspection".	
YES >:	 GO TO 2. Repair or replace (_	on.	
CHECK	CONNECTOR			
	nnect EVAP control s sensor harness cor		e sensor harness connector. r.	
	ter should not exis			I
the inspe	ection result normal?			I
<u>the inspe</u> YES >:	<u>ection result normal?</u> > GO TO 3.	2	tor.	
<u>s the inspe</u> YES >: NO >:	ection result normal? > GO TO 3. > Repair or replace I	2 narness connect		
the inspo YES >: NO >: CHECK	ection result normal ² > GO TO 3. > Repair or replace I (EVAP CONTROL S gnition switch ON.	harness connect	tor. SURE SENSOR POWER SUPPLY CIRCUIT-I system pressure sensor harness connector and ground.	_
the inspo YES >: NO >: CHECK . Turn ig . Check	ection result normal' > GO TO 3. > Repair or replace I (EVAP CONTROL S gnition switch ON. the voltage between	harness connect	SURE SENSOR POWER SUPPLY CIRCUIT-I	_
the insperiod YES >: NO >: CHECK . Turn ig . Check EVAP cor pressur	ection result normal' > GO TO 3. > Repair or replace I C EVAP CONTROL S gnition switch ON. the voltage between httpl system re sensor Ground	harness connect	SURE SENSOR POWER SUPPLY CIRCUIT-I	
the inspective YES >: NO >: CHECK Turn ig Check	ection result normal' > GO TO 3. > Repair or replace I C EVAP CONTROL S gnition switch ON. the voltage between htrol system re sensor Terminal Ground	2 narness connect SYSTEM PRESS n EVAP control s Voltage (V)	SURE SENSOR POWER SUPPLY CIRCUIT-I	_
the insperiod YES >: NO >: CHECK . Turn ig . Check EVAP cor pressur Connector B30	ection result normal? > GO TO 3. > Repair or replace If EVAP CONTROL S gnition switch ON. the voltage between ntrol system re sensor Ground Terminal 3 Ground	2 narness connect SYSTEM PRESS n EVAP control s Voltage (V) Approx. 5	SURE SENSOR POWER SUPPLY CIRCUIT-I	
 the inspective YES >: NO >: CHECK Turn ig Check EVAP corpressur Connector B30 the inspective 	ection result normal' > GO TO 3. > Repair or replace I C EVAP CONTROL S gnition switch ON. the voltage between ntrol system re sensor Terminal 3 Ground ection result normal'	2 narness connect SYSTEM PRESS n EVAP control s Voltage (V) Approx. 5	SURE SENSOR POWER SUPPLY CIRCUIT-I	
the inspective YES >: NO >: CHECK Turn ig Check EVAP corpressur Connector B30 the inspective YES >:	ection result normal? > GO TO 3. > Repair or replace If C EVAP CONTROL S gnition switch ON. the voltage between ntrol system re sensor Ground Terminal 3 Ground	2 narness connect SYSTEM PRESS n EVAP control s Voltage (V) Approx. 5	SURE SENSOR POWER SUPPLY CIRCUIT-I	

- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		
B30	3	M107	M107 107	

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M7, B1

Harness for open between ECM and EVAP control system pressure sensor

>> Repair open circuit.

6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F101	45	Brake booster pressure sensor	E48	1
FIUI	46	CKP sensor (POS)	F2	1
	103	APP sensor	E112	6
M107	107	EVAP control system pressure sensor	B30	3
	107	Refrigerant pressure sensor	E77	3

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair short to ground or short to power in harness or connectors.

7.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-276. "Component Inspection".)
- Brake booster pressure sensor (Refer to <u>EC-361, "Component Inspection"</u>.)
 Refrigerant pressure sensor (Refer to <u>EC-520, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to EC-469, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 9.

9.replace accelerator pedal assembly

1. Replace accelerator pedal assembly

Go to EC-469, "Special Repair Requirement". 2.

>> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and SHORT

1. Turn ignition switch OFF.

< DTC/CIRCUIT DIAGNOSIS >

2. Disconnect ECM harness connector.

3. Check the continuity between EVAP control system pressure sensor harness connector and ECM har- A ness connector.

		1				
EVAP contr pressure	•	EC	M	Continuity		EC
Connector	Terminal	Connector	Terminal			
B30	1	M107	112	Existed		С
4. Also ch			•	nd and sho	rt to power.	
<u>Is the inspe</u> YES >>	- GO TO		-			D
	- GO TO					
11. DETE	CT MALF	UNCTION	ING PAR	г		Е
Check the						
Harness				AD control	Nuctom processing conder and ECM	
• namess	lor open o	or short be	ween EV	AP CONTOIS	system pressure sensor and ECM	F
>>	Repair of	open circuit	. short to	around or s	hort to power in harness or connectors.	
	•	•	-	0		G
SHORT						
1. Check	the conti	inuity betw	een EVAF	control sy	stem pressure sensor harness connector and ECM har-	Н
ness c	onnector.					Π
EVAP contr pressure	-	EC	M	Continuity		
Connector	Terminal	Connector	Terminal			
B30	2	M107	102	Existed		J
2. Also ch	neck harn	ess for sho	ort to grou	nd and sho	rt to power.	0
Is the inspe) -			
	• GO TO • GO TO					Κ
13.DETE				т		
Check the				1		L
Harness						
 Harness 	for open	or short be	ween EV	AP control :	system pressure sensor and ECM	М
	. .	,				IVI
				-	hort to power in harness or connectors.	
					RE SENSOR	Ν
Refer to EC				<u>n"</u> .		
<u>Is the inspe</u> YES >>	GO TO		-			0
			trol syste	m pressure	sensor.	
15.снес						
Refer to GI						Ρ
>>	> INSPEC	TION END)			
Compon	ent Insp	pection			INFOID:000000004250825	
1.снеск	EVAP C		YSTEM F	RESSURF	SENSOR	

[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector. Always replace O-ring with a new one.
- Install a vacuum pump to EVAP control system pressure sensor.
- Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.

	ECM		Condition		
Connector	+	-	Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)	
Connector	Terminal	Terminal	[, , , , , , , , , , , , , , , , , , ,		
M107	102	112	Not applied	1.8 - 4.8	
101	102	112	-26.7 (-0.272, -3.87)	2.1 to 2.5 lower than above value	

CAUTION:

- Always calibrate the vacuum pump gauge when using it.
- Never apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

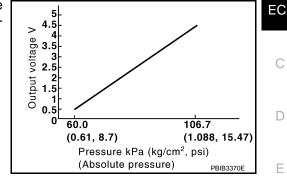
- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor

< DTC/CIRCUIT DIAGNOSIS >

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high in- put	An excessively high voltage from the sensor is sent to ECM.	 Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted) EVAP control system pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor Refrigerant pressure sensor Brake booster pressure sensor EVAP canister vent control valve EVAP canister Rubber hose from EVAP canister vent control valve to vehicle frame

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- T. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT-III.

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[VQ37VHR]

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< DTC/CIRCUIT DIAGNOSIS >

- 7. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
- 8. Start engine and wait at least 20 seconds.
- 9. Check 1st trip DTC.

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector terminals as per the following.

ECM					
Connector	+	-			
Connector	Terminal	Terminal			
M107	106 (Fuel tank temperature sensor signal)	128 (ECM ground)			

- 3. Make sure that the voltage is less than 4.2 V.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Turn ignition switch OFF and wait at least 10 seconds.
- 7. Start engine and wait at least 20 seconds.
- 8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-322, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

2. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

 ${f 3.}$ CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch ON.
- 2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system	Ground	Voltage (V)	
Connector	Terminal	Ciouna	voltage (v)
B30	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 4.

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

EC-322

INFOID:000000004250828

< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	n pressure sensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
B30	3	M107	107	Existed
	14 10			

Is the inspection result normal?

YES >> GO TO 6. NO

>> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M7, B1

· Harness for open between ECM and EVAP control system pressure sensor

>> Repair open circuit.

6. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F101	45	Brake booster pressure sensor	E48	1		
FIUI	46	CKP sensor (POS)	F2	1		
	103	APP sensor	E112	6		
M107	107	EVAP control system pressure sensor	B30	3		
	111	Refrigerant pressure sensor	E77	3		
Is the inspe	ection res	sult normal?				
NO >> Repair short to ground or short to power in harness or connectors. 7.CHECK COMPONENTS						
Brake bo Refrigera Is the inspective YES >:	aft position oster preant press ant press ection res > GO TO	on sensor (POS) (Refer to <u>EC-27</u> essure sensor (Refer to <u>EC-361. '</u> ure sensor (Refer to <u>EC-520. "Dia</u> sult normal?	Compone	<u>nt Inspec</u>	<u>ction"</u> .) <u>on"</u> .)	
8.CHECK	•	U 1				
		Component Inspection".				
Is the inspective VES >:		sult normal? 20.				
9.REPLA	CE ACCI	ELERATOR PEDAL ASSEMBLY				
		rator pedal assembly "Special Repair Requirement".				

>> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and SHORT

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< DTC/CIRCUIT DIAGNOSIS >

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	n pressure sensor	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
B30	1	M107	112	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B1, M7

Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	n pressure sensor	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
B30	2	M107	102	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 13.

NO >> GO 10 13.

13. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B1, M7

Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

14.CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

15. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-307, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP canister vent control valve.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-325, "Component Inspection".

CICCCCUTC DIAGNOSIS > [V037VHR] Is the inspection result normal? YES >> GO TO 17. A NO >> Replace EVAP control system pressure sensor. C 17. CHECK IF EVAP CANISTER IS SATURATED WITH WATER C C 2. Check II water with drain from the EVAP canister vent control valve and EVAP control system pressure sensor attached. C C 2. Check II water with GUAP canister? YES >> GO TO 20. C C Veligh the EVAP canister vent control valve C C C C Veligh the EVAP canister vent control valve and EVAP control system pressure sensor attached. C D C NO >> GO TO 20. C C C C Veligh the EVAP canister vent control valve and EVAP control system pressure sensor attached. C C 18. CHECK EVAP CANISTER F F C C Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached. G F 19. DETECT MALFUNCTIONING PART F C C C 19. DETECT MALFUNCTIONING PART F C C C C 19. DETECT MALFUNCTIONING PART F				P CONTROL SYSTEM	PRESSURE SENSOR	[VQ37VHR]	
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	M107	102	112				
	CALITI			20.1 (-0.212, -0.01)			

CAUTION:

• Always calibrate the vacuum pump gauge when using it.

Do not apply below -93.3 kPa (-0.952 kg/cm², -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm², 14.69 psi).

Is the inspection result normal?

YES >> INSPECTION END

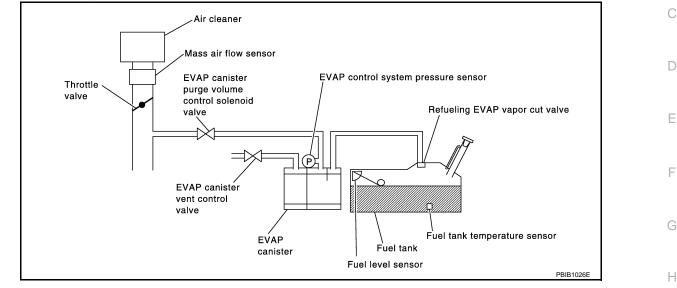
NO >> Replace EVAP control system pressure sensor.

P0455 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	 Fuel filler cap remains open or fails to close. Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP control system pressure sensor ORVR system leaks

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the P MIL may illuminate.
- If the fuel filler cap is not tightened properly, the MIL may illuminate.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

CAUTION:

INFOID:000000004250830

EC

< DTC/CIRCUIT DIAGNOSIS >

Never remove fuel filler cap during the DTC Confirmation Procedure.

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

TESTING CONDITION:

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedures.

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- T. Tighten fuel filler cap securely until ratcheting sound is heard.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 5. Make sure that the following conditions are met. COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
 - INT/A TEMP SE: 0 60°C (32 140°F)
- 6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instructions displayed on CONSULT-III screen.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to <u>EC-13, "BASIC INSPECTION : Special Repair Requirement"</u>.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END. NG >> GO TO 3.

3.CHECK DTC

Check DTC.

Which DTC is detected?

P0455 >> Go to <u>EC-331, "Component Inspection"</u>. P0442 >> Go to <u>EC-292, "Diagnosis Procedure"</u>.

4.PERFORM DTC CONFIRMATION PROCEDURE

With GST NOTE:

Be sure to read the explanation of Driving Pattern in EC-569, "How to Set SRT Code" before driving vehicle.

- 1. Start engine.
- 2. Drive vehicle according to Driving Pattern.
- 3. Stop vehicle.
- 4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

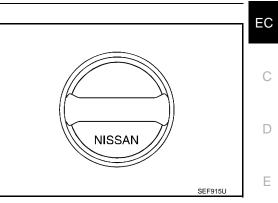
- YES-1 >> P0455: Go to EC-331, "Component Inspection".
- YES-2 >> P0442: Go to EC-292, "Diagnosis Procedure".
- YES-3 >> P0441: Go to EC-288, "Diagnosis Procedure".
- NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

1.CHECK FUEL FILLER CAP DESIGN

- 1. Turn ignition switch OFF.
- 2. Check for genuine NISSAN fuel filler cap design.
- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Retighten until G ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Is the inspection result normal? YES >> GO TO 5. NO >> GO TO 4. 4. CHECK FUEL TANK VACUUM RELIEF VALVE Refer to EC-516. "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace fuel filler cap with a genuine one. 5. CHECK EVAP PURGE LINE Check EVAP PURGE LINE Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to EC-33, "System Diagram". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or reconnect the hose. 6 CLEAN EVAD PURGE LINE	Check for air releasing sound while opening the fuel filler cap.	Н
NO \Rightarrow GO TO 4. 4. CHECK FUEL TANK VACUUM RELIEF VALVE Refer to <u>EC-516</u> , "Component Inspection". Is the inspection result normal? YES \Rightarrow GO TO 5. NO \Rightarrow Replace fuel filler cap with a genuine one. 5. CHECK EVAP PURGE LINE Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to <u>EC-83</u> , "System Diagram". Is the inspection result normal? YES \Rightarrow GO TO 6. NO \Rightarrow Repair or reconnect the hose. 6 CIEEAN EVAP DURCE LINE		
4. CHECK FUEL TANK VACUUM RELIEF VALVE Refer to EC-516, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace fuel filler cap with a genuine one. K 5. CHECK EVAP PURGE LINE Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to EC-83, "System Diagram". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or reconnect the hose. 6 CLEAN EVAP PURCE LINE		1
Refer to EC-516, "Component Inspection". J Is the inspection result normal? YES >> GO TO 5. NO >> Replace fuel filler cap with a genuine one. K 5.CHECK EVAP PURGE LINE K Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. L Refer to EC-83, "System Diagram". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or reconnect the hose. 6 CLEAN EVAP DUPOE LINE M		1
$\frac{\text{Is the inspection result normal?}}{\text{YES} \Rightarrow \text{GO TO 5.}} \\ \text{NO} \Rightarrow \text{Replace fuel filler cap with a genuine one.} \\ \text{S.CHECK EVAP PURGE LINE} \\ \hline \text{Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.} \\ \text{Refer to } \frac{\text{EC-83. "System Diagram"}}{\text{System Diagram"}}. \\ \hline \text{Is the inspection result normal?} \\ \text{YES} \Rightarrow \text{GO TO 6.} \\ \text{NO} \Rightarrow \text{Repair or reconnect the hose.} \\ \hline \text{S.CHECK EVAP PURCE LINE} \\ \hline \text{MO} = \text{S.CHECK EVAP PURCE LINE} \\ \hline \ $	4.CHECK FUEL TANK VACUUM RELIEF VALVE	
YES >> GO TO 5. NO >> Replace fuel filler cap with a genuine one. K 5.CHECK EVAP PURGE LINE Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to EC-83, "System Diagram". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or reconnect the hose. 6 CLEAN EVAP PURGE LINE	Refer to EC-516, "Component Inspection".	J
NO >> Replace fuel filler cap with a genuine one. K 5. CHECK EVAP PURGE LINE Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. L Refer to EC-83, "System Diagram". Is the inspection result normal? M YES >> GO TO 6. NO >> Repair or reconnect the hose. M	Is the inspection result normal?	
NO >> Replace the initial cap with a genuine one. 5. CHECK EVAP PURGE LINE Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to EC-83, "System Diagram". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or reconnect the hose. 6 CLEAN EVAP PURCE LINE	YES >> GO TO 5.	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection. Refer to <u>EC-83</u> , "System Diagram". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or reconnect the hose.	NO >> Replace fuel filler cap with a genuine one.	K
disconnection. Refer to <u>EC-83</u> , "System Diagram". <u>Is the inspection result normal?</u> YES $>>$ GO TO 6. NO $>>$ Repair or reconnect the hose. 6 CLEAN EVAD BUDGED UNE	5. CHECK EVAP PURGE LINE	
Refer to <u>EC-83, "System Diagram"</u> . <u>Is the inspection result normal?</u> YES >> GO TO 6. NO >> Repair or reconnect the hose. 6 OLEAN EVAD BUDGE LINE		L
Is the inspection result normal? YES >> GO TO 6. NO >> Repair or reconnect the hose. 6 CLEAN EVAD BUBCE LINE		
YES >> GO TO 6. NO >> Repair or reconnect the hose.		
NO >> Repair or reconnect the hose.		M
O.CLEAN EVAP PURGE LINE		
	O.CLEAN EVAP PURGE LINE	Ν

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to <u>EC-617, "Removal and Installation"</u>.
- EVAP canister vent control valve. Refer to <u>EC-307, "Component Inspection"</u>.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Repair or replace EVAP canister vent control valve and O-ring.

EC-329

2009 G37 Coupe

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< DTC/CIRCUIT DIAGNOSIS >

8.CHECK FOR EVAP LEAK

Refer to EC-615, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO-1 >> With CONSULT-III: GO TO 9.

NO-2 >> Without CONSULT-III: GO TO 10.

9.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

- 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- 2. Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT-III screen to increase "PURG VOL C/V" opening to 100%.
- 5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Stop engine.
- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- 4. Start engine and let it idle for at least 80 seconds.
- 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 11.

11.CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-83, "System Diagram".

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 12.

YES-2 >> Without CONSULT-III: GO TO 13.

NO >> Repair or reconnect the hose.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

- 1. Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 14.

NO >> GO TO 13.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

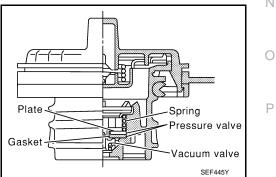
Refer to EC-300, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 14.
- NO >> Replace EVAP canister purge volume control solenoid valve.

EC-330

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR] 14.CHECK FUEL TANK TEMPERATURE SENSOR Refer to EC-250, "Component Inspection".
Refer to EC-250, "Component Inspection".
s the inspection result normal?
YES >> GO TO 15. NO >> Replace fuel level sensor unit.
NO >> Replace fuel level sensor unit. 5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR
Refer to <u>EC-315, "Component Inspection"</u> . s the inspection result normal?
YES >> GO TO 16.
NO >> Replace EVAP control system pressure sensor.
16.CHECK EVAP/ORVR LINE
Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, looseness and improper connection. For location, refer to <u>EC-513</u> , " <u>Description</u> ".
s the inspection result normal?
YES >> GO TO 17. NO >> Repair or replace hoses and tubes.
17. CHECK RECIRCULATION LINE
Check recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, looseness and
mproper connection.
s the inspection result normal?
YES >> GO TO 18. NO >> Repair or replace hose, tube or filler neck tube.
18. CHECK REFUELING EVAP VAPOR CUT VALVE
Refer to <u>EC-516, "Component Inspection"</u> . s the inspection result normal?
YES >> GO TO 19.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.
19. CHECK INTERMITTENT INCIDENT
Refer to GI-41, "Intermittent Incident".
>> INSPECTION END
Component Inspection
1.CHECK FUEL TANL VACUUM RELIEF VALVE
1. Turn ignition switch OFF.
 Remove fuel filler cap. Wipe clean valve housing.



< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Vacuum/

Pressure pump

SEF943S

-Vacuum/Pressure gauge

Cone-way valve

-Fuel filler

Fuel filler cap adapter

cap

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4. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 - 2.90 psi)

Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm², -0.87 to -0.48 psi)

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.

 $2. {\tt REPLACE FUEL FILLER CAP}$

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0456 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

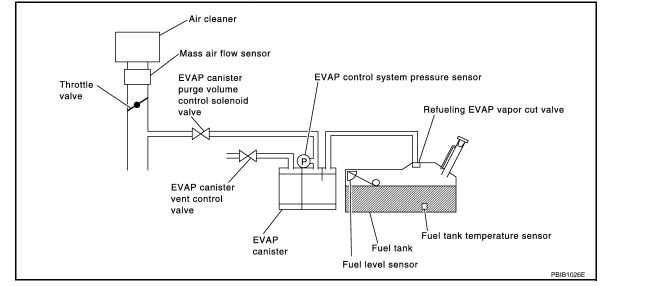
NOTE:

If DTC P0456 is displayed with DTC P0442, first perform the trouble diagnosis for DTC P0456.

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected. If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.

If ECM judges that there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system very small leak (negative pressure check)	 EVAP system has a very small leak. EVAP system does not operate properly. 	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or fails to close. Foreign matter caught in fuel filler cap. Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. Foreign matter caught in EVAP canister vent control valve. EVAP canister or fuel tank leaks EVAP purge line (pipe and rubber tube) leaks EVAP purge line rubber tube bent Loose or disconnected rubber tube EVAP canister vent control valve and the circuit EVAP canister purge volume control solenoid valve and the circuit EVAP canister vent control valve and the sinssing or damaged EVAP canister is saturated with water EVAP control system pressure sensor Refueling EVAP vapor cut valve ORVR system leaks Fuel level sensor and the circuit Foreign matter caught in EVAP canister purge volume control valve

CAUTION:

 Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

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< DTC/CIRCUIT DIAGNOSIS >

- If the fuel filler cap is not tightened properly, the MIL may illuminate.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 4.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

After repair, make sure that the hoses and clips are installed properly.

TESTING CONDITION:

- Open engine hood before conducting the following procedure.
- If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
- Fuel filler cap is removed.
- Fuel is refilled or drained.
- EVAP component part/parts is/are removed.
- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Make sure that the following conditions are met.

FUEL LEVEL SE: 0.25 - 1.4 V COOLAN TEMP/S: 0 - 32°C (32 - 90°F) FUEL T/TMP SE: 0 - 35°C (32 - 95°F)

INT A/TEMP SE: More than 0°C (32°F)

If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle), or refill/drain fuel until the output voltage condition of the "FUEL LEVEL SE" meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1.

- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Select "EVAP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.

Follow the instructions displayed on CONSULT-III.

NOTE:

If the engine speed cannot be maintained within the range displayed on CONSULT-III screen, go to <u>EC-13, "BASIC INSPECTION : Special Repair Requirement"</u>.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-335, "Diagnosis Procedure".

4.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-335, "Component Function Check".

NOTE:

Use component function check to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

< DTC/CIRCUIT DIAGNOSIS > Is the inspection result normal?

>> INSPECTION END

Component Function Check

YES

 With GST CAUTION:

NO

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1.PERFORM COMPONENT FUNCTION CHECK Never use compressed air, doing so may damage the EVAP system. Never exceed 4.12 kPa (0.042 kg/cm², 0.6 psi).

- 1. Attach the EVAP service port adapter securely to the EVAP service port.
- Set the pressure pump and a hose. 2.
- Also set a vacuum gauge via 3-way connector and a hose. 3.

>> Go to EC-335, "Diagnosis Procedure".

4. Turn ignition switch ON.

Never start engine.

- Connect GST and select Service \$08.
- 6. Using Service \$08 control the EVAP canister vent control valve (close).
- 7. Apply pressure and make sure the following conditions are satisfied.

Pressure to be applied: 2.7 kPa (0.028 kg/cm², 0.39 psi) Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (0.004 kg/cm², 0.06 psi).

Is the inspection result normal?

YES	>> GO TO 2.
NO	>> Go to EC-335, "Diagnosis Procedure"

2. RELEASE PRESSURE

- 1. Disconnect GST.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 4.
- Turn ignition switch OFF and wait at least 10 seconds. 5.
- Restart engine and let it idle for 90 seconds. 6.
- Keep engine speed at 2,000 rpm for 30 seconds. 7.
- 8. Turn ignition switch OFF.

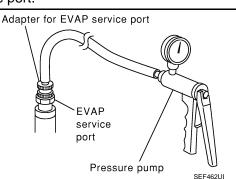
NOTE: For more information, refer to GST Instruction Manual.

>> INSPECTION END

Diagnosis Procedure

1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.



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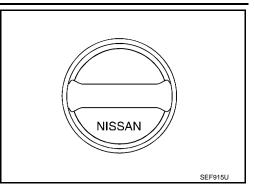
< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-516, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to EC-615, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

 $\mathbf{6}$.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to <u>EC-617, "Removal and Installation"</u>.
- EVAP canister vent control valve. Refer to <u>EC-307, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring.

7.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Remove EVAP canister with EVAP canister vent control valve

< DTC/CIRCUIT DIAGNOSIS >

1.

[VQ37VHR]

- $\int c$ (2) and EVAP control system pressure sensor attached. А Check if water will drain from EVAP canister (1). 2. Does water drain from the EVAP canister? ➀ >> GO TO 8. YES EC NO-1 >> With CONSULT-III: GO TO 10. NO-2 >> Without CONSULT-III: GO TO 11. PBIB2731E D 8.CHECK EVAP CANISTER Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached. Е The weight should be less than 2.2 kg (4.9 lb). Is the inspection result normal? YES-1 >> With CONSULT-III: GO TO 10. F YES-2 >> Without CONSULT-III: GO TO 11. >> GO TO 9. NO 9. DETECT MALFUNCTIONING PART Check the following. EVAP canister for damage • EVAP hose between EVAP canister and vehicle frame for clogging or poor connection Н >> Repair hose or replace EVAP canister. 10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION (P)With CONSULT-III 1. Disconnect vacuum hose connected to EVAP service port and EVAP canister purge volume control sole-. 1 noid valve from EVAP service port. Start engine and let it idle. 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode. Touch "Qu" on CONSULT-III screen to increase "PURG VOL C/V" opening to 100%. 4 Κ 5. Check vacuum hose for vacuum. Vacuum should exist. Is the inspection result normal? YES >> GO TO 13. NO >> GO TO 12. M 11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION Without CONSULT-III Ν Start engine and warm it up to normal operating temperature. 1. 2. Stop engine. 3. Disconnect vacuum hose connected to EVAP service port and EVAP canister purge volume control solenoid valve from EVAP service port. 4. Start engine and let it idle for at least 80 seconds. 5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm. Ρ Vacuum should exist. Is the inspection result normal?
 - YES >> GO TO 14. NO >> GO TO 12.

NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-83, "System Diagram".

EC-337

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or reconnect the hose.

 $13. {\sf check evap canister purge volume control solenoid valve}$

Refer to EC-300, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace EVAP canister purge volume control solenoid valve.

14.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-250, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel level sensor unit.

15.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-315, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP control system pressure sensor.

16.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to <u>EC-83, "System Diagram"</u>.

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or reconnect the hose.

17.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 18.

18.CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, looseness and improper connection. For location, refer to <u>EC-513, "Description"</u>.

Is the inspection result normal?

YES >> GO TO 19.

NO >> Repair or replace hoses and tubes.

19.CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kinks, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 20.

NO >> Repair or replace hose, tube or filler neck tube.

20.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-516, "Component Inspection".

Is the inspection result normal?

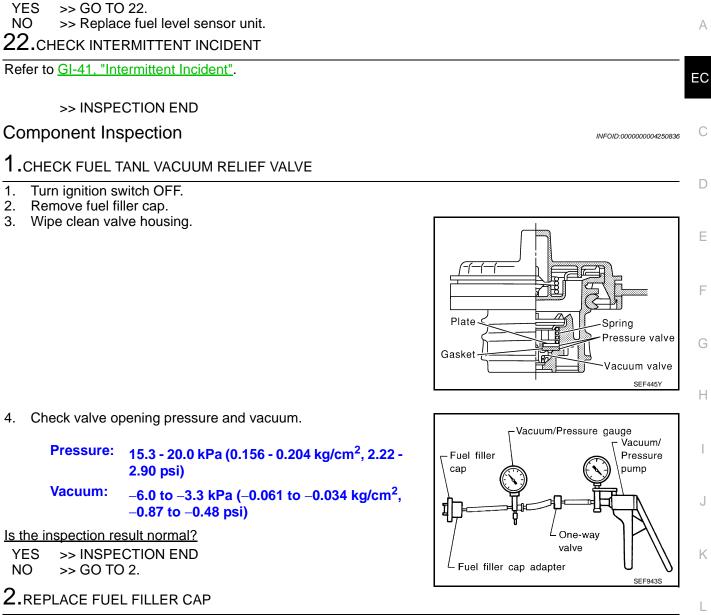
YES >> GO TO 21.

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

21. CHECK FUEL LEVEL SENSOR

Refer to <u>MWI-54</u>, "Component Inspection".

Is the inspection result normal?



Replace fuel filler cap.

< DTC/CIRCUIT DIAGNOSIS >

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.



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P0460 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the "unified meter and A/C amp.". The "unified meter and A/C amp." sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:000000004250838

DTC DETECTION LOGIC

NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-367, "DTC Logic"</u>.

When the vehicle is parked, the fuel level in the fuel tank is naturally stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal be- ing varied is sent from the fuel level sensor to ECM.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Unified meter and A/C amp. Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait maximum of 2 consecutive minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-340, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-37, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-53</u>, "Component Function Check".

2. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

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P0461 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the "unified meter and A/C amp.". The "unified meter and A/C amp." sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

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DTC DETECTION LOGIC

NOTE:

- If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-367, "DTC Logic"</u>.

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long dis- tance.	 Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (The sensor circuit is open or shorted) Unified meter and A/C amp. Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-342</u>, "<u>Component Function Check</u>". Use component function check to check the overall function of the fuel level sensor. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-343, "Diagnosis Procedure".

Component Function Check

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1.PRECONDITIONING

WARNING:

When performing the following procedure, always observe the handling of the fuel. Refer to <u>FL-5</u>, <u>"Removal and Installation"</u>.

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 3.

2. PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III

NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/ 8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.

P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
2. Release fuel pressure from fuel line, refer to EC-614, "Inspection".		
3. Remove the fuel feed hose on the fuel level sensor unit.		А
 Connect a spare fuel hose where the fuel feed hose was removed. Turn ignition switch OFF and wait at least 10 seconds then turn ON. 		
 Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-III. 		
7. Check "FUEL LEVEL SE" output voltage and note it.		EC
 Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it. 		
10. Check "FUEL LEVEL SE" output voltage and note it.		С
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).		
12. Check "FUEL LEVEL SE" output voltage and note it.		
13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12. <u>Is the inspection result normal?</u>		D
YES >> INSPECTION END		
NO >> Go to <u>EC-343, "Diagnosis Procedure"</u> .		E
3.PERFORM COMPONENT FUNCTION CHECK		
Without CONSULT-III		
NOTE:		F
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/	8 US gal, 6-5/8	
Imp gal) in advance. 1. Prepare a fuel container and a spare hose.		0
 Release fuel pressure from fuel line. Refer to <u>EC-614, "Inspection"</u>. 		G
3. Remove the fuel feed hose on the fuel level sensor unit.		
 Connect a spare fuel hose where the fuel feed hose was removed. Turn ignition switch ON. 		Н
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment		
Confirm that the fuel gauge indication varies.		
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).		
9. Confirm that the fuel gauge indication varies.		
<u>Is the inspection result normal?</u> YES >> INSPECTION END		J
YES >> INSPECTION END NO >> Go to <u>EC-343, "Diagnosis Procedure"</u> .		0
Diagnosis Procedure		
	INFOID:000000004250843	Κ
1.CHECK DTC WITH "UNIFIED METER AND A/C AMP."		
Refer to MWI-37, "CONSULT-III Function (METER/M&A)".		L
Is the inspection result normal?		
YES >> GO TO 2.		
NO >> Go to <u>MWI-53, "Component Function Check"</u> .		M
2.CHECK INTERMITTENT INCIDENT		
Refer to <u>GI-41, "Intermittent Incident"</u> .		Ν
>> INSPECTION END		
		_
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P0462, P0463 FUEL LEVEL SENSOR

Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the "unified meter and A/C amp.". The "unified meter and A/C amp." sends the fuel level sensor signal to the ECM via the CAN communication line. It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:000000004250845

DTC DETECTION LOGIC

NOTE:

- If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607.Refer to <u>EC-367, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The CAN communication line is open or
P0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	 shorted) Harness or connectors (The sensor circuit is open or shorted) Unified meter and A/C amp. Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-344, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to <u>MWI-37, "CONSULT-III Function (METER/M&A)"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-53</u>, "Component Function Check".

2. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

INFOID:000000004250846

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

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2009 G37 Coupe

P0500 VSS

Description

The vehicle speed signal is sent to the "unified meter and A/C amp." from the "ABS actuator and electric unit (control unit)" via the CAN communication line. The "unified meter and A/C amp." then sends a signal to the ECM via the CAN communication line.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-367, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	 Harness or connectors (The CAN communication line is open or short- ed) Harness or connectors (The vehicle speed signal circuit is open or shorted) Wheel sensor Unified meter and A/C amp. ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 5.

2. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.CHECK VEHICLE SPEED SIGNAL

NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT-III

- 1. Start engine (VDC switch OFF).
- 2. Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-III. The vehicle speed on CON-SULT-III should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to <u>EC-347, "Diagnosis Procedure"</u>.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select "DATA MONITOR" mode with CONSULT-III.

2. Warm engine up to normal operating temperature.

INEOID:000000004250848

< DTC/CIRCUIT	DIAGNOSIS >	[VQ37VHR]
CAUTION:	following conditions for at least 50 consecutive seconds. e vehicle at a safe speed.	
,		
ENG SPEED	1,800 - 6,000 rpm	
COOLAN TEMP/S	More than 70°C (158°F)	
B/FUEL SCHDL	5.0 - 31.8 msec	
Selector lever	Except P or N position (A/T) Except Neutral position (M/T)	
PW/ST SIGNAL	OFF	
. Check 1st tri	ρ DTC.	
NO >> INSF	D <u>EC-347, "Diagnosis Procedure"</u> . PECTION END	
PERFORM CO	OMPONENT FUNCTION CHECK	
se component	ent function check. Refer to <u>EC-347, "Component Function Check"</u> . function check to check the overall function of the vehicle speed sign DTC might not be confirmed.	al circuit. During this
the inspection	result normal?	
	PECTION END	
NO >> Go to	D <u>EC-347, "Diagnosis Procedure"</u> .	
component F	unction Check	INFOID:000000004250849
.PERFORM CO	OMPONENT FUNCTION CHECK	
With GST		
. Lift up drive v		
 Start engine. Read vehicle 	e speed signal in Service \$01 with GST.	
	speed signal on GST should be able to exceed 10 km/h (6 MPH) wher	n rotating wheels with
suitable gear		-
the inspection		
	PECTION END D <u>EC-347, "Diagnosis Procedure"</u> .	
	-	
iagnosis Pro	Jedule	INFOID:000000004250850
.CHECK DTC	WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"	
efer to <u>BRC-26</u> ,	"CONSULT-III Function".	
the inspection	result normal?	
YES >> GO 1		
•	air or replace.	
	WITH "UNIFIED METER AND A/C AMP."	
efer to <u>MWI-37,</u>	"CONSULT-III Function (METER/M&A)"	
	PECTION END	
>> 11N3F		

P0500 VSS

P0506 ISC SYSTEM

Description

INFOID:000000004250851

[VQ37VHR]

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000004250852

DTC DETECTION LOGIC

NOTE:

If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506	Idle speed control sys- tem RPM lower than ex- pected	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuatorIntake air leak

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

If the idle speed is out of the specified value, perform <u>EC-19, "IDLE AIR VOLUME LEARNING : Special</u> <u>Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above -10°C(14°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Restart engine and run it for at least 1 minute at idle speed.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-348, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.

2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS > YES >> Discover air leak location and repair. NO >> GO TO 2. 2.REPLACE ECM Stop engine. Replace ECM. 3. Go to EC-16, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement". >> INSPECTION END

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P0507 ISC SYSTEM

Description

INFOID:000000004250854

[VQ37VHR]

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:000000004250855

DTC DETECTION LOGIC

NOTE:

If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control sys- tem RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	Electric throttle control actuatorIntake air leakPCV system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

If the idle speed is out of the specified value, perform <u>EC-19</u>, <u>"IDLE AIR VOLUME LEARNING : Special</u> <u>Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

TESTING CONDITION:

• Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

• Always perform the test at a temperature above -10°C(14°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and run it for at least 1 minute at idle speed.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-350, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.

P0507 ISC SYSTEM	
< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]	
NO >> Repair or replace.	
2. CHECK INTAKE AIR LEAK	А
 Start engine and let it idle. Listen for an intake air leak after the mass air flow sensor. 	EC
Is intake air leak detected?	
YES >> Discover air leak location and repair. NO >> GO TO 3.	
3.REPLACE ECM	С
1. Stop engine. 2. Replace ECM.	D
 Go to <u>EC-16, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair</u> <u>Requirement"</u>. 	
>> INSPECTION END	E
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P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

P0524 ENGINE OIL PRESSURE

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0524 is displayed with DTC P0075 or P0081, first perform the trouble diagnosis for DTC P0075, P0081. Refer to <u>EC-165, "DTC Logic"</u>

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0524	Engine oil pressure too low	Engine oil pressure is low because there is a gap between angle of target and phase-control angle.	 Engine oil pressure or level too low Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-I

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2. PRECONDITIONING-II

Check oil level and oil pressure. Refer to LU-6, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to <u>LU-6, "Inspection"</u>.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Select "DATA MONITOR" mode with CONSULT-III.

2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	More than 1,700 rpm	
COOLAN TEMP/S	MP/S More than 70°C (158°F)	
Selector lever	1st or 2nd position	
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)	

CAUTION:

Always drive at a safe speed.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-353, "Diagnosis Procedure"</u> NO >> INSPECTION END

1.CHECK OIL PRESSURE WARNING LAMP

Diagnosis Procedure

INFOID:000000004250858

[VQ37VHR]

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1. Start engine. EC 2. Check oil pressure warning lamp and confirm it is not illuminated. Is oil pressure warning lamp illuminated? YES >> Go to LU-6, "Inspection". NO >> GO TO 2. D Е PBIA8559 2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-157, "Component Inspection". F Is the inspection result normal? YES >> GO TO 3. NO >> Replace malfunctioning intake valve timing control solenoid valve. ${f 3}.$ CHECK CRANKSHAFT POSITION SENSOR (POS) Refer to EC-276, "Component Inspection". Н Is the inspection result normal? YES >> GO TO 4. NO >> Replace crankshaft position sensor (POS). **4.**CHECK CAMSHAFT POSITION SENSOR (PHASE) Refer to EC-280, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace malfunctioning camshaft position sensor (PHASE). Κ **5.**CHECK CAMSHAFT (INTAKE) Check the following. · Accumulation of debris to the signal plate of camshaft front end Chipping signal plate of camshaft front end Is the inspection result normal? YES >> GO TO 6. M NO >> Remove debris and clean the signal plate of camshaft front end or replace camshaft. Ν 00 hanne JMBIA0962 6. CHECK TIMING CHAIN INSTALLATION Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

- YES >> Check timing chain installation. Refer to EM-51, "Removal and Installation".
- >> GO TO 7. NO

I.CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to EM-104, "Inspection". Is the inspection result normal?

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P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 8.

NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- 1. Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.
- 3. Check resistance between intake valve timing control solenoid valve terminals as per the following.

Terminals	Resistance (Ω)
1 and 2	7.0 - 7.7 [at 20°C (68°F)]
1 or 2 and ground	(Continuity should not exist)

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace malfunctioning intake valve timing control solenoid valve.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

- 1. Remove intake valve timing control solenoid valve.
- Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure. CAUTION:

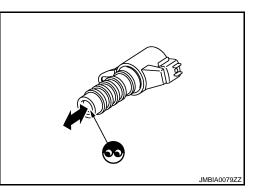
Never apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve.



P0550 PSP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0550 PSP SENSOR

Description

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load.

This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

DTC Logic

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DTC DETECTION LOGIC

NOTE: If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-368, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	 Harness or connectors (The sensor circuit is open or shorted) Power steering pressure sensor
	IFIRMATION PROC	EDURE	
before con	ducting the next test.	has been previously conducted, alwa	ays perform the following procedure

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

 Start engine and let it idle for at least 5 seconds. Check 1st trip DTC. 	K
Is 1st trip DTC detected? YES >> Go to EC-355, "Diagnosis Procedure".	1
NO >> INSPECTION END	L
Diagnosis Procedure	1250862 M
1. CHECK GROUND CONNECTION	IVI
 Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in <u>GI-44, "Circuit Inspection"</u>. 	Ν
Is the inspection result normal?	
YES >> GO TO 2. NO >> Repair or replace ground connection.	0
2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT	

1. Disconnect power steering pressure (PSP) sensor harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between PSP sensor harness connector and ground.

PSP sensor		Ground	Voltage (V)
Connector	Terminal	Ciouna	voltage (v)
F35	3	Ground	Approx. 5

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Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

 $\mathbf{3}$.check PSP sensor ground circuit for open and short

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between PSP sensor harness connector and ECM harness connector.

PSP sensor		EC	Continuity	
Connector	Terminal Connector Terminal		Terminal	Continuity
F35	1	F102	96	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground short to power in harness or connectors.

4.CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between PSP sensor harness connector and ECM harness connector.

PSP s	ensor	ECM		Continuity	
Connector	Connector Terminal		Terminal		
F35	2	F102	87	Existed	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK PSP SENSOR

Refer to EC-356, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace PSP sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK POWER STEERING PRESSURE SENSOR

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

- 3. Start engine and let it idle.
- 4. Check the voltage between ECM harness connector terminals under the following conditions.

ECM					
Connector	+	-	Condition		Voltage (V)
Connector	Terminal	Terminal			
F102	87	96	Steering wheel		0.5 - 4.5
1 102	07	90	Steering wheel	Not being turned	0.4 - 0.8

Is the inspection result normal?



P0550 PSP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

- YES >> INSPECTION END
- NO >> Replace power steering pressure sensor.

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P0555 BRAKE BOOSTER PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0555 BRAKE BOOSTER PRESSURE SENSOR

Description

Brake booster pressure sensor is connected to brake booster by a hose. It detects brake booster pressure and sends the voltage signal to the ECM. The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0555	Brake booster pressure sensor circuit	 An excessively low voltage from the sensor is sent to ECM. An excessively high voltage from the sensor is sent to ECM. 	 Harness or connectors (The sensor circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] (APP sensor 2 circuit is shorted) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Brake booster pressure sensor Crankshaft position sensor (POS) Accelerator pedal position sensor EVAP control system pressure sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 10 seconds.
- 2. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-358, "Diagnosis Procedure"</u>. NO >> INSPECTION END

NO >> INSPECTION EN

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

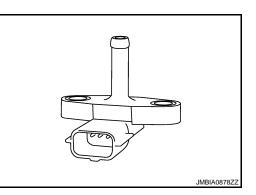
2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?





INFOID:000000004250864



INFOID:000000004250865

P0555 BRAKE BOOSTER PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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EC

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2. CHECK BRAKE BOOSTER PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect brake booster pressure sensor harness connector.
- 2. Turn ignition switch ON.

3. Check the voltage between brake booster pressure sensor harness connector and ground.

Brake	booster pres	sure sensor						
Conne	ctor	Terminal		Ground	Voltage (V)			
E48	3	1		Ground	Approx. 5			
s the insp	ection res	ult normal?	>					
NO >	> GO TO > GO TO (BRAKE I	3.	PRESSL	IRE SENSOR	POWER SL		CUIT-II	
1. Turn ig 2. Discol	gnition swi nnect ECN (the conti	itch OFF. I harness (connector				nnector and ECM harness con-	
	oster pres- sensor	EC	CM	Quatinuitu				
Connector		Connector	Terminal	Continuity				
E48	1	F101	45	Existed				
s the insp	ection res	ult normal?	>					
-	> GO TO > GO TO	-						
4.detec	T MALFU	NCTIONIN	IG PART					
	connecto		CM and b	rake booster p	ressure sen	sor		
>	> Repair o	pen circuit	ł					
_		R POWER		CIRCUIT				
				ort to ground,	hetween the	e following t	erminals	
Sheek hai	11000 101 0			ion to ground,	between in	s tonowing t	errinais.	
E	СМ			Sensor				
Connector	Terminal		Name	1	Connector	Terminal		
E404	45	Brake boos	ster pressure	e sensor	E48	1		
F101	46	CKP sense	or (POS)		F2	1		
	103	APP senso	r		E112	6		
M107	107	EVAP control system pressure sensor Refrigerant pressure sensor		B30	3			
	107			E77	3			
s the insp	ection res	ult normal?	<u> </u>					
NO >		short to gro	und or sh	ort to power in	harness or	connectors		
J. CHECK	COMPO	NENTS						
Check the	following.							

Check the following.

Crankshaft position sensor (POS) (Refer to <u>EC-276, "Component Inspection"</u>.)

• EVAP control system pressure sensor (Refer to EC-315, "Component Inspection".)

EC-359

P0555 BRAKE BOOSTER PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

• Refrigerant pressure sensor (Refer to <u>EC-520, "Component Function Check"</u>.)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

7.CHECK APP SENSOR

Refer to EC-469, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 8.

 $\mathbf{n} = \mathbf{n} \mathbf{n}$

8.Replace accelerator pedal assembly

1. Replace accelerator pedal assembly

2. Go to EC-469, "Special Repair Requirement".

>> INSPECTION END

9.CHECK BRAKE BOOSTER PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between brake booster pressure sensor harness connector and ECM harness connector.

Brake booster pressure sensor		E	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
E48	3	F101	36	Existed	

4. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F1, E3

• Harness for open or short between brake booster pressure sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

11. CHECK BRAKE BOOSTER PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between brake booster pressure sensor harness connector and ECM harness connector.

Brake booster pressure sensor		E	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
E48	2	F101	39	Existed	

2. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F1, E3

Harness for open or short between brake booster pressure sensor and ECM

EC-360

P0555 BRAKE BOOSTER PRESSURE SENSOR

< D	DTC/CIRCUIT DIA	AGNOSIS >		[VQ3	7VHR]
	>> Repair o	pen circuit, short to	ground or short to	power in harness or connectors.	
	3. CHECK BRAKE	BOOSTER PRESS	SURE SENSOR		
Re	fer to <u>EC-361, "Co</u>	mponent Inspection	".		
	he inspection resu				
	ES >> GO TO 1 O >> Replace	4. brake booster press	sure sensor		
	. '	MITTENT INCIDEN			
	fer to <u>GI-41, "Inter</u>		·		
_	>> INSPEC				
Сс	omponent Insp	ection		INFOID:0000	000004250867
1.	CHECK BRAKE E	BOOSTER PRESSU	RE SENSOR-I		
1.	Turn ignition swit				
2.	Start engine and	warm it up to norma			
3. 4.		tch OFF, wait at leas le between ECM har		nen turn ON. erminals as per the following.	
				initiale de per trie following.	
	C				
		ECM		_	
		ECM +		_	
	Connector		– Terminal		
		+	– Terminal 36		
	Connector F101 NOTE:	+ Terminal 39	36		onging
	Connector F101 NOTE: • To avoid the ini	+ Terminal 39	36	eck the voltage 1 or more minutes past after	engine
	Connector F101 NOTE: • To avoid the initis stopped. • Because the set	+ Terminal 39 fluence of intake ma ensor is absolute pre	36 nifold vacuum, che		•
	Connector F101 NOTE: • To avoid the initis stopped. • Because the sessure and altitud	+ Terminal 39 fluence of intake ma ensor is absolute pre de.	36 nifold vacuum, che		•
	Connector F101 NOTE: • To avoid the initial is stopped. • Because the set sure and altitud Measure the atm NOTE:	+ Terminal 39 fluence of intake ma ensor is absolute pre de. hospheric pressure.	36 nifold vacuum, cho essure sensor, out	put value may differ depends on atmospher	ic pres-
	Connector F101 NOTE: • To avoid the initial is stopped. • Because the set sure and altitud Measure the atm NOTE: As the atmosphe	+ Terminal 39 fluence of intake ma ensor is absolute pre de. lospheric pressure. eric pressure descril	36 nifold vacuum, cho essure sensor, out		ic pres-
	Connector F101 NOTE: • To avoid the initial is stopped. • Because the set sure and altitud Measure the atm NOTE:	+ Terminal 39 fluence of intake ma ensor is absolute pre de. lospheric pressure. eric pressure descril	36 nifold vacuum, cho essure sensor, out	put value may differ depends on atmospher	ic pres-
	Connector F101 NOTE: • To avoid the initial is stopped. • Because the set sure and altitud Measure the atm NOTE: As the atmosphe	+ Terminal 39 fluence of intake ma ensor is absolute pre de. lospheric pressure. eric pressure descril	36 nifold vacuum, cho essure sensor, out ped on the synopt	put value may differ depends on atmospher	ic pres-
	Connector F101 NOTE: • To avoid the initial is stopped. • Because the set sure and altitud Measure the atm NOTE: As the atmosphe pressure with the	+ Terminal 39 fluence of intake ma ensor is absolute pre de. ospheric pressure. eric pressure descril e following chart.	36 nifold vacuum, cho essure sensor, out ped on the synopt	put value may differ depends on atmospher	ic pres-
	Connector F101 NOTE: • To avoid the intis stopped. • Because the set sure and altitud Measure the atm NOTE: As the atmosphe pressure with the Altitude (m)	+ Terminal 39 fluence of intake ma ensor is absolute pre de. hospheric pressure descril eric pressure descril of following chart.	36 nifold vacuum, cho essure sensor, out ped on the synopt	put value may differ depends on atmospher	ic pres-
	Connector F101 NOTE: • To avoid the initial is stopped. • Because the set sure and altitude Measure the atmosphere is the atmosphere	+ Terminal 39 fluence of intake ma ensor is absolute pre- de. hospheric pressure. eric pressure descril e following chart.	36 nifold vacuum, cho essure sensor, out ped on the synopt	put value may differ depends on atmospher	ic pres-
	Connector F101 NOTE: • To avoid the intisstopped. • Because the server and altitude Measure the atmosphere pressure with the Altitude (m) 0 200 400 600	+ Terminal 39 fluence of intake ma ensor is absolute pre- de. hospheric pressure. eric pressure descril e following chart. Compensated pr 0 -24 -47 -70	36 nifold vacuum, cho essure sensor, out ped on the synopt	put value may differ depends on atmospher	ic pres-
	Connector F101 NOTE: • To avoid the initial stopped. • Because the set sure and altitude Measure the atm NOTE: As the atmosphere pressure with the store Altitude (m) 0 200 400 600 800	+ Terminal 39 fluence of intake ma ensor is absolute pre- de. sospheric pressure. eric pressure descril following chart. Compensated pr 0 -24 -47 -70 -92	36 nifold vacuum, cho essure sensor, out bed on the synopt	put value may differ depends on atmospher	ic pres-
	Connector F101 NOTE: • To avoid the intiss stopped. • Because the sessure and altitud Measure the atm NOTE: As the atmosphere pressure with the Altitude (m) 0 200 400 600 800 1000	+ Terminal 39 fluence of intake ma ensor is absolute pre- de. hospheric pressure. eric pressure descril e following chart. Compensated pr 0 -24 -47 -70 -92 -114	36 nifold vacuum, che essure sensor, out bed on the synopt	put value may differ depends on atmospher	ic pres-
5.	Connector F101 NOTE: • To avoid the initial stopped. • Because the set sure and altitude Measure the atm NOTE: As the atmosphere pressure with the store Altitude (m) 0 200 400 600 800	+ Terminal 39 fluence of intake ma ensor is absolute pre- de. sospheric pressure. eric pressure descril following chart. Compensated pr 0 -24 -47 -70 -92	36 nifold vacuum, che essure sensor, out bed on the synopt	put value may differ depends on atmospher	ic pres-

P0555 BRAKE BOOSTER PRESSURE SENSOR

(V) 5.0 4.5

0.9 4.0 Aoltage 3.5 3.0

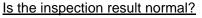
< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

1050 (hPa)

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Atmospheric pressure (hPa)	Voltage (V)
800	3.1 – 3.7
850	3.3 – 3.9
900	3.5 – 4.1
950	3.8 - 4.3
1000	4.0 - 4.6
1050	4.2 - 4.8

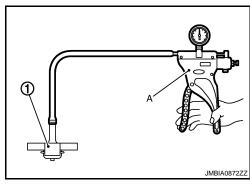


YES >> GO TO 2.

NO >> Replace brake booster pressure sensor.

2.CHECK BRAKE BOOSTER PRESSURE SENSOR-II

- 1. Turn ignition switch OFF.
- 2. Remove brake booster pressure sensor with its harness connected.
- 3. Connect the hose of vacuum pump (A) to brake booster pressure sensor (1).
- 4. Turn ignition switch ON.



850

800

900 950 1000

Atmospheric pressure

5. Check the voltage between ECM harness connector terminals as per the following.

	ECM				
	+		_		
Connector	Terminal	Connector	Terminal		
F101	39	F101	36		

6. Check that the difference of the voltage when engine is stopped and that when negative pressure is applied with vacuum pump is within the following limits.

Vacuum	Voltage difference (V)
-40kPa (-300mmHg)	1.5 – 2.0
-53.3kPa (-400mmHg)	2.0 - 2.6
-66.7kPa (-500mmHg)	2.6 - 3.2
-80kPa (-600mmHg)	3.2 - 3.8

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace brake booster pressure sensor.

P0603 ECM POWER SUPPLY

Description

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.

DTC Logic

DTC DETECTION LOGIC

 DTC No.
 Trouble diagnosis name
 DTC detecting condition
 Possible cause
 G

 P0603
 ECM power supply circuit
 ECM back up RAM system does not function properly.
 • Harness or connectors [ECM power supply (back up) circuit is open or shorted.]
 • Harness or connectors
 • Harness or connectors</td

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 10 seconds.
 Turn ignition switch OFF and wait at least 5 minutes.
- 3. Turn ignition switch ON and wait at least 10 seconds.
- 4. Repeat steps 2 and 3 for five times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

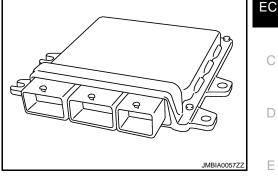
- YES >> Go to EC-363, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ECM POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the voltage between ECM harness connector terminals as per the following.

[VQ37VHR]



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P0603 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

+		_		Voltage
Connector	Terminal	Connector	Terminal	*
F102 93		M107	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E3, F1
- 15 A fuse (No. 50)
- IPDM E/R harness connector E7
- · Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace harness or connectors.

4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-363, "DTC Logic"</u>.
- Is the 1st trip DTC P0603 displayed again?
- YES >> GO TO 5.
- NO >> INSPECTION END

5.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-16, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> INSPECTION END

P0605 ECM

Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause	G
		A)	ECM calculation function is malfunctioning.		_ 0
P0605	Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM	
		C)	ECM self shut-off function is malfunctioning.		Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been	previously conducted,	always perform the	e following procedure		
before conducting the next test.					
1 Turn invition out to CEE and wait at las	- (40				

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON. 2.
- Turn ignition switch OFF and wait at least 10 seconds. 3.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

Turn ignition switch ON. 1. Check 1st trip DTC. 2. Is 1st trip DTC detected? YES >> Go to EC-366, "Diagnosis Procedure". NO >> GO TO 3. **3.** PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B 1. Turn ignition switch ON and wait at least 1 second. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON. 2. 3. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-366, "Diagnosis Procedure". NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.

2. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON.

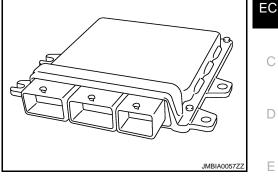
Repeat step 2 for 32 times. 3.

Check 1st trip DTC. 4.

Is 1st trip DTC detected?

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YES >> Go to EC-366, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. **Perform DTC Confirmation Procedure.** See <u>EC-365, "DTC Logic"</u>.

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-16, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> INSPECTION END

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[VQ37VHR]

P0607 ECM

Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle mul-EC tiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

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DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagno- sis of CAN controller of ECM.	• ECM
DTC CON	FIRMATION PROCED	URE	
1.PERFOR	RM DTC CONFIRMATIO	N PROCEDURE	
1. Turn ig 2. Check	nition switch ON.		
Is DTC dete			
YES >>	Go to EC-367, "Diagnos	sis Procedure".	
-	INSPECTION END		
Diagnosi	s Procedure		INFOID:000000004250667
1.INSPEC	TION START		
1. Turn ig	nition switch ON.		
2. Erase I		a dura	
	<u>C-367, "DTC Logic"</u> .		
4. Check	-		
	P0607 displayed again? • GO TO 2.		
	INSPECTION END		
2.REPLAC	CE ECM		
	e ECM.		
	<u>EC-16, "ADDITIONAL S</u> ement".	ERVICE WHEN REPLACING CONTR	<u>OL UNIT (ECM) : Special Repair</u>
require	<u></u>		
>>	INSPECTION END		

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P0643 SENSOR POWER SUPPLY

DTC Logic

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[VQ37VHR]

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects that the voltage of power source for sensor is excessively low or high.	 Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [CMP sensor (PHASE) (bank 1) circuit is shorted.] [Manifold absolute pressure (MAP) sensor circuit is shorted.] (PSP sensor circuit is shorted.) [CMP sensor (PHASE) (bank 2) circuit is shorted.] [Battery current sensor circuit is shorted/] Accelerator pedal position sensor Throttle position sensor Camshaft position sensor (PHASE) (bank 1) Manifold absolute pressure (MAP) sensor Power steering pressure sensor Camshaft position sensor (PHASE) (bank 2) Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-368, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.

2. Turn ignition switch ON.

3. Check the voltage between APP sensor harness connector and ground.

EC-368

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P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37	VHR]
-------	------

	sensor				
Connector	Terminal	Ground Voltage (V)			_
E112	5	Ground Approx. 5			1
ls the inspe	ection resu	It normal?			
	GO TO 7				
-	• GO TO 3				
3. CHECK	SENSOR	POWER SUPPLY CIRCUITS			
Check harr	ess for sh	ort to power and short to ground,	between the	e following terminals.	
EC Connector	Terminal	Sensor Name	Connector	Terminal	
Connector	43		F27	1	
F101	43	Electric throttle control actuator (bank 2) Electric throttle control actuator (bank 1)	F27 F6	6	
	44	, , , , , , , , , , , , , , , , , , ,	F5	1	
	F	CMP sensor (PHASE) (bank 1)	61		
	60	Manifold absolute pressure (MAP) sen- sor	F50	1	
F102	_	PSP sensor	F35	3	
		CMP sensor (PHASE) (bank 2)	F18	1	
	64	Battery current sensor	E21	1	
M107	99	APP sensor	E112	5	
heck the					")
4.снеск	COMPON	IENTS			
Camshaf	t position s	sensor (PHASE) (bank 1) (Refer to		Component Inspection	<u>"</u> .)
		ressure (MAP) sensor (Refer to \underline{E}			
		Source concor (Poter to EC 356 "C	Component I	nponent Inspection".)	
	L POSILION S	ssure sensor (Refer to <u>EC-356, "C</u> sensor (PHASE) (bank 2) (Refer to		nponent Inspection".) nspection".)	".)
Camshaf		ssure sensor (Refer to <u>EC-356, "C</u> sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u>	o <u>EĊ-280, "(</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u>)
Camshaf Battery co the inspe	urrent sens	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u>	o <u>EĊ-280, "(</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery co s the inspe YES >>	ection resu GO TO 5	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u>	o <u>EĊ-280, "(</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery co s the inspe YES >> NO >>	ection resu GO TO 5 Replace	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component.	o <u>EĊ-280, "(</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshafi Battery cr s the inspe YES >> NO >> D.CHECK	ection resu GO TO 5 Replace TP SENS	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR	o <u>EĊ-280, "(</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery co s the inspective YES >> NO >> D.CHECK Refer to EC	GO TO 5 Replace TP SENS	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> .	o <u>EĊ-280, "(</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery co s the inspective YES >> NO >> D.CHECK Refer to EC s the inspective	GO TO 5 GO TO 5 Replace TP SENS C-196, "Co ection resu	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> . <u>It normal?</u>	o <u>EĊ-280, "(</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery cr s the inspe YES >> NO >> D.CHECK Refer to EC s the inspe YES >>	GO TO 5 Replace TP SENS	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> . <u>It normal?</u>	o <u>EĊ-280, "(</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery co sthe inspe YES >> NO >> O.CHECK Refer to EC sthe inspe YES >> NO >>	GO TO 5 Replace TP SENS -196, "Co ection resu GO TO 9 GO TO 6	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> . <u>It normal?</u>	D <u>EC-280, "(</u> <u>t Inspection</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery cr s the inspe YES >> D.CHECK Refer to EC s the inspe YES >> NO >> D.REPLAC	GO TO 5 Replace TP SENS -196, "Co ction resu GO TO 9 GO TO 6 CE ELECT	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> . <u>It normal?</u> RIC THROTTLE CONTROL ACT	D <u>EC-280, "(</u> <u>t Inspection</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery co s the inspective YES >> D.CHECK Refer to EC s the inspective YES >> NO >> D.REPLAC	GO TO 5 Replace TP SENS -196, "Co ction resu GO TO 9 GO TO 9 GO TO 6 CE ELECT ce electric	sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> . <u>It normal?</u>	D <u>EC-280, "(</u> <u>t Inspection</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery co s the inspective YES >> D.CHECK Refer to EC s the inspective YES >> NO >> D.REPLAC 1. Replace	GO TO 5 Replace TP SENS -196, "Co ction resu GO TO 9 GO TO 9 GO TO 6 CE ELECT ce electric	Sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> . <u>It normal?</u> RIC THROTTLE CONTROL ACT throttle control actuator.	D <u>EC-280, "(</u> <u>t Inspection</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery cd s the inspective YES >> D.CHECK Refer to EC s the inspective YES >> NO >> D.REPLAC I. Replace 2. Go to E >>	GO TO 5 Replace TP SENS -196, "Co ction resu GO TO 9 GO TO 9 GO TO 6 CE ELECT e electric f EC-196, "S	Sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> . <u>It normal?</u>	D <u>EC-280, "(</u> <u>t Inspection</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery cu s the inspective YES >> D.CHECK Refer to EC s the inspective YES >> NO >> D.REPLAC . Replac 2. Go to E	GO TO 5 Replace TP SENS -196, "Co ction resu GO TO 9 GO TO 9 GO TO 6 CE ELECT e electric f EC-196, "S	Sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> . <u>It normal?</u>	D <u>EC-280, "(</u> <u>t Inspection</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)
Camshaft Battery cd s the inspective YES >> D.CHECK Refer to EC s the inspective YES >> NO >> D.REPLAC . Replace . Go to E >> C.CHECK	GO TO 5 Replace TP SENS -196, "Co ction resu GO TO 9 GO TO 6 CE ELECT e electric 1 EC-196, "S NSPECT APP SEN	Sensor (PHASE) (bank 2) (Refer to sor (Refer to <u>EC-420, "Componen</u> <u>It normal?</u> malfunctioning component. OR <u>mponent Inspection"</u> . <u>It normal?</u>	D <u>EC-280, "(</u> <u>t Inspection</u>	nponent Inspection".) nspection".) Component Inspection	<u>"</u> .)

YES >> GO TO 9.

NO >> GO TO 8.

8. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
 Go to <u>EC-469</u>, "Special Repair Requirement".

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

P0850 PNP SWITCH

Description

When the selector lever position is P or N, park/neutral position (PNP) signal from the TCM is sent to ECM.(A/ T models)

When the selector lever position is Neutral position, park/neutral position (PNP) switch is ON.(M/T models) ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:000000004250877

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850	Park/neutral position switch	The signal of the park/neutral position (PNP) signal does not change during driving after the engine is started.	 Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.] Park/neutral position (PNP) switch (M/T models) TCM (A/T models)
DTC CON	FIRMATION PROC	EDURE	
1.INSPEC	TION START		
Do you hav	e CONSULT-III?		
-	e CONSULT-III?		1
	• GO TO 2. • GO TO 5.		
	NDITIONING		
conducting 1. Turn ig	the next test.	as been previously conducted, always p I wait at least 10 seconds.	perform the following prcedure before
		I wait at least 10 seconds.	ł
3.снеск	GO TO 3. PNP SWITCH SIGNA	AL	
2. Select	nition switch ON.	ATA MONITOR" mode with CONSULT-III	I. Then check the "P/N POSI SW" sig-
Posi	ition (Selector lever)	Known-good signal	1
N or P positi Neutral posi	. ,	ON	
Except abov	e position	OFF	(
YES >> NO >> 4.PERFO	ection result normal? • GO TO 4. • Go to <u>EC-372, "Diag</u> RM DTC CONFIRMA ⁻		F
 Start er Mainta CAUTI 	ngine and warm it up t in the following condit	ode with CONSULT-III. to normal operating temperature. ions for at least 50 consecutive seconds afe speed.	5.

INFOID:000000004250876

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< DTC/CIRCUIT DIAGNOSIS >

ENG SPEED	1,400 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-372, "Diagnosis Procedure".

NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-372, "Component Function Check".

NOTE:

Use component function check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-372, "Diagnosis Procedure".

Component Function Check

INFOID:000000004250878

1.PERFORM COMPONENT FUNCTION CHECK

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM		Condition		
Connector	+	_			Voltage (V)
Connector	Terminal	Terminal			
M107	109	128	Selector lever	P or N (A/T) Neutral (M/T)	Battery voltage
				Except above	Approx. 0

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-372, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000004250879

1.INSPECTION START

Check which type of transmission the vehicle is equipped with.

Which type of transmission?

A/T >> GO TO 2. M/T >> GO TO 7. **2.**CHECK DTC WITH TCM

Refer to TM-165. "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START. Does starter motor operate?

< DTC/CIF		AGNOSIS	>		[VQ37VHR]	
	> GO TO 4					
NO >:	Check D NAL BU		CM. Refe	r to <u>BCS-</u>	31, "SIGNAL BUFFER : CONSULT-III Function (BCM - SIG-	Α
4. CHECK	-		JT SIGNA	L CIRCU	IT FOR OPEN AND SHORT	
	nition swi					EC
2. Discor	nect A/T a	assembly h				
		1 harness o nuity betwe			arness connector and ECM harness connector.	C
in chook		iany source				
A/T ass	sembly	EC	M	Continuity	— ,	
Connector	Terminal	Connector	Terminal	Continuity		
F51	9	M107	109	Existed	_	
			-	nd and sh	nort to power.	E
Is the inspe			-			
	> GO TO 6 > GO TO 5					F
5.DETEC		-	IG PART			Г
Check the			-			
• Harness	connector					(
Harness				assambl	y and ECM	
• Hamess	ioi open c			assembi		ŀ
>:	> Repair o	pen circuit	, short to	ground or	short to power in harness or connectors.	
6.снеск	•			0		
Refer to G						
_ >:	> INSPEC	TION END)			,
7.снеск	PNP SW	ITCH POV	ER SUP	PLY CIRC	CUIT	
	nition swi					k
	nect park		sition (PN	IP) switch	harness connector.	
			n PNP swi	tch harne	ess connector and ground.	
						L
PNP	switch	Ground	Voltag	10		
Connector	Terminal	Croana	Volide	,		Ν
F55	2	Ground	Battery vo	oltage		
Is the inspe			- -			
	> GO TO 9 > GO TO 8					Ν
8.DETEC						
Check the						C
• Harness		s E3, F1				
• 10 A fuse	e (No. 43)					
IPDM E/IHarness				P switch :	and fuse	F
114111000						
>:	> Repair o	pen circuit	, short to	ground or	short to power in harness or connectors.	
~					IT FOR OPEN AND SHORT	

1.

Turn ignition switch OFF. Disconnect ECM harness connector. 2.

< DTC/CIRCUIT DIAGNOSIS >

3. Check the continuity between PNP switch harness connector and ECM harness connector.

PNP s	witch	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F55	1	M107	109	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F103, M116

Harness for open or short between PNP switch and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

11.CHECK PNP SWITCH

Refer to TM-9, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace PNP switch.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace.

P100A, P100B VVEL SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P100A or P100B is displayed with DTC P1090 or P1093, first perform the trouble diagnosis for DTC P1090 or P1093. Refer to <u>EC-388. "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P100A P100B	VVEL response malfunction (bank 1) VVEL response malfunction (bank 2)	Actual event response to target is poor.	 Harness or connectors (VVEL actuator motor circuit is open or shorted.) VVEL actuator motor VVEL actuator sub assembly VVEL ladder assembly VVEL control module
DTC CONFI	RMATION PROCEDURE		
1.PRECONE	DITIONING		
before conduct 1. Turn ignit 2. Turn ignit 3. Turn ignit TESTING CO	rmation Procedure has been pr cting the next test. ion switch OFF and wait at least ion switch ON. ion switch OFF and wait at least NDITION: rming the following procedure,	10 seconds. 10 seconds.	
	60 TO 2.		
2.PERFORM	I DTC CONFIRMATION PROCE	DURE	
 Wait at id Repeat st Check 1s <u>Is DTC detect</u> YES >> G 	the accelerator pedal rapidly half le for 5 seconds or more. teps 2 to 3 for three times. t trip DTC.		ns, and then release it.
Diagnosis	Procedure		INFOID:000000004250881
1.снеск с	ROUND CONNECTION		
2. Check ground ch	ion switch OFF. ound connection M95. Refer to G ion result normal? O TO 2. Repair or replace ground connecti	on.	
	UATOR MOTOR OUTPUT SIGN		SHORT
2. Disconne	et VVEL control module namess et VVEL actuator motor harness e continuity between VVEL contro	connector.	nd VVEL actuator motor harness

3. Check the continuity between VVEL control module harness connector and VVEL actuator motor harness connector.

INFOID:000000004250880



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P100A, P100B VVEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

	VVEL control module		VVEL actu	ator motor	Continuity	
DIC NO.	Bank	Connector	Terminal	Connector	Terminal	Continuity
			12		1	Existed
P100A	1		12	F48	2	Not existed
FIUUA	I	25	25	140	1	Not existed
			25		2	Existed
		2 E15	2		1	Existed
D100P	2		2	F49	2	Not existed
P100B			15	Г49	1	Not existed
			15		2	Existed

4. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F1, E3

Harness for open or short between VVEL actuator motor and VVEL control module

>> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK VVEL ACTUATOR MOTOR

Refer to EC-377, "Component Inspection (VVEL ACTUATOR MOTOR)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.REPLACE VVEL ACTUATOR SUB ASSEMBLY

1. Replace VVEL actuator sub assembly.

2. Go to EC-378, "Special Repair Requirement".

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace.

7.REPLACE VVEL CONTROL MODULE

- 1. Replace VVEL control module.
- 2. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> GO TO 8.

8.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-375, "DTC Logic"</u>.

Is the DTC P100A or P100B displayed again?

P100A, P100B VVEL SYSTEM

< DTC/CIRCUIT DIAGN	NOSIS >	[VQ37VHR]
YES >> GO TO 9. NO >> INSPECTIO		
9.CHECK VVEL ACTUA		A
	onent Inspection (VVEL ACTUATOR SUB ASSEMB	I Y)"
Is the inspection result no		EC
YES >> GO TO 11.		
NO >> GO TO 10.		С
	CTUATOR SUB ASSEMBLY	
 Replace VVEL actual Go to <u>EC-378</u>, "Specification of the second se	ator sub assembly. cial Repair Requirement".	D
>> INSPECTIO	N END	_
11. CHECK VVEL LADI	DER ASSEMBLY	E
Refer to EM-104, "Inspec	ction".	
Is the inspection result no	ormal?	F
YES >> GO TO 13. NO >> GO TO 12.		
	ER HEAD, VVEL LADDER ASSEMBLY AND VVEL	ACTUATOR SUB ASSEMBLY G
	ad, VVEL ladder assembly and VVEL actuator sub a	
	cial Repair Requirement".	н
>> INSPECTION		
Refer to <u>GI-41, "Intermitte</u>	<u>ent incldent"</u> .	
>> INSPECTIO	N END	J
Component Inspect	tion (VVEL ACTUATOR MOTOR)	INF0ID:00000004250882
1.CHECK VVEL ACTUA		K
1. Turn ignition switch (
 Disconnect VVEL ac Check resistance be 	tuator motor harness connector. tween VVEL actuator motor terminals as follows.	L
5. Check resistance be		
VVEL actuator motor	Desisteres	M
Terminal	Resistance	
1 and 2	16 Ω or less	Ν
Is the inspection result no		11
YES >> INSPECTION NO >> GO TO 2.	N END	
	UATOR SUB ASSEMBLY	0
1. Replace VVEL actua		
	cial Repair Requirement".	Р
>> INSPECTIO	N END	
Component Inspect	tion (VVEL ACTUATOR SUB ASSEMBLY	Y) INFOID:000000004250883
1.CHECK VVEL ACTUA	ATOR SUB ASSEMBLY	
1. Turn ignition switch (DFF.	

P100A, P100B VVEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

- 2. Remove VVEL actuator sub assembly. Refer to EM-95, "Disassembly and Assembly".
- 3. Turn the ball screw shaft to check that it works smoothly.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE VVEL ACTUATOR SUB ASSEMBLY

- 1. Replace VVEL actuator sub assembly.
- 2. Go to EC-378, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000004250884

[VQ37VHR]

1.PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

Refer to EC-21, "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-19. "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

P1087, P1088 VVEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

P1087, P1088 VVEL SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE:

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If DTC P1087 or P1088 is displayed with DTC P1090 or P1093. Perform the trouble diagnosis for DTC P1090 or P1093. Refer to <u>EC-384, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1087	VVEL small event angle malfunction (bank 1)		Harness or connectors (VVEL actuator motor circuit is	D
P1088	VVEL small event angle malfunction (bank 2)	The event angle of VVEL control shaft is always small.	open or shorted.) • VVEL actuator motor • VVEL actuator sub assembly • VVEL ladder assembly • VVEL control module	E

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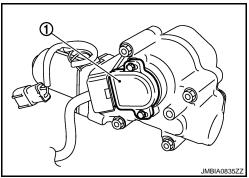
Revision: 2009 October

< DTC/CIRCUIT DIAGNOSIS >

P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

Description

VVEL control shaft position sensor (1) is placed on VVEL actuator sub assembly and detects the control shaft position angle. A magnet is pressed into the arm on the edge of control shaft. The magnetic field changes as the magnet rotates together with the arm resulting in the output voltage change of the sensor. VVEL control module detects the actual position angle through the voltage change and sends the signal to ECM.



[VQ37VHR]

INFOID:000000004250886

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DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1089 or P1092 is displayed with DTC P1608, first perform the trouble diagnosis for DTC P1608. Refer to <u>EC-461, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1089	VVEL control shaft position sensor (bank 1) circuit	• An excessively low voltage from the sensor is sent to VVEL control module.	
P1092	VVEL control shaft position sensor (bank 2) circuit	 An excessively high voltage from the sensor is sent to VVEL control module. Rationally incorrect voltage is sent to VVEL control module compared with the signals from VVEL control shaft po- sition sensor 1 and VVEL control shaft position sensor 2. 	 Harness or connectors (VVEL control shaft position sensor circuit is open or shorted.) VVEL control shaft position sensor VVEL control module

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

- YES >> Go to EC-380, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

EC-380

INFOID:000000004250888

/ES >> G	on result nor O TO 2.	ace ground cor	naction				
		T POSITION		WER SUPPL	Y CIRCUIT		
		rol shaft positi					
Turn igniti	on switch Of	N				ector and ground.	_
		control shaft positi	ion concor			_	
DTC No.	Bank	Connector	Terminal	Ground	Voltage (V))	
	Bank	Connocion	3				
P1089	1	F46	6				
	_		3	- Ground	Approx. 5		
P1092	2	F47	6	_			
the inspecti	on result nor	mal?			1	_	
	O TO 4. O TO 3.						
neck the follo Harness cor Harness for >> Re	owing. inectors F1, open or shor epair open ci	E3 t between VVE ircuit, short to g	ground or she	ort to power in	harness or c		ORT
heck the folk Harness cor Harness for >> R CHECK VV Turn igniti Disconne Check the	owing. open or shor epair open ci /EL CONTRO on switch Of ct VVEL cont	E3 t between VVE ircuit, short to g DL SHAFT PO FF. rol module har between VVEL	ground or sho SITION SEN	ort to power in SOR GROUN tor.	harness or c D CIRCUIT F		
heck the folk Harness cor Harness for >> R CHECK VV Turn igniti Disconnee Check the module ha	owing. open or shor epair open ci (EL CONTRO on switch Of ct VVEL cont e continuity b arness conne	E3 t between VVE ircuit, short to g DL SHAFT PO FF. trol module han between VVEL ector.	ground or sho SITION SEN rness connec . control shaf	ort to power in SOR GROUN tor.	harness or c D CIRCUIT F sor harness	onnectors. OR OPEN AND SHO connector and VVEL	
eck the folk Harness cor Harness for >> R CHECK VV Turn igniti Disconne Check the	owing. open or shor epair open ci (EL CONTRO on switch Of ct VVEL cont e continuity b arness conne	E3 t between VVE ircuit, short to g DL SHAFT PO FF. rol module har between VVEL	ground or sho SITION SEN rness connec . control shaf	ort to power in SOR GROUN tor. t position sen	harness or c D CIRCUIT F sor harness	onnectors. OR OPEN AND SHO	
eck the follo larness cor larness for >> Ro CHECK VV Turn igniti Disconneo Check the module ha	owing. open or shore epair open ci (EL CONTRO on switch OF ct VVEL conte continuity be arness conne VVEL conte Bank	E3 t between VVE ircuit, short to g DL SHAFT PO FF. crol module han between VVEL ector.	ground or sho SITION SEN rness connec . control shaf	ort to power in SOR GROUN tor. t position sen	harness or c D CIRCUIT F sor harness	onnectors. OR OPEN AND SHO connector and VVEL	
Arness cor Harness for >> Re CHECK VV Turn igniti Disconnee Check the module ha	owing. Inectors F1, open or shor epair open ci (EL CONTRO on switch OF ct VVEL cont e continuity b arness conne VVEL co	E3 t between VVE ircuit, short to g DL SHAFT PO FF. rol module han between VVEL ector.	ground or sho SITION SEN rness connec control shaf	ort to power in SOR GROUN tor. t position sen VVEL cont Connector	harness or c D CIRCUIT F sor harness rol module Terminal	onnectors. OR OPEN AND SHO connector and VVEL	
Arness cor Harness for >> Re CHECK VV Turn igniti Disconnee Check the module ha	owing. open or shore epair open ci (EL CONTRO on switch OF ct VVEL conte arness conne VVEL conte Bank 1	E3 t between VVE DL SHAFT PO FF. crol module har between VVEL ector.	ground or sho SITION SEN rness connec control shaf n sensor Terminal 2	ort to power in SOR GROUN tor. t position sen	harness or C D CIRCUIT F sor harness rol module Terminal 4	onnectors. OR OPEN AND SHO connector and VVEL	
PHOP2	owing. open or shore epair open ci (EL CONTRO on switch OF ct VVEL conte continuity barness conne VVEL co Bank 1	E3 t between VVE ircuit, short to g DL SHAFT PO FF. rol module han between VVEL ector. ontrol shaft positio Connector F46 F47	ground or sho SITION SEN rness connec . control shaf n sensor Terminal 2 5 2 5	ort to power in SOR GROUN tor. t position sen VVEL cont Connector E15	harness or c D CIRCUIT F sor harness trol module Terminal 4 17	onnectors. OR OPEN AND SHO connector and VVEL	
P1092 Also check	owing. Inectors F1, open or shor epair open ci /EL CONTRO on switch OF ct VVEL cont e continuity b arness conne VVEL co Bank 1 2 k harness fo	E3 t between VVE ircuit, short to g DL SHAFT PO FF. rol module han between VVEL ector. ontrol shaft positio Connector F46 F47 r short to groun	ground or sho SITION SEN rness connec . control shaf n sensor Terminal 2 5 2 5	ort to power in SOR GROUN tor. t position sen VVEL cont Connector E15	harness or C D CIRCUIT F sor harness rol module Terminal 4 17 6	onnectors. OR OPEN AND SHO connector and VVEL	
Arness cor Harness cor Harness for >> Re CHECK VV Turn igniti Disconnee Check the module ha DTC No. P1089 P1092 Also chect the inspection CS >> G	owing. open or shore epair open ci (EL CONTRO on switch OF ct VVEL conte continuity to arness conne VVEL conte Bank 1 2 k harness fo on result nor O TO 6.	E3 t between VVE ircuit, short to g DL SHAFT PO FF. rol module han between VVEL ector. ontrol shaft positio Connector F46 F47 r short to groun	ground or sho SITION SEN rness connec . control shaf n sensor Terminal 2 5 2 5	ort to power in SOR GROUN tor. t position sen VVEL cont Connector E15	harness or C D CIRCUIT F sor harness rol module Terminal 4 17 6	onnectors. OR OPEN AND SHO connector and VVEL	
Harness for >> R CHECK VV Turn igniti Disconner Check the module ha DTC No. P1089 P1092 Also chect the inspection (ES >> G NO >> G	owing. open or shore epair open ci (EL CONTRO on switch OF ct VVEL conte continuity barness conner VVEL conte arness conner VVEL conte arness conner VVEL conte arness conner O TO 6. O TO 5.	E3 t between VVE ircuit, short to g DL SHAFT PO FF. rol module han between VVEL ector. ontrol shaft positio Connector F46 F47 r short to groun	ground or sho SITION SEN rness connec . control shaf n sensor Terminal 2 5 2 5	ort to power in SOR GROUN tor. t position sen VVEL cont Connector E15	harness or C D CIRCUIT F sor harness rol module Terminal 4 17 6	onnectors. OR OPEN AND SHO connector and VVEL	

 $6. \ensuremath{\mathsf{VVel}}$ control shaft position sensor input signal circuit for open and short

1. Check the continuity between VVEL control shaft position sensor harness connector and VVEL control module harness connector.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

DTC No.	VVEL co	ontrol shaft position	on sensor	VVEL con	trol module	Continuity
DIC NO.	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1089	1	F46	1		3	
F 1009	I	140	4	E15	16	Existed
P1092	2	F47	1		5	LAISted
F 1092	2	Г47	4		18	†

2. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

NO >> GO 107.

7. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F1, E3

Harness for open or short between VVEL control shaft position sensor and VVEL control module

>> Repair open circuit, short to ground or short to power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace.

9.REPLACE VVEL CONTROL MODULE

1. Replace VVEL control module.

2. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> GO TO 10.

10.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-380, "DTC Logic"</u>.

Is the DTC P1089 or P1092 displayed again?

YES >> GO TO 11.

NO >> INSPECTION END

11.REPLACE VVEL ACTUATOR SUB ASSEMBLY

1. Replace VVEL actuator sub assembly.

2. Go to EC-382, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000004250889

1.PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

Refer to <u>EC-21</u>, "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Repair Requirement".

>> GO TO 2.

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
2.PERFORM IDLE AIR VOLUME LEARNING Refer to <u>EC-19. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"</u> .		
Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	Α	
>> END	EC	
	С	
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P1090, P1093 VVEL ACTUATOR MOTOR

Description

The VVEL actuator motor rotates the control shaft according to the control signal from the VVEL control module. The VVEL control module judges whether the VVEL actuator motor controls the angle properly by the VVEL control shaft position sensor signal.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1090 or P1093 is displayed with DTC P1091, first perform the trouble diagnosis for DTC P1091. Refer to <u>EC-388</u>, "<u>DTC Logic</u>".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1090	VVEL system performance (bank 1)		Harness or connectors
P1093	VVEL system performance (bank 2)	 Event angle difference between the actual and the target is detected. Abnormal current is sent to VVEL actuator motor. 	 (VVEL actuator motor circuit is open or shorted.) VVEL actuator motor VVEL actuator sub assembly VVEL ladder assembly VVEL control module

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 10 second.
- 2. Keep the engine speed at about 3,500 rpm for at least 10 seconds under no load.
- 3. Check DTC.
- Is DTC detected?
- YES >> Go to EC-384, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.vvel actuator motor output signal circuit for open and short

- 1. Disconnect VVEL control module harness connector.
- 2. Disconnect VVEL actuator motor harness connector.
- Check the continuity between VVEL control module harness connector and VVEL actuator motor harness connector.

EC-384

INFOID:000000004250892

INFOID:000000004250890

INEOID-000000004250891

P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	١	/VEL control modu	le	VVEL actu	ator motor		А
DTC No.	Bank	Connector	Terminal	Connector	Terminal	 Continuity 	
			10		1	Existed	EC
D 1000			12	F 40	2	Not existed	EC
P1090	1	-	F48	1	Not existed		
		– E15 –	25		2	Existed	С
		E15	2		1	Existed	
P1093	2		2	- F49	2	Not existed	D
F 1093	2		15	149	1	Not existed	D
			15		2	Existed	
$\begin{array}{rrrr} & \text{Is the inspection } \\ & \text{YES} & >> G \\ & \text{NO} & >> G \\ \hline & \text{3.DETECT N} \\ \hline & \text{Check the foll} \\ \hline & \text{Harness constraints} \\ \hline & \text{Harness for} \\ \hline & \text{Harness for} \\ \hline & \text{NO} & >> R \\ \hline & \text{4.CHECK VV} \\ \hline & \text{Refer to } \\ \hline & \text{EC-3} \\ \hline & \text{Is the inspection } \\ \hline & \text{YES} & >> G \\ \hline & \text{NO} & >> G \\ \hline \hline & \text{5.REPLACE} \end{array}$	ion result nor GO TO 4. GO TO 3. MALFUNCTIC iowing. nnectors F1, open or sho cepair open c VEL ACTUAT Compor ion result nor GO TO 6. GO TO 5. VVEL ACTU	DNING PART E3 rt between VVE ircuit, short to g FOR MOTOR hent Inspection mal? JATOR SUB AS	EL actuator n ground or sho (VVEL ACT SSEMBLY	notor and VVE ort to power in	harness or o		E F G H J
2. Go to <u>EC</u>		or sub assembl <u>al Repair Requi</u> END					K
6.CHECK IN							
Refer to GI-4							
Is the inspect							M
YES >> G	60 TO 7.						
	epair or repla						Ν
1 .REPLACE	VVEL CON						
2. Go to <u>EC</u>		I module. IONAL SERVI Requirement".	<u>CE WHEN R</u>	EPLACING C	ONTROL UI	NIT (VVEL CONTROL MOD-	0
>> G	60 TO 8.						Ρ
8.PERFORM	I DTC CONF	IRMATION PR	OCEDURE				
 Turn ignit Erase DT Perform I 	ion switch O	N. ation Procedur					
		<u>igic</u> . <u>3 displayed ag</u>	ain?				

P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 9. NO >> INSPECTION END

9.CHECK VVEL ACTUATOR SUB ASSEMBLY

Refer to EC-386. "Component Inspection (VVEL ACTUATOR SUB ASSEMBLY)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. Replace vvel actuator sub assembly

1. Replace VVEL actuator sub assembly.

2. Go to EC-387, "Special Repair Requirement".

>> INSPECTION END

11.CHECK VVEL LADDER ASSEMBLY

Refer to EM-104, "Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 12.

12. Replace cylinder head, vvel ladder assembly and vvel actuator sub assembly

1. Replace cylinder head, VVEL ladder assembly and VVEL actuator sub assembly.

2. Go to EC-387, "Special Repair Requirement".

>> INSPECTION END

13. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (VVEL ACTUATOR MOTOR)

1.CHECK VVEL ACTUATOR MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect VVEL actuator motor harness connector.
- 3. Check resistance between VVEL actuator motor terminals as follows.

VVEL actuator motor	Resistance	
Terminal		
1 and 2	16 Ω or less	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE VVEL ACTUATOR SUB ASSEMBLY

1. Replace VVEL actuator sub assembly.

2. Go to EC-387, "Special Repair Requirement".

>> INSPECTION END

Component Inspection (VVEL ACTUATOR SUB ASSEMBLY)

1.CHECK VVEL ACTUATOR SUB ASSEMBLY

1. Turn ignition switcl	າ OFF.
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EC-386

2009 G37 Coupe

INFOID:000000004250894

INFOID:000000004250893

P1090, P1093 VVEL ACTUATOR MOTOR	
< DTC/CIRCUIT DIAGNOSIS > [VQ37VHF	۲]
 Remove VVEL actuator sub assembly. Refer to <u>EM-95</u>, "<u>Disassembly and Assembly</u>". Turn the ball screw shaft to check that it works smoothly. 	A
Is the inspection result normal?	
YES >> INSPECTION END NO >> GO TO 2.	EC
2.REPLACE VVEL ACTUATOR SUB ASSEMBLY	
 Replace VVEL actuator sub assembly. Go to <u>EC-387. "Special Repair Requirement"</u>. 	С
>> INSPECTION END	D
Special Repair Requirement)895
1.PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT	E
Refer to EC-21, "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Repair Requir	<u>e-</u>
ment".	F
>> GO TO 2.	
2. PERFORM IDLE AIR VOLUME LEARNING	G
Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	_
>> END	Н
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P1091 VVEL ACTUATOR MOTOR RELAY

Description

Power supply for the VVEL actuator motor is provided to the VVEL control module via VVEL actuator motor relay. VVEL actuator motor relay is ON/OFF controlled by the VVEL control module. In addition, when the VVEL actuator motor relay cannot be controlled by the VVEL control module for some reason, it ON/OFF controlled by ECM.

DTC Logic

INFOID:000000004250897

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1091	VVEL actuator motor relay circuit	 VVEL control module detects the VVEL actuator motor relay is stuck OFF. VVEL control module detects the VVEL actuator motor relay is stuck ON. 	 Harness or connectors (VVEL actuator motor relay circuit is open or shorted.) (Abort circuit is open or shorted.) VVEL actuator motor relay VVEL control module ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 1 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON and wait at least 1 seconds.
- 4. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-388, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000004250898

1.VVEL ACTUATOR MOTOR RELAY POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect VVEL actuator motor relay.
- 3. Check the voltage between VVEL actuator motor relay harness connector and ground.

VVEL actuat	or motor relay	Ground	Voltage	
Connector	Terminal	Glound	voltage	
E16	1	Ground	Battery voltage	
LIU	5	Glound	Dattery voltage	

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2. INFOID:000000004250896

P1091 VVEL ACTUATOR MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Harpoon for	owing. link (letter N)			or motor rolov	and battony	
Harness for	open or shor	t between v	VEL actuato	or motor relay	and battery	
>> R	epair open ci	rcuit, short to	o ground or	short to powe	er in harness o	r connectors.
.VVEL ACT	UATOR MOT	OR RELAY	POWER SI	UPPLY CIRCU	JIT-II	
					narness conne	ector and VVEL control module
VVEL co	ontrol module	VV	EL actuator m	otor relay		
Connector	Termina	I Conr	ector	Terminal	Continuity	
E15	23	E	16	2	Existed	
Also cheo	k harness fo	r short to gro	und and po	ower.		
	on result nor	<u>mal?</u>				
	O TO 4. epair open ci	rcuit short to	o around or	short to powe	er in harness o	r connectors
	• •		-	•	FOR OPEN	
						ector and VVEL control module
harness of	•			motor relay		
VV	VVEL control module VVEL actuator motor relay Continuity					
Bank	Connector	Terminal	Connector	Terminal	Continuity	
1	E15	13	E16	3	Existed	
2	k harnaaa fa	1				
	k harness for on result nor	0	unu anu pu	ower.		
	<u>0 TO 5.</u>					
NO >> R	epair open ci	rcuit, short to	o ground or	short to powe	er in harness o	r connectors.
CHECK V	/EL ACTUAT	OR MOTOR	RELAY			
efer to EC-3	<u>90, "Compon</u>	ent Inspection	<u>on"</u> .			
<u></u>	on result nor	<u>mal?</u>				
the inspecti	O TO 6. eplace VVEL	actuator mo	tor relay			
<u>the inspecti</u> ′ES >> G	•		-			
the inspecti ′ES >> G NO >> R						
the inspecti (ES >> G NO >> R .CHECK AB	of ECM horn			odule harness	s connector an	d ECM harness connector.
the inspection (ES >> G NO >> R .CHECK AB Disconne	ct ECM harne e continuity b	etween VVE				
the inspecti (ES >> G NO >> R .CHECK AB Disconne Check the		etween VVE	ECM		Continuity	_
the inspecti YES >> G NO >> R .CHECK AB Disconne Check the	e continuity b		ECM nector	Terminal	Continuity	
the inspecti (ES >> G NO >> R .CHECK AB Disconne Check the	e continuity b	ıl Con		Terminal 28	Continuity Existed	-

7.DTECT MALFUNCTIONING PART

Check the following.

P1091 VVEL ACTUATOR MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

- Harness connector E3, F1
- Harness for open or short between ECM and VVEL control module

>> Repair open circuit, short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace.

9.REPLACE VVEL CONTROL MODULE

- 1. Replace VVEL control module.
- 2. Go to EC-17. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> GO TO 10.

10.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-388, "DTC Logic"</u>.

Is the DTC P1091 displayed again?

- YES >> GO TO 11.
- NO >> INSPECTION END

11.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-16, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:000000004250899

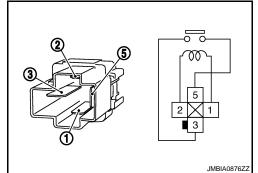
1.CHECK VVEL ACTUATOR MOTOR RELAY

- 1. Turn ignition switch OFF.
- 2. Remove VVEL actuator motor relay.
- 3. Check the continuity between VVEL actuator motor relay terminals under the following conditions.

Terminal	Condition	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace VVEL actuator motor relay.



P1148, P1168 CLOSED LOOP CONTROL

DTC detecting condition

The closed loop control function for bank 1 does

not operate even when vehicle is being driven

The closed loop control function for bank 2 does

not operate even when vehicle is being driven

in the specified condition.

in the specified condition.

< DTC/CIRCUIT DIAGNOSIS >

P1148, P1168 CLOSED LOOP CONTROL

DTC Logic

DTC No.

P1148

P1168

DTC DETECTION LOGIC NOTE: DTC P1148 or P1168 is displayed with another DTC for A/F sensor 1.

Trouble diagnosis name

Closed loop control

Closed loop control

function (bank 2)

function (bank 1)

Perform the trouble diagnosis for the corresponding DTC.

[VQ37VHR]

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EC

INFOID:000000004250900

Possible cause

· Harness or connectors

• A/F sensor 1 heater

ed.)

A/F sensor 1

D (The A/F sensor 1 circuit is open or short-Е F

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P1211 TCS CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

P1211 TCS CONTROL UNIT

Description

The malfunction information related to TCS is transferred via the CAN communication line from "ABS actuator and electric unit (control unit)" to ECM.

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

DTC Logic

DTC DETECTION LOGIC

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211	TCS control unit	ECM receives malfunction information from "ABS actuator and electric unit (control unit)".	 ABS actuator and electric unit (control unit) TCS related parts

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 60 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-392, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

Go to BRC-4, "Work Flow".

Revision: 2009 October

INFOID:000000004250901

INFOID:000000004250902

INFOID:000000004250903

P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

P1212 TCS COMMUNICATION LINE

Description

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and "ABS actuator and electric unit (control unit)". Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit (control unit)" but also for ECM after TCS related repair.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1212 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-367, "DTC Logic"</u>.

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1212	TCS communication line	ECM cannot receive the information from "ABS actuator and electric unit (control unit)" continuously.	 Harness or connectors (The CAN communication line is open or short- ed.) ABS actuator and electric unit (control unit) Dead (Weak) battery 	(

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.	

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-393, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

Go to BRC-4, "Work Flow".

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INFOID:000000004250906

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P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

P1217 ENGINE OVER TEMPERATURE

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-367, "DTC Logic"</u>.

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over tempera- ture (Overheat)	 Cooling fan does not operate properly (Overheat). Cooling fan system does not operate properly (Overheat). Engine coolant was not added to the system using the proper filling method. Engine coolant is not within the specified range. 	 Harness or connectors (The cooling fan circuit is open or short- ed.) IPDM E/R Cooling fan control module Cooling fan motor Radiator hose Radiator Radiator cap Water pump Thermostat

CAUTION:

When a malfunction is indicated, always replace the coolant. Refer to <u>CO-7, "Draining"</u> and <u>CO-8,</u> "<u>Refilling"</u>. Also, replace the engine oil. Refer to <u>LU-8, "Draining"</u> and <u>LU-8, "Refilling"</u>.

- 1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Always use coolant with the proper mixture ratio. Refer to <u>MA-11</u>, "<u>Anti-Freeze Coolant Mixture Ratio</u>".
- 2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-394, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-395</u>, "Diagnosis Procedure".

Component Function Check

INFOID:000000004250908

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

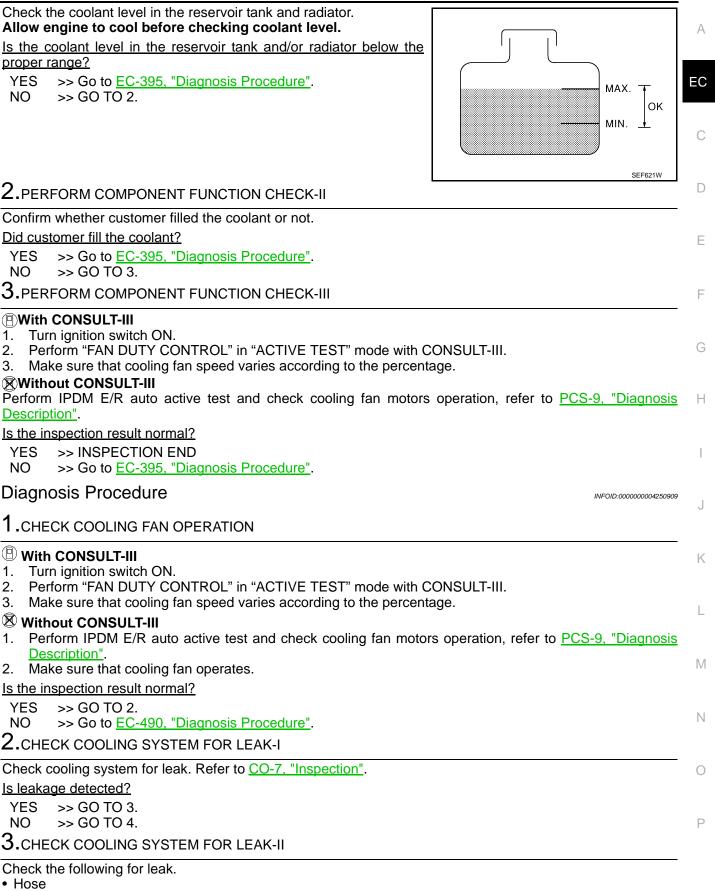
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

INFOID:000000004250907

P1217 ENGINE OVER TEMPERATURE

[VQ37VHR]



- Radiator
- Water pump

< DTC/CIRCUIT DIAGNOSIS >

P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

>> Repair or replace malfunctioning part.

4.CHECK RADIATOR CAP

Check radiator cap. Refer to <u>CO-11, "RADIATOR CAP : Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace radiator cap.

5.CHECK THERMOSTAT

Check thermostat. Refer to CO-21, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-193, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace engine coolant temperature sensor.

7.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	 Blocked radiator Blocked condenser Blocked radiator grille Blocked bumper 	• Visual	No blocking	_
-	2	Coolant mixture	Coolant tester	MA-11, "Anti-Freeze Coolant Mixture Ratio"	
	3	Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-7, "Inspection"
-	4	Radiator cap	Pressure tester	107 kPa (1.1 kg/cm ² , 16 psi) (Limit)	CO-11, "RADIATOR CAP : Inspection"
ON* ²	5	Coolant leaks	Visual	No leaks	CO-7, "Inspection"
ON* ²	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-21, "Inspection"
ON* ¹	7	Cooling fan	CONSULT-III	Operating	EC-490, "Component Function Check"
OFF	8	Combustion gas leak	Color checker chemical tester 4 Gas analyzer	Negative	_
ON* ³	9	Coolant temperature gauge	Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to res- ervoir tank	• Visual	No overflow during driving and idling	CO-7, "Inspection"
OFF* ⁴	10	Coolant return from res- ervoir tank to radiator	Visual	Should be initial level in reservoir tank	CO-7, "Inspection"
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maxi- mum distortion (warping)	EM-117, "Inspection"
	12	Cylinder block and pis- tons	Visual	No scuffing on cylinder walls or piston	EM-131, "Inspection"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.



P1217 ENGINE OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

For more information, refer to CO-3, "Troubleshooting Chart".

>> INSPECTION END



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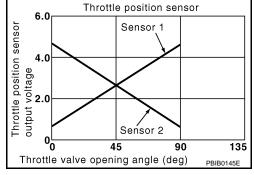
< DTC/CIRCUIT DIAGNOSIS >

P1225, P1234 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

INFOID:000000004250911

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1225	Closed throttle position learning per- formance (bank 1)	Closed throttle position learning value	Electric throttle control actuator	
P1234	Closed throttle position learning per- formance (bank 2)	is excessively low.	(TP sensor 1 and 2)	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-398, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.

INFOID:000000004715382

P1225, P1234 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

1.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

 $2. {\tt Replace electric throttle control actuator}$

2. Go to EC-399, "Special Repair Requirement".

2. PERFORM IDLE AIR VOLUME LEARNING

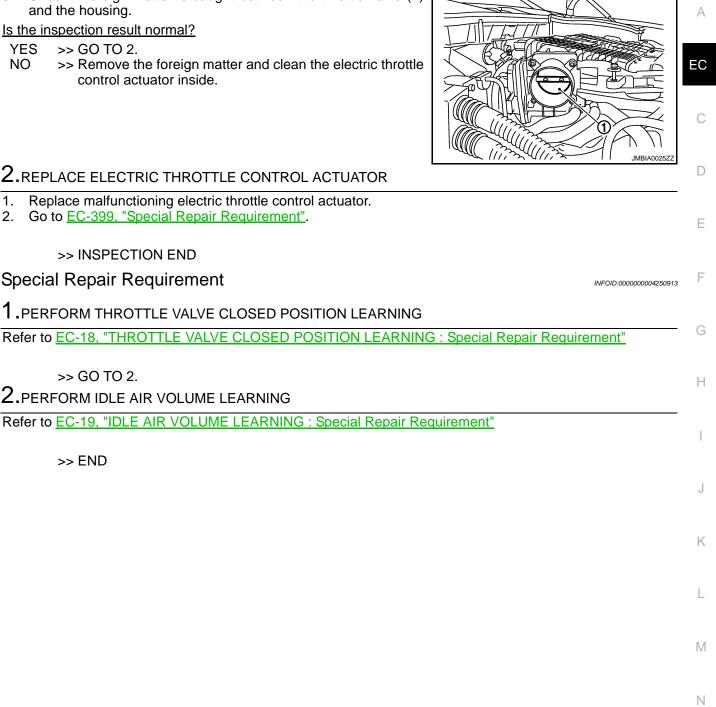
>> INSPECTION END

Special Repair Requirement

>> GO TO 2.

>> END

Replace malfunctioning electric throttle control actuator.



[VQ37VHR]

Ρ

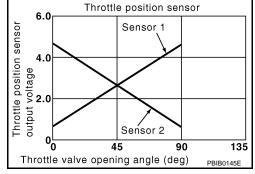
< DTC/CIRCUIT DIAGNOSIS >

P1226, P1235 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learn- ing performance (bank 1)	Closed throttle position learning is not performed	Electric throttle control actuator
P1235	Closed throttle position learn- ing performance (bank 2)	successfully, repeatedly.	(TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Repeat steps 2 and 3 for 32 times.
- 5. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-400, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.

INFOID:000000004715383

[VQ37VHR]

INFOID:0000000004250915

P1226, P1235 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

1.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

 $2. {\tt Replace electric throttle control actuator}$

2. Go to EC-401, "Special Repair Requirement".

2. PERFORM IDLE AIR VOLUME LEARNING

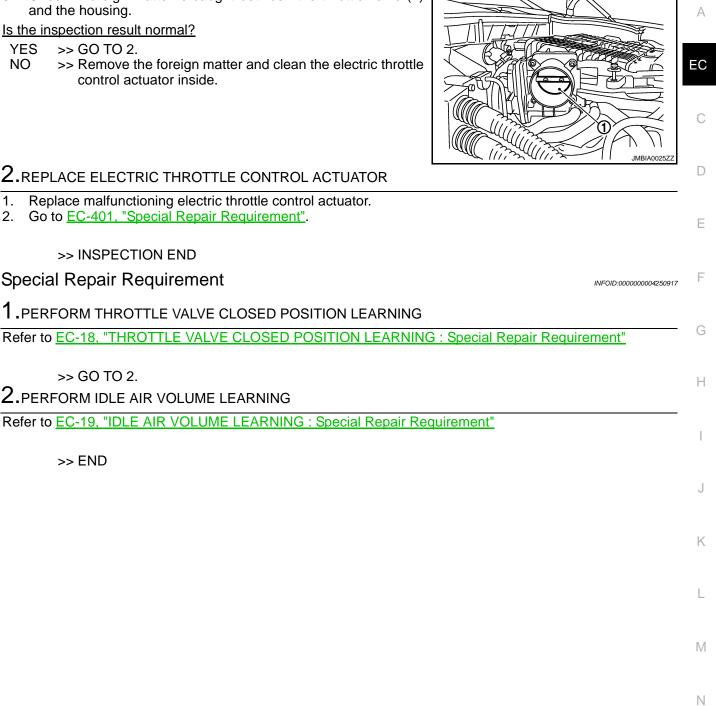
>> INSPECTION END

Special Repair Requirement

>> GO TO 2.

>> END

Replace malfunctioning electric throttle control actuator.



[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:000000004250918

[VQ37VHR]

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:000000004250919

DTC DETECTION LOGIC

NOTE: If DTC P1233 or P2101 is displayed with DTC P1238, P1290, P2100 or 2119, first perform the trouble diagnosis for DTC P1238, P2119 or P1290, P2100. Refer to <u>EC-409, "DTC Logic"</u> or <u>EC-414, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1233	Electric throttle control performance (bank 2)	Electric throttle control function does not oper-	Harness or connectors (Throttle control motor circuit is open or
P2101	Electric throttle control performance (bank 1)	ate properly.	shorted)Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

Is DTC detected?

- YES >> Go to EC-402, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check the voltage between ECM harness connector terminals as per the following.

EC-402

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

			ECM						
DTC		+	2011	_		Con	dition	Voltage (V)	
2.0	Connect		nal Conn	ector Ter	minal				
							OFF	Approx. 0	
P1233	F102	52					ON	Battery voltage	-
			M1	07	128	Ignition switch	OFF	Approx. 0	
P2101	F101	3					ON	Battery voltage	
s the in	spectior	n result no	ormal?						
YES	>> GO								
NO	>> GO								
3. CHE	CK THF	ROTTLE (CONTRO		RELA	AY POWER S	UPPLY CIRC	CUIT	
		n switch (
-		ECM har IPDM E/I			or E7				
						ess connector	and ECM ha	arness connector.	
		-							
IF	PDM E/R		ECM	C	ontinuity				
Connec	tor Terr	minal Con	nector Te	rminal	ontinuity				
E7	7	70 F	101	25 E	Existed	_			
5. Also	o check	harness f	or short t	o ground	and sh	ort to power.			
ls the in	spection	n result no	ormal?						
YES	>> GO								
	>> GO								
		LFUNCT	IONING	PARI					
	he follow	ving. iectors E3							
		ectors F1							
Harne	ess for o	pen or sh	ort betwe	en ECM a	and IPI	DM E/R			
	_								
= .				-		•		or connectors.	
J.CHE	CK THF	ROTTLE	CONTRO		RELA	AY INPUT SIG	NAL CIRCU	IT-II	
l. Che	eck the o	continuity	between	IPDM E/F	Rharn	ess connector	and ECM ha	arness connector.	
				_			_		
DT		IPDM			CM	Continuit	у		
		Connector	Terminal	Connecto		ninal			
P12		E7	54	F102		Existed			
P21				F101		3	_		
				o ground	and sh	nort to power.			
		n result no	ormal?						
YES NO	>> GO >> GO								
~		LFUNCT							
				AKI					
	he follov ss conn	ving. lectors E3	5. F1						

• Harness connectors E3, F1

• Harness for open or short between ECM and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

EC-403

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

7.CHECK FUSE

1. Disconnect 15 A fuse (No. 51) from IPDM E/R.

2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace 15 A fuse.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

9. Check throttle control motor output signal circuit for open or short

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- 3. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electri	c throttle cont	rol actuator	EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
			5		49	Existed
P1233	2	F27	5	F102	50	Not existed
P1233	1	F27	6	F102	49	Not existed
					50	Existed
					2	Existed
P2101				F101	4	Not existed
			2		2	Not existed
					4	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace.

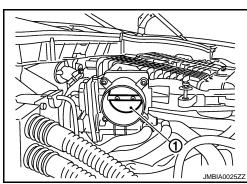
10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Remove the intake air duct.
- 2. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-405, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 13.

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > 12. CHECK INTERMITTENT INCIDENT А Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 13. EC NO >> Repair or replace harness or connectors. 13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR Replace malfunction electric throttle control actuator. Go to EC-405, "Special Repair Requirement". 2. D >> INSPECTION END Component Inspection INFOID:00000000425092 Е 1. CHECK THROTTLE CONTROL MOTOR Turn ignition switch OFF. 1. Disconnect electric throttle control actuator harness connector. F 2. Check resistance between electric throttle control actuator terminals as per the following. 3 Electric throttle control actuator Resistance (Ω) Bank Terminals 1 1 and 2 Approx. 1 - 15 [at 25°C (77°F)] Н 2 5 and 6 Is the inspection result normal? YES >> INSPECTION END NO >> GO TO 2. 2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR Replace malfunctioning electric throttle control actuator. 1. Go to EC-405, "Special Repair Requirement". 2. Κ >> INSPECTION END Special Repair Requirement INFOID:000000004250922 L 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement" Μ >> GO TO 2. 2.PERFORM IDLE AIR VOLUME LEARNING Ν Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement" >> END Ρ

P1236, P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

P1236, P2118 THROTTLE CONTROL MOTOR

Description

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

INFOID:000000004250924

[VQ37VHR]

INFOID:000000004250923

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1236	Throttle control motor (bank 2) circuit short	ECM detects short in both circuits between	Harness or connectors (Throttle control motor circuit is shorted.)	
P2118	Throttle control motor (bank 1) circuit short	ECM and throttle control motor.	Electric throttle control actuator (Throttle control motor)	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.
- Is DTC detected?
- YES >> Go to EC-406, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.check throttle control motor output signal circuit for open and short

- 1. Disconnect electric throttle control actuator harness connector.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

INEOID:000000004250925

P1236, P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

BankConnectorTerminalConnectorTerminalP12362F275F102 $\frac{49}{50}$ Not existed9Not existed $\frac{49}{50}$ Not existed91F61 $\frac{2}{50}$ Existed91F62Existed92Not existed2Not existed92Not existed2Not existed92Not existed2Not existed92Not existed2Not existed43Not existed2Not existed42Not existed2Not existed42Not existed2Not existed42Not existed2Not existed45SGOTO 3.NONO> Repair or replace.S3CHECK THROTTLE CONTROL MOTORRefer to EC-407. "Component Inspection". s the inspection result normal? YESYES> GOTO 5.4CHECK INTERMITTENT INCIDENTRefer to GI-41. "Intermittent Incident". s the inspection result normal? YESYES> GOTO 5.0> Repair or replace harness or connectors.0> Repair or replace harness or connectors.0> Repair or replace harness or connectors.0> Repair Control Actuator> INSPECTION ENDComponent Inspection.> INSPECTION ENDComponent Inspection.Netwitch OFF. <th>DTC</th>	DTC
P1236 2 F27 5 F102 50 Not existed 49 Not existed 50 Existed 92118 1 F6 2 F101 4 Not existed 41 Not existed 4 Not existed 4 Not existed 42 Existed 4 Not existed 4 Not existed 42 Existed 4 Not existed 4 Not existed 43 Not existed 4 Not existed 4 Not existed 44 Not existed 4 Not existed 4 Not existed 44 Not existed 4 Not existed 4 Not existed 5 No > Repair or replace. 3 5	
P1236 2 F27 6 F102 50 Not existed 49 Not existed 50 Existed 92118 1 F6 1 2 Existed 4 Not existed 2 Existed 4 Not existed 2 Not existed 4 Not existed 2 Not existed 2 Not existed 4 Existed 4 Not existed 2 Not existed 2 Not existed 4 Existed 4 Not existed 2 Not existed 4 Not existed 4 Existed 50 OTO 3. Not existed 1 NO > Repair or replace. CHECK THROTTLE CONTROL MOTOR Refer to GL-41. "Intermittent Incident". 4th isspection result normal? YES > GO TO 5. 0 >> Repair or replace hamess or connectors. 0 >> Replace malfun	T
P2118 1 F0 $\frac{49}{50}$ Not existed P2118 1 F6 $\frac{2}{2}$ Existed 4 Not existed $\frac{2}{4}$ Not existed 4. Also check harness for short to ground and short to power. Image: Comparison of the existed 4. Also check harness for short to ground and short to power. Image: Comparison of the existed 4. Also check harness for short to ground and short to power. Image: Comparison of the existed 4. Also check harness for short to ground and short to power. Image: Comparison of the existed 4. Also check harness for short to ground and short to power. Image: Comparison of the existed 4. Also check harness for short to ground and short to power. Image: Comparison of the existed 3. CHECK THROTTLE CONTROL MOTOR Refer to EC-407. "Component Inspection". 8. Is the inspection result normal? YES YES > GO TO 5. 9. NO >> Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. So to EC-408. "Special Repair Requirement". >> INSPECTION END Component Inspection 1. Turn ignition switch OFF.	P1236
P2118 1 F6 2 Existed 2 Existed 2 Existed 4 Not existed 2 Not existed 2 Not existed 2 Not existed 4 Also check harness for short to ground and short to power. Existed 4 Also check harness for short to ground and short to power. Is the inspection result normal? YES > GO TO 3. NO > Repair or replace. 3 3.CHECK THROTTLE CONTROL MOTOR Refer to EC-407. "Component Inspection". Is the inspection result normal? YES > GO TO 5. 4.CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". Is the inspection result normal? YES > GO TO 5. 4.CHECK INTERMITTENT INCIDENT Secondors. 5 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". > > INSPECTION END Component Inspection ************************************	
P2118 1 F6 1 F101 4 Not existed 2 Not existed 4 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace. 3.CHECK THROTTLE CONTROL MOTOR Refer to EC-407. "Component Inspection". Is the inspection result normal? YES >> GO TO 3. NO >> GO TO 5. 4.CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. 4.CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". >> INSPECTION END Component Inspection 1. Turn ignition switch OFF. 2. Disconnect electric throtthe control actuator harn	
P2118 1 F6 F101 4 Not existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace. 3. CHECK THROTTLE CONTROL MOTOR Refer to EC-407. "Component Inspection". Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Repair or replace maifunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". >> INSPECTION END Component Inspection 1. Turn ig	
2 2 Not existed 4 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace. 3. CHECK THROTTLE CONTROL MOTOR Refer to EC-407. "Component Inspection". Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". >> INSPECTION END Component Inspection 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. <td>P2118</td>	P2118
4 Existed 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace. 3. CHECK THROTTLE CONTROL MOTOR Refer to EC-407, "Component Inspection". Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408, "Special Repair Requirement". >> INSPECTION END Component Inspection 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following.	12110
Is the inspection result normal? YES >> GO TO 3. NO >> Repair or replace. 3. CHECK THROTTLE CONTROL MOTOR Refer to EC-407. "Component Inspection". Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41. "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". >> INSPECTION END Component Inspection 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (2)	
YES >> GO TO 3. NO >> Repair or replace. 3. CHECK THROTTLE CONTROL MOTOR Refer to EC-407, "Component Inspection". Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408, "Special Repair Requirement". >> INSPECTION END MOTOSE 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator 2. Disconnect electric throttle control actuator terminals as per the following.	
NO >> Repair or replace. 3. CHECK THROTTLE CONTROL MOTOR Refer to EC-407, "Component Inspection". Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408, "Special Repair Requirement". >> INSPECTION END Component Inspection 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator	
3. CHECK THROTTLE CONTROL MOTOR Refer to EC-407. "Component Inspection". Is the inspection result normal? YES > GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408, "Special Repair Requirement". >> INSPECTION END Component Inspection 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	
Refer to EC-407. "Component Inspection". Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". >> INSPECTION END MFORE Component Inspection 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	
s the inspection result normal? YES >> GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". s the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408, "Special Repair Requirement". >> INSPECTION END Component Inspection 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	
YES >> GO TO 4. NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to <u>GI-41, "Intermittent Incident"</u> . Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to <u>EC-408</u> , "Special Repair Requirement". >> INSPECTION END Component Inspection 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	
NO >> GO TO 5. 4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408, "Special Repair Requirement". >> INSPECTION END Ormponent Inspection 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following.	
4. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". >> INSPECTION END Or OTO S. OCOMPONENT Inspection I. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. Output to throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	
Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408, "Special Repair Requirement". >> INSPECTION END More the control actuator. 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following.	
Is the inspection result normal? YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". >> INSPECTION END INSPECTION END Component Inspection 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	
YES >> GO TO 5. NO >> Repair or replace harness or connectors. 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". >> INSPECTION END Component Inspection 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following.	
NO >> Repair or replace harness or connectors. 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". >> INSPECTION END IMPOLEMENT Ormponent Inspection 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	
 5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. 2. Go to EC-408. "Special Repair Requirement". > INSPECTION END Component Inspection 1.CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. 	
 Replace malfunctioning electric throttle control actuator. Go to EC-408. "Special Repair Requirement". > INSPECTION END Component Inspection CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. Disconnect electric throttle control actuator harness connector. Check resistance between electric throttle control actuator terminals as per the following. 	
 2. Go to EC-408. "Special Repair Requirement". > INSPECTION END Component Inspection 1. CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. 	
>> INSPECTION END Component Inspection 1.CHECK THROTTLE CONTROL MOTOR 1. Turn ignition switch OFF. 2. Disconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	
Component Inspection INFOIL:0000000 1. CHECK THROTTLE CONTROL MOTOR Inspection 1. Turn ignition switch OFF. Insconnect electric throttle control actuator harness connector. 3. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	
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 CHECK THROTTLE CONTROL MOTOR Turn ignition switch OFF. Disconnect electric throttle control actuator harness connector. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	າມມວນ
 Turn ignition switch OFF. Disconnect electric throttle control actuator harness connector. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	mpon
 Disconnect electric throttle control actuator harness connector. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	CHECK
 Disconnect electric throttle control actuator harness connector. Check resistance between electric throttle control actuator terminals as per the following. Electric throttle control actuator Resistance (Ω)	Turn ig
Electric throttle control actuator Resistance (Ω)	Discon
Resistance (Ω)	Check
Resistance (Ω)	
Bank lerminals	
1 1 and 2 Approx. 1 - 15 [at 25°C (77°F)]	
2 5 and 6	
Is the inspection result normal?	
YES >> INSPECTION END NO >> GO TO 2.	0 >>
2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR	REPLAC
 Replace malfunctioning electric throttle control actuator. Go to <u>EC-408</u>, "Special Repair Requirement". 	

P1236, P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

>> INSPECTION END

Special Repair Requirement

INFOID:000000004250927

 $1. {\tt perform\ throttle\ valve\ closed\ position\ learning}$

Refer to EC-18. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-19. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.

DTC Logic

INFOID:000000004250929

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	E
	Electric throttle control	A)	 A) Electric throttle control actuator does not func- tion properly due to the return spring malfunc- tion. 		F
P1238	actuator (bank 2)		Throttle valve opening angle in fail-safe mode is not in specified range.		
		C)	ECM detect the throttle valve is stuck open.	Electric throttle control actuator	G
	P2119 Electric throttle control actuator (bank 1)	A)	Electric throttle control actuator does not func- tion properly due to the return spring malfunc- tion.		Н
P2119		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	_	
		C)	ECM detect the throttle valve is stuck open.		I

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure	
before conducting the next test.	

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
- 3. Shift selector lever to P position (A/T) or Neutral position (M/T).
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON and wait at least 1 second.
- 6. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
- 7. Shift selector lever to P position (A/T) or Neutral position (M/T).
- 8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 9. Check DTC.

Is DTC detected?

- YES >> Go to EC-410, "Diagnosis Procedure".
- NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
- 3. Shift selector lever to P position (A/T) or Neutral position (M/T).
- 4. Start engine and let it idle for 3 seconds.

EC-409

[VQ37VHR]

INFOID:000000004250928

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P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

INFOID:000000004250930

5. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-410, "Diagnosis Procedure"</u>. NO >> INSPECTION END

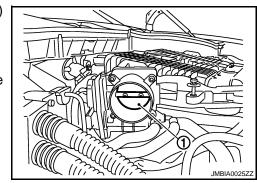
Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- 2. Remove the intake air duct.
- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



2.Replace electric throttle control actuator

1. Replace malfunctioning electric throttle control actuator.

2. Go to EC-410, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000004250931

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-19. "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

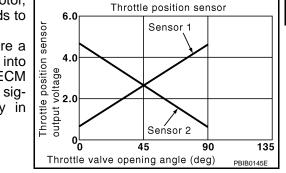
< DTC/CIRCUIT DIAGNOSIS >

P1239, P2135 TP SENSOR

Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1239 or P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-368, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1239	Throttle position sensor (bank 2) circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1	Harness or connector (TP sensor 1 or 2 circuit is open or short- od)	ŀ
P2135	Throttle position sensor (bank 1) circuit range/ performance	and TP sensor 2.	ed.) • Electric throttle control actuator (TP sensor 1 or 2)	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure k before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-411, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

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P1239, P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between electric throttle control actuator harness connector and ground.

DTC	Electr	ic throttle cont	trol actuator	Ground	Voltage (V)	
DIC	Bank	Connector	Terminal	Ground		
P1239	2	F27	1	Ground	Approx. 5	
P2135	1	F6	6	Giouna	Αρριολ. 3	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electri	c throttle cont	rol actuator	EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1239	2	F27	4	F101	48	Existed
P2135	1	F6	3	FIUI	40	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electri	c throttle cont	rol actuator	EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1239	2	F27	2		31	
F 1239	2		3	F101	35	Existed
P2135	1	F6	4	FIUI	30	EXISTED
F 2 1 3 3	1	1.0	5		34	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-413, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator.

P1239, P2135 TP SENSOR

efer to G	INTERMITTENT INCID					
		<u></u> .				
>	> INSPECTION END					
ompon	ent Inspection				INFOI	D:0000000004250935
.CHECk	THROTTLE POSITION	SENSOR				
	gnition switch OFF. Inect all harness connec	tore disconr	ected			
Perfor	m <u>EC-18, "THROTTLE \</u>			EARNING : Spe	ecial Repair Require	<u>ement"</u> .
	gnition switch ON. lector lever to D (A/T) or	1st (M/T) p	osition.			
	the voltage between EC			lls as per the fol	lowing.	
	504					
	ECM +		Cond	ition	Voltage (V)	
Connector	Terminal	Terminal			vollage (v)	
				Fully released	More than 0.36	
	30 [TP sensor 1 (bank 1)]	40		Fully depressed	Less than 4.75	
	31 [TP sensor 1 (bank 2)]	48	-	Fully released	More than 0.36	
F101		40	Accelerator pedal	Fully depressed	Less than 4.75	
1 101	34 [TP sensor 2 (bank 1)]	40		Fully released	Less than 4.75	
			_	Fully depressed	More than 0.36	
	35 [TP sensor 2 (bank 2)]	48		Fully released	Less than 4.75	
the lines				Fully depressed	More than 0.36	
	ection result normal? > INSPECTION END					
	> GO TO 2.					
REPLA	CE ELECTRIC THROTT	LE CONTR	OL ACTUATOR			
Repla	ce malfunctioning electri	c throttle co	ntrol actuator.			
Go to	EC-413, "Special Repair	Requireme	<u>nt"</u> .			
>	> INSPECTION END					
	Repair Requiremer	ht				
			0.01710111		INFOI	D:0000000004250936
	RM THROTTLE VALVE					
	<u>C-18, "THROTTLE VAL\</u>	<u>'E CLOSED</u>	POSITION LEAR	<u>NING : Special</u>	Repair Requirement	nt"

>> END

< DTC/CIRCUIT DIAGNOSIS >

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:000000004250937

[VQ37VHR]

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:000000004250938

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1290	Throttle control motor relay circuit open (bank 2)	ECM detects a voltage of power source for	Harness or connectors (Throttle control motor relay circuit is	
P2100	Throttle control motor relay circuit open (bank 1)	throttle control motor is excessively low.	open) Throttle control motor relay 	
P2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	 Harness or connectors (Throttle control motor relay circuit is shorted) Throttle control motor relay 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

Which DTC is detected?

P1290, P2100>>GO TO 2.

P2103 >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1290 AND P2100

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

Is DTC detected?

YES >> Go to EC-414, "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Check DTC.

Is DTC detected?

- YES >> Go to EC-414, "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

EC-414

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY CUIT DIAGNOSIS > [VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

- 3. Disconnect IPDM E/R harness connector E7.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

$\frac{\text{Connector Terminal Connector Terminal 25 Existed}{2}$ 5. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 3. NO >> GO TO 2. 2.DETECT MALFUNCTIONING PART Check the following. • Harness connectors E3, F1 • Harness connectors F104, F105 • Harness connectors F104, F105 • Harness for open or short between ECM and IPDM E/R >> Repair open circuit, short to ground or short to power in harness or connectors. 3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT 1. Check the continuity between IPDM E/R sensor harness connector and ECM harness connector. $\frac{DTC}{DTC} \frac{IPDM E/R}{F101 3} Existed}{F102 52}$ 2. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 5. NO >> GO TO 4. 4.DETECT MALFUNCTIONING PART Check the following. • Harness connectors E3, F1 • Harness for open or short between ECM and IPDM E/R So GO TO 5. NO >> GO TO 4. 4.DETECT MALFUNCTIONING PART Check the following. • Harness connectors E3, F1 • Harness for open or short to ground and short to power. Is the inspection result normal? YES >> GO TO 5. NO >> GO TO 4. 4.DETECT MALFUNCTIONING PART Check the following. • Harness for open or short between ECM and IPDM E/R >> Repair open circuit, short to ground or short to power in harness or connectors. 5.CHECK FUSE	IPDN	1 E/R	E	СМ		-	
5. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 3. NO >> GO TO 2. 2.DETECT MALFUNCTIONING PART Check the following. • Harness connectors E3, F1 • Harness connectors F104, F105 • Harness for open or short between ECM and IPDM E/R >> Repair open circuit, short to ground or short to power in harness or connectors. 3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT 1. Check the continuity between IPDM E/R sensor harness connector and ECM harness connector. DTC IPDM E/R ECM P2100 E7 54 F101 P2103 E7 54 F101 P2103 E7 54 F101 P2104 F101 S Existed P2103 </td <td>Connector</td> <td>Terminal</td> <td>Connector</td> <td>Terminal</td> <td>Continuity</td> <td></td> <td>E</td>	Connector	Terminal	Connector	Terminal	Continuity		E
Is the inspection result normal? YES > GO TO 3. NO >> GO TO 2. 2.DETECT MALFUNCTIONING PART Check the following. + Harness connectors F104, F105 • Harness for open or short between ECM and IPDM E/R >> Repair open circuit, short to ground or short to power in harness or connectors. 3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT 1. Check the continuity between IPDM E/R sensor harness connector and ECM harness connector. Tot IPDM E/R P1290 F101 52 P2100 E7 54 F101 P2100 E7 54 F101 Existed 2. Also check harness for short to ground and short to power. Is the inspection result normal? YES > GO TO 5. NO > GO TO 4. 4.DETECT MALFUNCTIONING PART Check the following. - Check the following. - - - I Harness connectors E3, F1 - - - Check the following. - - - I Harness for open or short between ECM and IPDM E/R - - I Harness for open or short between ECM an	E7	70	F101	25	Existed	-	
YES >> GO TO 3. NO >> GO TO 2. 2.DETECT MALFUNCTIONING PART Check the following. • Harness connectors E3, F1 • Harness connectors F104, F105 • Harness for open or short between ECM and IPDM E/R >> Repair open circuit, short to ground or short to power in harness or connectors. 3.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT 1. Check the continuity between IPDM E/R sensor harness connector and ECM harness connector. Tot IPDM E/R P2100 E7 92103 F101 92104 F102 92105 E7 54 F101 92106 E7 54 F101 92107 E7 54 F102 92108 E7 92109 E7 92103 E7 92104 F102 92105 S0 OT 0 5. NO > GO TO 5. NO > GO TO 4. 4.DETECT MALFUNCTIONING PART Check the following. • Harness for open or short between ECM and IPDM E/R <td< td=""><td>5. Also c</td><td>heck harn</td><td>ess for sho</td><td>ort to grou</td><td>nd and sh</td><td>ort to power.</td><td>(</td></td<>	5. Also c	heck harn	ess for sho	ort to grou	nd and sh	ort to power.	(
NO \Rightarrow GO TO 2. 2. DETECT MALFUNCTIONING PART Check the following. • Harness connectors E3, F1 • Harness connectors E3, F1 • Harness for open or short between ECM and IPDM E/R \Rightarrow Repair open circuit, short to ground or short to power in harness or connectors. 3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT 1. Check the continuity between IPDM E/R sensor harness connector and ECM harness connector. The transport of the tran	Is the insp	ection resu	ult normal'	<u>?</u>			
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P2103 F101 3 F102 52 2. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 5. NO >> GO TO 4. 4.DETECT MALFUNCTIONING PART Check the following. • Harness connectors E3, F1 • Harness for open or short between ECM and IPDM E/R >> Repair open circuit, short to ground or short to power in harness or connectors. 5.CHECK FUSE 1. Disconnect 15 A fuse (No. 51) from IPDM E/R. 2. Check 15 A fuse for blown. Is the inspection result normal? YES >> GO TO 6.	P2100	F 7	54	F101	3		
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YES >> GO TO 5. NO >> GO TO 4. 4.DETECT MALFUNCTIONING PART Check the following. • Harness connectors E3, F1 • Harness for open or short between ECM and IPDM E/R >> Repair open circuit, short to ground or short to power in harness or connectors. 5.CHECK FUSE 1. Disconnect 15 A fuse (No. 51) from IPDM E/R. 2. Check 15 A fuse for blown. Is the inspection result normal? YES >> GO TO 6.	2. Also c	heck harn	ess for she	ort to grou	nd and sh	ort to power.	
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 Check 15 A fuse for blown. <u>Is the inspection result normal?</u> YES >> GO TO 6. 							
Is the inspection result normal? YES >> GO TO 6.					PDM E/R.		
YES >> GO TO 6.							(
	-			<u> </u>			

6. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

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< DTC/CIRCUIT DIAGNOSIS >

P1421 COLD START CONTROL

Description

ECM controls ignition timing and engine idle speed when engine is started with prewarming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

INFOID:000000004250941

INFOID:000000004250940

DTC DETECTION LOGIC

NOTE:

• If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with prewarming up condition.	Lack of intake air volumeFuel injection systemECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Check the indication of "COOLAN TEMP/S".
 If it is between 4°C (39°F) and 36°C (97°F), go to the following steps.
 If it is below 4°C (39°F), warm engine up to more than 4°C (39°F) and retry from step 1.
 If it is above 36°C (97°F), cool engine down to less than 36°C (97°F) and retry from step 1.
- 5. Start engine and let it idle for 5 minutes.
- 6. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-416. "Diagnosis Procedure".
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000004250942

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 2.
- NO >> Follow the instruction of Idle Air Volume Learning.

2.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.

- Crushed intake air passage
- Intake air passage clogging

P1421 COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]	
Is the inspection result normal?	_
YES >> GO TO 3. NO >> Repair or replace malfunctioning part	А
3. CHECK FUEL INJECTION SYSTEM FUNCTION	
Perform DTC Confirmation Procedure for DTC P0171, P0174. Refer to <u>EC-240, "DTC Logic"</u> .	EC
Is the inspection result normal?	
YES >> GO TO 4.	С
NO >> Go to EC-241, "Diagnosis Procedure" for DTC P0171, P0174.	0
4.PERFORM DTC CONFIRMATION PROCEDURE	
1. Turn ignition switch ON.	D
 Erase DTC. Perform DTC Confirmation Procedure. 	
See <u>EC-416, "DTC Logic"</u> .	Е
Is the 1st trip DTC P1421 displayed again?	
YES >> GO TO 5. NO >> INSPECTION END	_
5.REPLACE ECM	F
 Replace ECM. Go to <u>EC-16</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair 	G
Requirement".	
	Н
>> INSPECTION END	
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P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1550 BATTERY CURRENT SENSOR

Description

INFOID:000000004250943

[VQ37VHR]

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to <u>CHG-8</u>. "System Description".

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

INFOID:000000004250944

DTC DETECTION LOGIC

NOTE:

If DTC P1550 is displayed with DTC P0643, first perform the trouble diagnosis for P0643. Refer to <u>EC-368,</u> <u>"DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1550	Battery current sensor circuit range/performance	The output voltage of the battery current sensor remains within the specified range while engine is running.	 Harness or connectors (Battery current sensor circuit is open or shorted.) Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-418, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. Turn ign	BATTERY	CURREN	IT SENSO	OR POWER SUPPLY CIRCUIT-I
			sensor ha	arness connector.
J. Oneck u			hattery c	urrent sensor harness connector and ground.
	ie voltage	between	battery c	
Battery curre	ent sensor			
Connector	Terminal	Ground	Voltage	(V)
E21	1	Ground	Approx	.5
	tion result GO TO 4. GO TO 3.	normal?		
3.DETECT			G PART	
Check the fo • Harness co		F1, E3		
			ween batt	tery current sensor and ECM
4	• •		•	ground or short to power in harness connectors.
4.CHECK E	SATTERY	CURREN	IT SENSO	OR GROUND CIRCUIT FOR OPEN AND SHORT
3. Check th Battery currer		ity betwee	-	/ current sensor harness connector and ECM harness connector.
		Connector	Terminal	Continuity
E21	2	F102	95	Existed
4. Also che	ck harnes	s for sho	rt to groui	nd and short to power.
Is the inspec	tion result	normal?		
	GO TO 6.			
_	GO TO 5.			
5. DETECT	MALFUNG		3 PART	
Check the fo				
 Harness co 			ween hatt	tery current sensor and ECM
 Harness for 				
 Harness for 				
	Repair ope	ən circuit.	short to a	ground or short to power in harness or connectors.
>>				ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
>> 6.снеск е	BATTERY	CURREN	IT SENSO	OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
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>> 6. CHECK E 1. Check th	BATTERY	CURREN	IT SENSO	OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
>> 6.CHECK E 1. Check th Battery currer	BATTERY	CURREN ity betwee ECI	IT SENSO	OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
>> 6.CHECK E 1. Check th Battery currer Connector	BATTERY ne continui nt sensor Terminal	CURREN ity betwee ECI	IT SENSO en battery M Terminal	OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
>> 6.CHECK E 1. Check th Battery currer Connector E21	BATTERY (ne continui nt sensor Terminal C 3	CURREN ity betwee ECI Connector F102	IT SENS en battery M Terminal 91	OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT / current sensor harness connector and ECM harness connector. Continuity Existed
>> 6.CHECK E 1. Check th Battery currer Connector E21 2. Also che	BATTERY ne continui nt sensor Terminal C 3 eck harnes	CURREN ity betwee ECI Connector F102 ss for shou	IT SENS en battery M Terminal 91	OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
>> 6.CHECK E 1. Check th Battery currer Connector E21 2. Also che Is the inspec	BATTERY ne continui nt sensor Terminal C 3 eck harnes stion result	CURREN ity betwee ECI Connector F102 ss for shou	IT SENS en battery M Terminal 91	OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT / current sensor harness connector and ECM harness connector. Continuity Existed
>> 6.CHECK E 1. Check th Battery currer Connector E21 2. Also che Is the inspect YES >> 0	BATTERY ne continui nt sensor Terminal C 3 eck harnes	CURREN ity betwee ECI Connector F102 ss for shou	IT SENS en battery M Terminal 91	OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT / current sensor harness connector and ECM harness connector. Continuity Existed

Check the following. • Harness connectors F1, E3

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

• Harness for open or short between battery current sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

8.CHECK BATTERY CURRENT SENSOR

Refer to EC-420, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace battery negative cable assembly.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

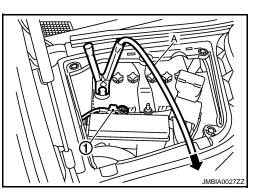
Component Inspection

1.CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable (1).

E: To body ground

- 4. Install jumper cable (A) between battery negative terminal and body ground.
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector terminals as per the following.



	ECM					
Connector	+	_	Voltage (V)			
Connector	Terminal	Terminal				
F102	91 (Battery current sensor signal)	95	Approx. 2.5			

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1551, P1552 BATTERY CURRENT SENSOR

Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to CHG-8. "System Description".

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

INFOID:000000004250948

DTC DETECTION LOGIC

NOTE:

If DTC P1551 or P1552 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-368, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1551	Battery current sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (Battery current sensor circuit is open	
P1552	Battery current sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	or shorted.) Battery current sensor 	I

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

Turn ignition switch ON. 2.

Turn ignition switch OFF and wait at least 10 seconds. 3.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V with ignition switch ON

>> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE Ν 1. Turn ignition switch ON and wait at least 10 seconds. 2. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-421, "Diagnosis Procedure". >> INSPECTION END NO Diagnosis Procedure INFOID:000000004460722 1. CHECK GROUND CONNECTION

Turn ignition switch OFF. 1.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2. INFOID:00000000446072

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P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect battery current sensor harness connector.

- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage (V)	
Connector	Terminal	Giodila	voltage (v)	
E21	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F1, E3

Harness for open or short between battery current sensor and ECM

>> Repair open circuit, short to ground or short to power in harness connectors.

 ${f 4.}$ CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	ent sensor	EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E21	2	F102	95	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F1, E3

• Harness for open or short between battery current sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

6.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	ent sensor	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E21	3	F102	91	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

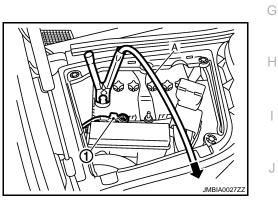
Check the following.

P1551, P1552 BATTERY CURRENT SENSOR	
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
 Harness connectors F1, E3 Harness for open or short between battery current sensor and ECM 	
>> Repair open circuit, short to ground or short to power in harness or connectors. 8. CHECK BATTERY CURRENT SENSOR	
Refer to EC-429, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 9. NO >> Replace battery negative cable assembly. 9.CHECK INTERMITTENT INCIDENT	
Refer to <u>GI-41, "Intermittent Incident"</u> .	
>> INSPECTION END	
Component Inspection	INFOID:000000004460723
1.CHECK BATTERY CURRENT SENSOR	
1. Turn ignition switch OFF.	

- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable (1).

To body ground

- Install jumper cable (A) between battery negative terminal and 4. body ground.
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector terminals as per the following.



	ECM		
Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
F102	91 (Battery current sensor signal)	95	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

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P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1553 BATTERY CURRENT SENSOR

Description

INFOID:000000004460724

[VQ37VHR]

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to <u>CHG-8</u>. "System Description".

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

INFOID:000000004250952

DTC DETECTION LOGIC

NOTE:

If DTC P1553 is displayed with DTC P0643, first perform the trouble diagnosis for P0643. Refer to <u>EC-368,</u> <u>"DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1553	Battery current sensor perfor- mance	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	 Harness or connectors (Battery current sensor circuit is open or shorted.) Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-424, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

CHECK	BATTERY	CURREN	T SENS	OR POWER SUPPLY CIRCUIT-I
				arness connector.
	nition swite		h = 11 = m - =	
3. Check	the voltage	e between	battery c	current sensor harness connector and ground.
Batton/ cu	rent sensor			
Connector	Terminal	Ground	Voltage	(V)
E21	1	Ground	Approx	
			Арріох	
<u>s the inspe</u> YES >>	GO TO 4			
	• GO TO 4			
3.DETEC	T MAI FUN		3 PART	
Check the				
Harness		s F1, E3		
			veen bat	tery current sensor and ECM
>>	Repair op	pen circuit,	short to	ground or short to power in harness connectors.
1. CHECK	BATTERY	CURREN	T SENS	OR GROUND CIRCUIT FOR OPEN AND SHORT
I. Turn ig	nition swite	ch OFF.		
2. Discon	nect ECM	harness c		
3. Check	the continu	uity betwee	en batter	y current sensor harness connector and ECM harness connector.
D <i>u</i>				
		ECI	N	
Battery curr				Continuity
Connector	Terminal	Connector	Terminal	
Connector E21	Terminal 2	Connector F102	Terminal 95	Existed
Connector E21 4. Also ch	Terminal 2 neck harne	Connector F102 ess for shor	Terminal 95	
Connector E21 4. Also ch s the inspe	Terminal 2 neck harne ection resu	F102 F102 Find the second seco	Terminal 95	Existed
Connector E21 4. Also ch s the inspe YES >>	Terminal 2 neck harne ection resu GO TO 6	Connector F102 ess for shou It normal?	Terminal 95	Existed
Connector E21 4. Also ch s the inspe YES >> NO >>	Terminal 2 neck harne ection resu GO TO 6 GO TO 5	Connector F102 ess for shou It normal?	Terminal 95 't to grou	Existed
Connector E21 4. Also ch s the inspe YES >> NO >> D.DETEC	Terminal 2 neck harne ection resu GO TO 6 GO TO 5 F MALFUN	Connector F102 ess for shou It normal?	Terminal 95 't to grou	Existed
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the f	Terminal 2 neck harne ection resu GO TO 6 GO TO 5 F MALFUN following.	Connector F102 ess for shot It normal?	Terminal 95 't to grou	Existed
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the for Harness	Terminal 2 heck harne cotion resu GO TO 6 GO TO 5 T MALFUN following. connectors	Connector F102 ess for shou <u>It normal?</u> NCTIONING s F1, E3	Terminal 95 It to grou	Existed nd and short to power.
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the for Harness	Terminal 2 heck harne cotion resu GO TO 6 GO TO 5 T MALFUN following. connectors	Connector F102 ess for shou <u>It normal?</u> NCTIONING s F1, E3	Terminal 95 It to grou	Existed
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the for Harness for	Terminal 2 heck harne ection resu GO TO 6 GO TO 5 F MALFUN following. connectors for open of	Connector F102 ess for shou <u>It normal?</u> NCTIONING s F1, E3 r short bety	Terminal 95 It to grou G PART veen bat	Existed nd and short to power. tery current sensor and ECM
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the for Harness for Harness for	Terminal 2 heck harne action resu GO TO 6 GO TO 5 T MALFUN following. connectors for open of Repair op	Connector F102 ess for shou It normal? NCTIONING s F1, E3 r short betw pen circuit,	Terminal 95 t to grou G PART ween bat short to	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors.
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the for Harness for Harness for S.CHECK	Terminal 2 heck harne action resu GO TO 6 GO TO 5 T MALFUN following. connectors for open of Repair op BATTERY	Connector F102 Pass for shore It normal? NCTIONING S F1, E3 r short betw Den circuit, CURREN	Terminal 95 T to grou G PART veen bat short to T SENS	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the for Harness for Harness for S.CHECK	Terminal 2 heck harne action resu GO TO 6 GO TO 5 T MALFUN following. connectors for open of Repair op BATTERY	Connector F102 Pass for shore It normal? NCTIONING S F1, E3 r short betw Den circuit, CURREN	Terminal 95 T to grou G PART veen bat short to T SENS	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors.
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the for Harness for Harness for Check Leck	Terminal 2 heck harne ection resu GO TO 6 GO TO 5 T MALFUN following. for open of Repair op BATTERY the continu	Connector F102 ess for shou <u>It normal?</u> NCTIONING s F1, E3 r short betw pen circuit, CURREN uity betwee	Terminal 95 It to grou G PART ween bat short to T SENS en batter	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
Connector E21 4. Also ch s the inspective YES >> D.DETEC Check the for Harness for Harness for Check the for Harness for Check the for Harness for Battery curr	Terminal 2 neck harne ection resu GO TO 6 GO TO 5 T MALFUN following. connectors for open of BATTERY the continuent ent sensor	Connector F102 ess for shou- <u>It normal?</u> NCTIONING s F1, E3 r short betwo pen circuit, CURREN uity between ECI	Terminal 95 It to grou G PART veen bat short to T SENS en batter	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the for Harness for Harness for Check Leck I. Check Battery curr Connector	Terminal 2 heck harne ection resu GO TO 6 GO TO 5 T MALFUN following. connectors for open of BATTERY the continuent ent sensor Terminal	Connector F102 Pass for shou- It normal? CTIONING F1, E3 r short between COURREN uity between ECI Connector	Terminal 95 It to grou G PART Veen bat short to T SENS en batter M Terminal	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT y current sensor harness connector and ECM harness connector.
Connector E21 4. Also ch s the inspective YES >> NO >> D.DETEC Check the for Harness for Harness for Check the for Harness for Check the for Harness for Harness for Battery curr Connector E21	Terminal 2 neck harne ection resu GO TO 6 GO TO 5 T MALFUN following. connectors for open of BATTERY the continuent ent sensor Terminal 3	Connector F102 ess for shou- <u>It normal?</u> NCTIONING s F1, E3 r short betwo connector ECI Connector F102	Terminal 95 It to grou G PART veen bat short to T SENS en batter M Terminal 91	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT y current sensor harness connector and ECM harness connector. Continuity Existed
Connector E21 4. Also ch s the inspective YES >> D.DETEC D.DETEC Check the for Harness for Harness for Check the for Harness for Battery curr Connector E21 2. Also ch	Terminal 2 heck harne ection resu GO TO 6 GO TO 5 T MALFUN following. connectors for open of BATTERY the continue ent sensor Terminal 3 heck harne	Connector F102 F102 F102 F102 F102 F1, E3 F1, E	Terminal 95 It to grou G PART veen bat short to T SENS en batter M Terminal 91	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT y current sensor harness connector and ECM harness connector.
Connector E21 4. Also ch s the inspective YES >> D.DETEC Check the for Harness for Harness for Check the for Harness for Harness for Battery curr Connector E21 2. Also ch s the inspective S the	Terminal 2 heck harne action resu GO TO 6 GO TO 5 T MALFUN following. connectors for open of BATTERY the continue ent sensor Terminal 3 heck harne action resu	Connector F102 Pass for shore It normal? CTIONING S F1, E3 r short betwo Den circuit, CURREN uity betwee ECI Connector F102 Pass for shore It normal?	Terminal 95 It to grou G PART veen bat short to T SENS en batter M Terminal 91	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT y current sensor harness connector and ECM harness connector. Continuity Existed
Connector E21 4. Also ch s the inspective YES >> D.DETEC Check the for Harness for Harness for Check the for Harness for Harness for Battery curr Connector E21 2. Also ch s the inspective YES >>	Terminal 2 heck harne action resu GO TO 6 GO TO 5 T MALFUN following. connectors for open of BATTERY the continue ent sensor Terminal 3 heck harne action resu GO TO 8	Connector F102 Print State S	Terminal 95 It to grou G PART veen bat short to T SENS en batter M Terminal 91	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT y current sensor harness connector and ECM harness connector. Continuity Existed
Connector E21 4. Also ch s the inspective YES >> D.DETEC Check the for Harness for Harness for Check the for Harness for Harness for Battery curr Connector E21 2. Also ch s the inspective YES >>	Terminal 2 heck harne ection resu GO TO 6 GO TO 5 T MALFUN following. connectors for open or BATTERY the continue ent sensor Terminal 3 heck harne ection resu GO TO 8 GO TO 8 GO TO 7	Connector F102 Pass for shou- It normal? CONNECTIONING S F1, E3 r short betwo S F1, E3 r short betwo CONNECTIONING S F1, E3 r short betwo CONNECTIONING S F1, E3 r short betwo S F1, E3 S	Terminal 95 It to grou G PART ween bat short to T SENS en batter M Terminal 91 It to grou	Existed nd and short to power. tery current sensor and ECM ground or short to power in harness or connectors. OR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT y current sensor harness connector and ECM harness connector. Continuity Existed

P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

• Harness for open or short between battery current sensor and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

8.CHECK BATTERY CURRENT SENSOR

Refer to EC-429, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace battery negative cable assembly.

9.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

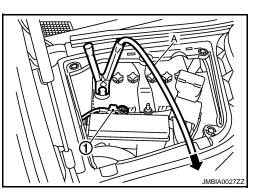
Component Inspection

1.CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable (1).

E: To body ground

- 4. Install jumper cable (A) between battery negative terminal and body ground.
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector terminals as per the following.



	ECM		
Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
F102	91 (Battery current sensor signal)	95	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1554 BATTERY CURRENT SENSOR

Description

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to <u>CHG-8</u>, <u>"System Description"</u>.

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

INFOID:000000004250956

DTC DETECTION LOGIC

NOTE:

If DTC P1554 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-</u> <u>368, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	Ц
P1554	Battery current sensor perfor- mance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	(Battery current sensor circuit is open or shorted)	

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-427, "Component Function Check".

NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-428, "Diagnosis Procedure"</u>.

Component Function Check

1.PRECONDITIONING

TESTING CONDITION:

- Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.
- Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.

>> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III

1. Start engine and let it idle.

- 2. Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BAT CUR SEN" indication for 10 seconds.
- "BAT CUR SEN" should be above 2,300 mV at least once.

Without CONSULT-III

1. Start engine and let it idle.

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P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

2. Check the voltage between ECM harness connector terminals as per the following.

	ECM		
Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	*
F102	91 (Battery current sensor signal)	95	Above 2.3 at least once

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-428, "Diagnosis Procedure"

Diagnosis Procedure

INFOID:000000004460728

[VQ37VHR]

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground Voltage (V	
Connector	Terminal	Giouna	voltage (v)
E21	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F1, E3

• Harness for open or short between battery current sensor and ECM

>> Repair open circuit, short to ground or short to power in harness connectors.

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	ent sensor	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E21	2	F102	95	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

		Р	1554 B	ATTER	Y CURRENT SENSOR		
< DTC/CIR		AGNOSIS	>		[να	Q37VHR]	
HarnessHarness			tween bat	tery currer	nt sensor and ECM	A	L
6. CHECK	BATTER	Y CURRE	NT SENS	OR INPUT	short to power in harness or connectors. SIGNAL CIRCUIT FOR OPEN AND SHORT	EC	
1. Check	the contil	nuity betwe	en batter	y current s	ensor harness connector and ECM harness conr		、 、
Battery curr	ent sensor	EC	CM			С	1
Connector	Terminal	Connector	Terminal	Continuity			
E21	3	F102	91	Existed	-	D	1
			•	nd and sh	ort to power.		
<u>Is the inspe</u> YES >>	ection res GO TO 8		2			E	
	GO TO						
7.DETEC	T MALFU	NCTIONIN	IG PART			F	-
Check the							
HarnessHarness			tween bat	tery currer	t sensor and ECM	G	,
	Popoir c	non oiroui	t chart to	around or	short to power in harness or connectors.		
8.CHECK		•		-	short to power in namess of connectors.	Н	1
Refer to EC	C-429, "Co	omponent	Inspection)".			
Is the inspe				_		1	
	GO TO					-	
NO >> 9.CHECK	•	battery ne	0	ble assem	DIY.		
						J	
Refer to <u>GI</u>	<u>-41, Inte</u>	<u>millent m</u>	<u>cident</u> .				
>>	> INSPEC)			K	k
Compon	ent Insp	pection			INFOIL	D:0000000004460729	
1.снеск	BATTER	Y CURRE	NT SENS	OR		L	
1. Turn ig	nition swi		otoro dio o				

- 2. Reconnect harness connectors disconnected.
- 3. Disconnect battery negative cable (1).

To body ground

- 4. Install jumper cable (A) between battery negative terminal and body ground.
- 5. Turn ignition switch ON.
- 6. Check the voltage between ECM harness connector terminals as per the following.

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ECM			
Connector	+	_	Voltage (V)
	Terminal	Terminal	
F102	91 (Battery current sensor signal)	95	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".



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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal? YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

< DTC/CIRCUIT DIAGNOSIS >

P1564 ASCD STEERING SWITCH

Description

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated. Refer to <u>EC-63</u>, "System Description" for the ASCD function.

DTC Logic

DTC DETECTION LOGIC **NOTE**:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-365, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1564	ASCD steering switch	 An excessively high voltage signal from the ASCD steering switch is sent to ECM. ECM detects that input signal from the ASCD steering switch is out of the specified range. ECM detects that the ASCD steering switch is stuck ON. 	 Harness or connectors (The switch circuit is open or shorted.) ASCD steering switch ECM 	F
DTC CO	NFIRMATION PRO	DCEDURE		Н
1.PRECO	ONDITIONING			
before cor 1. Turn i	· · · · · · · · · · · · · · · · · · ·			
	6			J
>> GO TO 2.				
2. PERFORM DTC CONFIRMATION PROCEDURE				Κ
 Turn ignition switch ON and wait at least 10 seconds. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds. 				L
onds.5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.6. Check DTC.				Μ
Is DTC detected?				
YES >> Go to <u>EC-431, "Diagnosis Procedure"</u> . N NO >> INSPECTION END				Ν
Diagnosis Procedure				
	0			

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44. "Circuit Inspection".

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch ON.
- 2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
MAIN SW	MAIN SWICH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW	CANCEL SWICH	Released	OFF
RESUME/ACC SW	RESUME/ACCEL-	Pressed	ON
RESUME/ACC SW	ERATE switch	Released	OFF
SET SW	SET/COAST switch	Pressed	ON
5L1 5W	SE 1/COAST SWICH	Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals as per the following.

ECM				
Connector -	+	_	Condition	Voltage (V)
	Terminal	Terminal		
M107	101 (ASCD steering switch signal)	108	MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 1
			SET/COAST switch: Pressed	Approx. 2
			RESUME/ACCELERATE switch: Pressed	Approx. 3
			All ASCD steering switches: Released	Approx. 4

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

$\mathbf{3}.$ CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Disconnect combination switch harness connector M303.

4. Check the continuity between combination switch and ECM harness connector.

Combination switch	EC	CM	Continuity
Terminal	Connector	Terminal	
16	M107	108	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

Combination switch (spiral cable)

• Harness for open and short between ECM and combination switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

EC-432

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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5.check ascd steering switch input signal circuit for open and short

1. Check the continuity between combination switch and ECM harness connector.

Combination switch			Continuity
Terminal	Connector	Terminal	Continuity
13	M107	101	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

Combination switch (spiral cable)

Harness for open and short between ECM and combination switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-433, "Component Inspection". Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ASCD steering switch.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF.

2. Disconnect combination switch (spiral cable) harness connector M303.

Check resistance between combination switch harness connector terminals under the following condi-3. L tions.

Combinat	tion switch	Condition	Basistanas (O)	
Connector	Terminals	Condition	Resistance (Ω)	
		MAIN switch: Pressed	Approx. 0	
		CANCEL switch: Pressed	Approx. 250	
M303	13 and 16	SET/COAST switch: Pressed	Approx. 660	
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480	
		All ASCD steering switches: Released	Approx. 4,000	
Is the insp	ection resu	<u>ult normal?</u>		
VEO				

YES >> INSPECTION END

NO >> Replace ASCD steering switch

P1564 ICC STEERING SWITCH

Description

ICC steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated. Refer to <u>CCS-17</u>, "System Description" for the ICC function.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-365, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564	ICC steering switch	 An excessively high voltage signal from the ICC steering switch is sent to ECM. ECM detects that input signal from the ICC steering switch is out of the specified range. ECM detects that the ICC steering switch is stuck ON. 	 Harness or connectors (The switch circuit is open or shorted.) ICC steering switch ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 10 seconds.
- 2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Press DISTANCE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 7. Check DTC.

Is DTC detected?

YES >> Go to EC-434, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-44. "Circuit Inspection".
- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

2. CHECK ICC STEERING SWITCH CIRCUIT

With CONSULT-III

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P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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- 1. Turn ignition switch ON.
- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW", "SET SW" and "DIST SW" in "DATA MONITOR" A mode with CONSULT-III.
- 3. Check each item indication under the following conditions.

Monitor item	Conditior	ı	Indication
MAIN SW	MAIN switch	Pressed	ON
MAIN SW	MAIN SWICH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW	CANCEL SWICH	Released	OFF
RESUME/ACC SW	RESUME/ACCEL-	Pressed	ON
RESOME/ACC SW	ERATE switch	Released	OFF
SET SW	SET/COAST switch	Pressed	ON
SET SW	SET/COAST SWICH	Released	OFF
DIST SW	DISTANCE switch	Pressed	ON
	DISTANCE SWICH	Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals as per the following.

	ECM			
Connector	+	-	Condition	Voltage (V)
Connector	Terminal	Terminal		
			MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 1.3
MAOZ	101	100	DISTANCE switch: Pressed	Approx. 2.2
M107	(ICC steering switch signal)	108	SET/COAST switch: Pressed	Approx. 3.0
			RESUME/ACCELERATE switch: Pressed	Approx. 3.7
			All ICC steering switches: Released	Approx. 4.3

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

 ${f 3.}$ CHECK ICC STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Disconnect combination switch harness connector M303.

4. Check the continuity between combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	Continuity
16	M107	108	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

• Combination switch (spiral cable)

· Harness for open and short between ECM and combination switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

5. Check ICC steering switch input signal circuit for open and short

1. Check the continuity between combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	Continuity
13	M107	101	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

• Combination switch (spiral cable)

Harness for open and short between ECM and combination switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

1.CHECK ICC STEERING SWITCH

Refer to EC-436, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ICC steering switch.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

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1. CHECK ICC STEERING SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect combination switch (spiral cable) harness connector M303.
- Check resistance between combination switch harness connector terminals under the following conditions.

Combination switch		Condition	Resistance (Ω)
Connector	Terminals	Condition	
		MAIN switch: Pressed	Approx. 0
		CANCEL switch: Pressed	Approx. 310
M303	13 and 16	DISTANCE switch: Pressed	Approx. 740
101303	15 and 10	SET/COAST switch: Pressed	Approx. 1,400
		RESUME/ACCELERATE switch: Pressed	Approx. 2,600
		All ICC steering switches: Released	Approx. 5,500

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC steering switch

P1568 ICC FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

P1568 ICC FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1568 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1568 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-365, "DTC Logic"</u>.
- If DTC P1568 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-367, "DTC Logic"</u>.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1568	ICC function	ECM detects a difference between signals from ICC sensor integrated unit is out of specified range.	 Harness or connectors (The CAN communication line is open or shorted.) ICC sensor integrated unit ECM
	NFIRMATION PR	OCEDURE	
.PREC	ONDITIONING		
			lways perform the following procedure
1. Turn i		and wait at least 10 seconds.	
	gnition switch ON.	and wait at least 10 seconds.	
resting	CONDITION:		
			or by driving the vehicle. If a road test
's expect	ed to be easier. It i	is unnecessary to lift the vehicle.	
s expect	ed to be easier, it i	s unnecessary to lift the vehicle.	
•	SO TO 2.	is unnecessary to lift the vehicle.	
	-> GO TO 2.	is unnecessary to lift the vehicle. MATION PROCEDURE	
2.PERF(1. Turn i	-> GO TO 2. DRM DTC CONFIR gnition switch ON.	MATION PROCEDURE	
2.PERFO 1. Turn i 2. Press 3. Drive	 > GO TO 2. DRM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more 	MATION PROCEDURE	
2.PERFO 1. Turn i 2. Press 3. Drive CAU	> GO TO 2. DRM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more FION:	MATION PROCEDURE C steering switch. than 40 km/h (25 MPH).	
2.PERFO 1. Turn i 2. Press 3. Drive CAU ⁻ Alwa 4. Press	> GO TO 2. ORM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more FION: ys drive vehicle at SET/COAST switch	MATION PROCEDURE C steering switch. than 40 km/h (25 MPH). a safe speed.	
2.PERFO 1. Turn i 2. Press 3. Drive CAU ⁻ Alwa 4. Press 5. Chec	 > GO TO 2. DRM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more FION: ys drive vehicle at SET/COAST switck of DTC. 	MATION PROCEDURE C steering switch. than 40 km/h (25 MPH). a safe speed.	
2.PERFO 1. Turn 2. Press 3. Drive CAU Alwa 4. Press 5. Chec Is DTC de	> GO TO 2. DRM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more FION: ys drive vehicle at SET/COAST switck DTC. etected?	MATION PROCEDURE C steering switch. than 40 km/h (25 MPH). a safe speed. h.	
2.PERFO 1. Turn i 2. Press 3. Drive CAU Alwa 4. Press 5. Chec is DTC de YES >	> GO TO 2. DRM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more FION: ys drive vehicle at SET/COAST switck DTC. etected?	MATION PROCEDURE C steering switch. than 40 km/h (25 MPH). a safe speed. th. Diagnosis Procedure".	
2.PERFO 1. Turn i 2. Press 3. Drive CAU Alwa 4. Press 5. Chec <u>s DTC de</u> YES = NO =	 > GO TO 2. DRM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more FION: ys drive vehicle at SET/COAST switch ADTC. etected? > Go to EC-437, "E 	MATION PROCEDURE C steering switch. than 40 km/h (25 MPH). a safe speed. th. Diagnosis Procedure".	INFOID:00000004250969
2.PERFO 1. Turn i 2. Press 3. Drive CAU Alwa 4. Press 5. Chec <u>s DTC de</u> YES NO S Diagnos	 > GO TO 2. DRM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more FION: ys drive vehicle at SET/COAST switch A DTC. etected? > Go to EC-437, "E > INSPECTION EN sis Procedure 	MATION PROCEDURE C steering switch. than 40 km/h (25 MPH). a safe speed. th. Diagnosis Procedure".	INFOID:00000004250969
2.PERFO 1. Turn i 2. Press 3. Drive CAU Alwa 4. Press 5. Chec SDTC de YES NO 2 Diagnos 1.REPLA 1. Repla	 > GO TO 2. DRM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more FION: ys drive vehicle at SET/COAST switch > DTC. etected? > Go to EC-437, "E > INSPECTION EN Sis Procedure ACE ICC SENSOR ace ICC sensor inter 	MATION PROCEDURE C steering switch. than 40 km/h (25 MPH). a safe speed. h. Diagnosis Procedure". ND INTEGRATED UNIT grated unit.	
2.PERFO 1. Turn i 2. Press 3. Drive CAU Alwa 4. Press 5. Chec SDTC de YES NO 2 Diagnos 1.REPLA 1. Repla	 > GO TO 2. DRM DTC CONFIR gnition switch ON. MAIN switch on IC the vehicle at more FION: ys drive vehicle at more SET/COAST switch DTC. etected? > Go to EC-437, "E > INSPECTION EN Sis Procedure ACE ICC SENSOR Ince ICC sensor integration 	MATION PROCEDURE C steering switch. than 40 km/h (25 MPH). a safe speed. h. Diagnosis Procedure". ND INTEGRATED UNIT grated unit.	INFOID:00000004250969 nt (Vehicle-To-Vehicle Distance Control

>> INSPECTION END

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[VQ37VHR]

P1572 ASCD BRAKE SWITCH

Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to <u>EC-63</u>, "System Description" for the ASCD function.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-365, "DTC Logic"</u>.
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
		A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	 Harness or connectors (The stop lamp switch circuit is shorted.) Harness or connectors (The ASCD brake switch circuit is shorted.)
P1572	ASCD brake switch	B)	ASCD brake switch signal is not sent to ECM for extremely long time while the ve- hicle is being driven.	 Stop lamp switch ASCD brake switch Incorrect stop lamp switch installation Incorrect ASCD brake switch installation ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine (VDC switch OFF).
- 2. Press MAIN switch and make sure that CRUISE lamp illuminates.
- 3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.
- CAUTION: Always drive vehicle at a safe speed.

NOTÉ:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

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: DTC/CIR(CUIT DIAGNOSIS >					[VQ37VHR]
YES >>	<u>FC detected?</u> Go to <u>EC-439, "Diagno</u> GO TO 3.	sis Proc	edure".			
-	M DTC CONFIRMATIC					
	e vehicle for at least 5 of			inder the following c	onditions	
CAUTIC	ON:				onutions.	
Always NOTE:	drive vehicle at a safe	e speed				
-	ocedure may be cond	ucted w	ith the drive v	wheels lifted in the	shop or by drivir	ng the vehicle.
If a road	d test is expected to b	e easie	r, it is unnece	essary to lift the vel	nicle.	
Vehicle speec	t	More thar	n 30 km/h (19 mpl	h)		
Selector lever	r	Suitable p	oosition			
		•	the brake pedal fo			
Driving location	วท		so as not to come entioned vehicle s			
. Check 1	st trip DTC.			·		
	TC detected?					
	Go to EC-439, "Diagno	<u>sis Proc</u>	edure".			
	INSPECTION END					
Diagnosis	s Procedure					INFOID:000000004250972
.CHECK (OVERALL FUNCTION-	l				
) With CO						
With CO Turn ign Select "I	nition switch ON. BRAKE SW1" in "DATA					
With CO I. Turn ign C. Select "I	ition switch ON.					
With CO . Turn ign . Select "l	nition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication					
With CO Turn ign Select "I Check " Monitor item	hition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch pedal	n under		Indication		
With CO . Turn ign . Select "I . Check "	hition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch pedal	n under ondition al (M/T)	the following o	Indication		
With CO Turn ign Select "I Check " Monitor item BRAKE SW1 Without	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal (A/T) Brake pedal and clutch pe CONSULT-III	n under ondition al (M/T)	the following of Slightly depress	Indication sed OFF		
With CO Turn ign Select "I Monitor item BRAKE SW1 Without Turn ign	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal and clutch pe CONSULT-III Nition switch ON.	n under ondition al (M/T) dal (M/T)	the following of Slightly depress	conditions. Indication Sed OFF ON	following	
With CO Turn ign Select "I Check " Monitor item BRAKE SW1 Without Turn ign	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal (A/T) Brake pedal and clutch pe CONSULT-III	n under ondition al (M/T) dal (M/T)	the following of Slightly depress	conditions. Indication Sed OFF ON	following.	
With CO Turn ign Select "I Monitor item BRAKE SW1 Without Turn ign	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal and clutch pe CONSULT-III Nition switch ON.	n under ondition al (M/T) dal (M/T)	the following of Slightly depress	conditions. Indication Sed OFF ON	following.	
With CO Turn ign Select "I Monitor item BRAKE SW1 Without Turn ign Check tl	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal and clutch pe CONSULT-III hition switch ON. he voltage between EC	n under ondition al (M/T) dal (M/T)	the following of Slightly depress	conditions. Indication Sed OFF ON	following.	Voltage (V)
With CO Turn ign Select "I Monitor item BRAKE SW1 Without Turn ign	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Construction Brake pedal (A/T) Brake pedal or clutch pedal Brake pedal (A/T) Brake pedal and clutch pe CONSULT-III hition switch ON. he voltage between EC	n under ondition al (M/T) dal (M/T)	the following of Slightly depress Fully released	conditions.	following.	Voltage (V)
With CO Turn ign Select "I Check " Monitor item BRAKE SW1 Without Turn ign Check th	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal and clutch pe CONSULT-III nition switch ON. he voltage between EC ECM + Terminal	n under ondition al (M/T) dal (M/T) M harne 	Slightly depress Fully released ess connector nal Brake peda	conditions. Indication sed OFF ON terminals as per the Condition al (A/T) al or clutch pedal (M/T)	following.	Voltage (V) Approx. 0
With CO . Turn ign . Select "I . Check " Monitor item BRAKE SW1 Without . Turn ign . Check th Connector	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal and clutch pe CONSULT-III nition switch ON. he voltage between EC ECM + Terminal	n under ondition al (M/T) dal (M/T) M harne 	Slightly depress Fully released Fully released ess connector nal Brake peda Brake peda Brake peda	conditions. Indication sed OFF ON terminals as per the Condition al (A/T) al or clutch pedal (M/T)	-	
With CO Turn ign Check " Monitor item BRAKE SW1 Without Turn ign Connector M107	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal and clutch pe CONSULT-III nition switch ON. he voltage between EC ECM + Terminal	n under ondition al (M/T) dal (M/T) M harne 	Slightly depress Fully released Fully released ess connector nal Brake peda Brake peda Brake peda	conditions.	Slightly depressed	Approx. 0
With CO Turn ign Connector M107 M107 Without Sthe inspec YES >> NO-1 >>	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal (A/T) Brake pedal and clutch pe CONSULT-III hition switch ON. he voltage between EC ECM + Terminal 126 (ASCD brake switch signal) Ction result normal? GO TO 2. A/T models: GO TO 3.	n under ondition al (M/T) dal (M/T) M harne 	Slightly depress Fully released Fully released ess connector nal Brake peda Brake peda Brake peda	conditions.	Slightly depressed	Approx. 0
With CO Turn ign Select "I Monitor item BRAKE SW1 Without Turn ign Connector M107 YES >> NO-1 >> NO-2 >>	ition switch ON. BRAKE SW1" in "DATA BRAKE SW1" indication Co Brake pedal (A/T) Brake pedal or clutch peda Brake pedal (A/T) Brake pedal and clutch pe CONSULT-III nition switch ON. he voltage between EC ECM + Terminal 126 (ASCD brake switch signal) Ction result normal? GO TO 2.	n under ondition al (M/T) dal (M/T) M harne Termin 128	Slightly depress Fully released Fully released ess connector nal Brake peda Brake peda Brake peda	conditions.	Slightly depressed	Approx. 0

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EC-439

< DTC/CIRCUIT DIAGNOSIS >

Monitor item	Condition		Indication
BRAKE SW2	Brako podal	Slightly depressed ON	
DIANE OWZ	Diake pedal	Fully released	OFF

Without CONSULT-III

Check the voltage between ECM harness connector terminals as per the following.

ECM					
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
M107	122	128	Slightly depressed		Battery voltage
WITO7	(Stop lamp switch signal)	120	Brake pedal	Fully released	Approx. 0

Is the inspection result normal?

YES >> GO TO 21.

NO >> GO TO 16.

$\mathbf{3}$.check ascd brake switch power supply circuit

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ake switch	Ground	Voltage	
Connector	Terminal	Ciouna	voltage	
E109	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10 A fuse (No. 3)
- · Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

5. Check ascd brake switch input signal circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ke switch	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E109	2	M107	126	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E106, M6

[VQ37VHR]

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Harness for open or short between ECM and ASCD brake switch

< DTC/CIRCUIT DIAGNOSIS >

>> Repair open circuit, short to ground or short to power in harness or connectors.

7.снеск			· ·		power in namess of connectors.	EC
Refer to EC	-443, "Co	mponent	t Inspection	(ASCD Brake Sv	vitch)"	
Is the inspe	<u>ction resu</u>	lt norma	<u> ?</u>			
	GO TO 2					С
•	•		rake switch.			
8.CHECK			VITCH CIRC	CUIT		D
	nition swite		witch horn	ess connector.		D
	nition swite		Switch name	ess connector.		
			en ASCD br	ake switch harne	ss connector and ground.	E
		1				
ASCD bral		Ground	(Condition	Voltage (V)	F
Connector	Terminal					
E109	1	Ground	Brake pedal	Slightly depressed	Approx. 0	
<u> </u>				Fully released	Battery voltage	G
<u>Is the inspe</u> YES >>	GO TO 1		<u>1?</u>			
-	GO TO 9	-				Н
9.CHECK	ASCD BR	AKE SW	/ITCH POW	ER SUPPLY CIR	CUIT	
-	nition swite					
2. Disconr	nect ASC	D clutch	switch harn	ess connector.		I
	nition swite			Itch switch harpo	ss connector and ground.	
4. Check	ine voltage	e betwee				J
ASCD clut	ch switch					
Connector	Terminal	Ground	Voltage			
E108	1	Ground	Battery volta	ge		K
Is the inspe	ction resu	lt norma	-			
	GO TO 1					L
10	GO TO 1					
10.DETE	CT MALFU	JNCTIO	NING PART	-		
Check the f						M
Fuse bloc10 A fuse		nnector I	E103			
		r short be	etween ASC	D clutch switch a	and fuse	Ν
>>	Repair op	pen circu	it or short to	o ground in harne	ss or connectors.	0
11. CHEC	K ASCD E	BRAKE S	WITCH INF	PUT SIGNAL CIR	CUIT FOR OPEN AND SHORT-I	0
	nition swite					
		uity betw	ween ASCD	clutch switch ha	arness connector and ASCD brake switch ha	rness _P
connec	ι Ο Ι.					

ASCD clu	tch switch	ASCD brake switch		Continuity
Connector	Terminal	Connector Terminal		Continuity
E108	2	E109	1	Existed

3. Also check harness for short to ground and short to power.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

12. CHECK ASCD CLUTCH SWITCH

Refer to EC-444, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace ASCD clutch switch.

13. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ke switch	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E109	1	M107	126	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 15. NO >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E106, M6

Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

15. CHECK ASCD BRAKE SWITCH

Refer to EC-443, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace ASCD brake switch.

16. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect stop lamp switch harness connector.

3. Check the voltage between stop lamp switch harness connector and ground.

Stop lam	p switch	Ground	Voltage
Connector	nector Terminal		Voltage
E110	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 18.

NO >> GO TO 17.

17. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10A fuse (No. 7)

Harness for open or short between stop lamp switch and battery

>> Repair open circuit, short to ground or short to power in harness or connectors.

EC-442

[VQ37VHR]

18. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT А 1. Disconnect ECM harness connector. Check the continuity between stop lamp switch harness connector and ECM harness connector. 2. EC Stop lamp switch ECM Continuity Terminal Connector Terminal Connector E110 2 M107 122 Existed Also check harness for short to ground and short to power. 3. Is the inspection result normal? D YES >> GO TO 20. NO >> GO TO 19. 19. DETECT MALFUNCTIONING PART Ε Check the following. Fuse block (J/B) connectors E103, M2 Harness for open or short between ECM and stop lamp switch >> Repair open circuit, short to ground or short to power in harness or connectors. 20.check stop lamp switch Refer to EC-444, "Component Inspection (Stop Lamp Switch)" Is the inspection result normal? Н YES >> GO TO 21. NO >> Replace stop lamp switch. 21. CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". >> INSPECTION END Component Inspection (ASCD Brake Switch) INFOID:000000004250973 Κ 1.CHECK ASCD BRAKE SWITCH-I 1. Turn ignition switch OFF. 2. Disconnect ASCD brake switch harness connector. 3. Check the continuity between ASCD brake switch terminals under the following conditions. Terminals Condition Continuity M Fully released Existed 1 and 2 Brake pedal Slightly depressed Not existed Ν Is the inspection result normal? >> INSPECTION END YES NO >> GO TO 2. 2.CHECK ASCD BRAKE SWITCH-II Adjust ASCD brake switch installation. Refer to BR-8, "Inspection and Adjustment". 1. Check the continuity between ASCD brake switch terminals under the following conditions. Ρ 2. Terminals Condition Continuity Fully released Existed 1 and 2 Brake pedal Slightly depressed Not existed

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

INFOID:000000004250974

YES >> INSPECTION END NO >> Replace ASCD brake switch.

Component Inspection (ASCD Clutch Switch)

1.CHECK ASCD CLUTCH SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD clutch switch harness connector.
- 3. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
	Ciutori pedar	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-5. "Inspection and Adjustment".

2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Clutch pedal	Fully released	Existed
i anu z	Ciuteri pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch.

Component Inspection (Stop Lamp Switch)

INFOID:000000004250975

1.CHECK STOP LAMP SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brako podal	Fully released	Not existed
	Brake pedal	Slightly depressed	Existed

Is the inspection result normal?

YES	>> INSPECTION END

2.CHECK STOP LAMP SWITCH-II

- 1. Adjust stop lamp switch installation. Refer to <u>BR-8, "Inspection and Adjustment"</u>.
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
	Brake pedar	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

P1572 ICC BRAKE SWITCH

Description

When the brake pedal is depressed, ICC brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to <u>CCS-17</u>, "System Description" for the ICC function.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-365, "DTC Logic"</u>.
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
		A) ON signals from the stop lamp switch an the ICC brake switch are sent to ECM at the same time.	(The stop lamp switch circuit is shorted.)Harness or connectors	G
P1572	ICC brake switch	ICC brake switch signal is not sent to ECI B) for extremely long time while the vehicle being driven		H

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine (VDC switch OFF).
- 2. Press MAIN switch and make sure that CRUISE lamp illuminates.
- 3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed. NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

^{4.} Check 1st trip DTC.

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Is 1st trip DTC detected?

YES >> Go to EC-446, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION: Always drive vehicle at a safe speed. NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-446, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1.CHECK OVERALL FUNCTION-I

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
Brake pedal (A/T) Brake pedal or clutch pedal (M/T)		Slightly depressed	OFF
BRAKE SWI	Brake pedal (A/T) Brake pedal and clutch pedal (M/T)	Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM					
Connector	+ –		Condition		Voltage (V)	
CONNECTOR	Terminal	Terminal				
M107	126	128	Brake pedal (A/T) Brake pedal or clutch pedal (M/T)	Slightly depressed	Approx. 0	
MT07	(ICC brake switch signal)	120	Brake pedal (A/T) Brake pedal and clutch pedal (M/T)	Fully released	Battery voltage	

Is the inspection result normal?

YES >> GO TO 2.

NO-1 >> A/T models: GO TO 3.

NO-2 >> M/T models: GO TO 8.

2. CHECK OVERALL FUNCTION-II

(B) With CONSULT-III

Select "BRAKE SW2" and check indication under the following conditions.

EC-446

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< DTC/CIRCUIT DIAGNOSIS >

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Monitor item	Condition		Condition Inc		Indication
BRAKE SW2	Brako podal	Slightly depressed	ON		
	Brake pedar	Fully released	OFF		

Without CONSULT-III

Check the voltage between ECM harness connector terminals as per the following.

ECM						
Connector	+	_	Condition		Voltage (V)	
Connector	Terminal	Terminal				
M107	122	128	Brake pedal	Slightly depressed	Battery voltage	
WITO7	(Stop lamp switch signal)	120	Diake pedai	Fully released	Approx. 0	

Is the inspection result normal?

YES >> GO TO 22.

NO >> GO TO 16.

$\mathbf{3.}$ CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT

1.	Turn	ignition	switch	OFF.
----	------	----------	--------	------

2. Disconnect ICC brake switch harness connector.

- 3. Turn ignition switch ON.
- 4. Check the voltage between ICC brake switch harness connector and ground.

ICC brake switch		Ground	Voltage
Connector	Terminal	Ciouna	voltage
E114	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10 A fuse (No. 3)

Harness for open or short between ICC brake switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

5.check ICC brake switch input signal circuit for open and short

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between ICC brake switch harness connector and ECM harness connector.

ICC brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E114	2	M107	126	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

6.DETECT MALFUNCTIONING PART

Check the following.

< DTC/CIRCUIT DIAGNOSIS >

Harness for open or short between ICC brake switch and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

7. CHECK ICC BRAKE SWITCH

Refer to EC-450, "Component Inspection (ICC Brake Switch)".

Is the inspection result normal?

YES >> GO TO 22.

NO >> Replace ICC brake switch.

8. CHECK ICC BRAKE SWITCH CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ICC brake switch harness connector and ground.

ICC brake switch		Ground	(Condition	Voltage (V)
Connector	Terminal	Glound	Condition		voltage (v)
F114	1	Ground	Brake pedal	Slightly depressed	Approx. 0
	I	Glound	Diake pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 9.

9.CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC clutch switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ICC clutch switch harness connector and ground.

ICC clutch switch		Ground	Voltage
Connector	Terminal	Ciouna	voltage
E113	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

• Fuse block (J/B) connector E103

10 A fuse (No. 3)

• Harness for open or short between ICC clutch switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

11. CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

- 1. Turn ignition switch OFF.
- Check the continuity between ICC clutch switch harness connector and ICC brake switch harness connector.

ICC clute	ICC clutch switch		ICC brake switch	
Connector	Terminal	Connector	Terminal	Continuity
E113	2	E114	1	Existed

EC-448

F1372 ICC BRAKE SWITCH	
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
3. Also check harness for short to ground and short to power.	
Is the inspection result normal?	A
 YES >> GO TO 12. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 	
12. CHECK ICC CLUTCH SWITCH	EC
Refer to <u>EC-451, "Component Inspection (ICC Clutch Switch)"</u> . Is the inspection result normal?	
YES >> GO TO 22.	С
NO >> Replace ICC clutch switch.	
13.CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II	D
1. Turn ignition switch OFF.	
 Disconnect ECM harness connector. Check the continuity between ICC brake switch harness connector and ECM harness conr 	nector E
3. Check the continuity between ICC brake switch harness connector and ECM harness conr	
ICC brake switch ECM	
Connector Terminal Connector Terminal	F
E114 1 M107 126 Existed	
4. Also check harness for short to ground and short to power.	G
Is the inspection result normal?	
YES >> GO TO 15.	
NO >> GO TO 14.	Н
14.DETECT MALFUNCTIONING PART	
Check the following. Harness connectors E106, M6 	I
Harness for open or short between ICC brake switch and ECM	
	J
>> Repair open circuit, short to ground or short to power in harness or connectors.	0
15. CHECK ICC BRAKE SWITCH	
Refer to EC-450, "Component Inspection (ICC Brake Switch)".	K
Is the inspection result normal?	
YES >> GO TO 22. NO >> Replace ICC brake switch.	L
16. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT	
1. Turn ignition switch OFF.	
2. Disconnect stop lamp switch harness connector.	Μ
 Disconnect ICC brake hold relay harness connector. Check the voltage between stop lamp switch harness connector and ground. 	
The check the voltage between stop lamp switch namess connector and ground.	Ν
Stop lamp switch	
Connector Terminal Ground Voltage	0
E110 1 Ground Battery voltage	0
5. Check the voltage between ICC brake hold relay harness connector and ground.	
	Р
ICC brake hold relay Ground Voltage	
Connector Terminal	

Is the inspection result normal?

YES >> GO TO 18.

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NO >> GO TO 17.
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< DTC/CIRCUIT DIAGNOSIS >

17. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10 A fuse (No. 7)
- Harness for open or short between battery and stop lamp switch
- · Harness for open or short between battery and ICC brake hold relay

>> Repair open circuit or short to ground in harness or connectors.

18. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E110	2	M107	122	Existed

3. Check the continuity between ICC brake hold relay harness connector and ECM harness connector.

ICC brake	hold relay	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E51	5	M107	122	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 20.

NO >> GO TO 19.

19. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103, M2
- Harness for open or short between ECM and stop lamp switch
- Harness for open or short between ECM and ICC brake hold relay

>> Repair open circuit, short to ground or short to power in harness or connectors.

20. CHECK STOP LAMP SWITCH

Refer to EC-451, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace stop lamp switch.

21. CHECK ICC BRAKE HOLD RELAY

Refer to EC-452, "Component Inspection (ICC Brake Hold Relay)".

Is the inspection result normal?

YES >> GO TO 22.

NO >> Replace ICC brake hold relay.

22. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ICC Brake Switch)

1.CHECK ICC BRAKE SWITCH-I

Revision: 2009 October

2009 G37 Coupe

INFOID:000000004250979

< DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC brake switch harness connector.
- 3. Check the continuity between ICC brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
T and Z	Brake pedar	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ICC BRAKE SWITCH-II

1. Adjust ICC brake switch installation. Refer to <u>BR-8. "Inspection and Adjustment"</u>.

2. Check the continuity between ICC brake switch terminals under the following conditions.

Terminals	(Continuity	
1 and 2	1 and 2 Brake pedal	Fully released	Existed
T and Z		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake switch.

Component Inspection (ICC Clutch Switch)

1. CHECK ICC CLUTCH SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC clutch switch harness connector.
- 3. Check the continuity between ICC clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 Clutch n	and 2 Clutch pedal	Fully released	Existed
T and 2		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.check ICC CLUTCH SWITCH-II

1. Adjust ICC clutch switch installation. Refer to <u>CL-5. "Inspection and Adjustment"</u>.

2. Check the continuity between ICC clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 Clutch p	Clutch podal	Fully released	Existed
	Ciucii peuai	Slightly depressed	Not existed

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace ICC clutch switch.

Component Inspection (Stop Lamp Switch)

1.CHECK STOP LAMP SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the continuity between stop lamp switch terminals under the following conditions.

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Terminals	C	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
	Diake peual	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to <u>BR-8, "Inspection and Adjustment"</u>.

2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
	Diake peuai	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

Component Inspection (ICC Brake Hold Relay)

1. CHECK ICC BRAKE HOLD RELAY

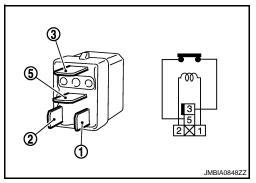
- 1. Turn ignition switch OFF.
- 2. Remove ICC brake hold relay.
- 3. Check the continuity between ICC brake hold relay terminals under the following conditions.

Terminals	Condition	Continuity
3 and 5	12V direct current supply between terminals 1 and 2	Existed
5 and 5	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake hold relay



P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P1574 ASCD VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed signals via the CAN communication line. One is sent from "unified meter and A/C amp.", and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to <u>EC-63</u>, "System Description" for ASCD functions.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-346, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-365, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-367, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P1574	ASCD vehicle speed sensor	The difference between the two vehicle speed signals is out of the specified range.	 Harness or connectors (The CAN communication line is open or shorted.) Unified meter and A/C amp. ABS actuator and electric unit (control unit) Wheel sensor TCM ECM 	H

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- M 1. Start engine (VDC switch OFF). Drive the vehicle at more than 40 km/h (25 MPH). 2. **CAUTION:** Ν Always drive vehicle at a safe speed. NOTE: This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle. 3. Check DTC. Is DTC detected? YFS >> Go to EC-453, "Diagnosis Procedure". Ρ >> INSPECTION END NO Diagnosis Procedure INFOID:000000004250985
- **1.**CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-165, "Diagnosis Description".

Is the inspection result normal?

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P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

 $2. {\sf CHECK} \ {\sf DTC} \ {\sf WITH} \ "{\sf ABS} \ {\sf ACTUATOR} \ {\sf AND} \ {\sf ELECTRIC} \ {\sf UNIT} \ ({\sf CONTROL} \ {\sf UNIT})"$

Refer to BRC-26, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-37. "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

P1574 ICC VEHICLE SPEED SENSOR

Description

The ECM receives two vehicle speed signals via CAN communication line. One is sent from "unified meter and A/C amp.", and the other is from TCM (Transmission control module). The ECM uses these signals for ICC control. Refer to <u>CCS-17</u>, "System Description" for ICC functions.

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-346, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-365, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-367, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P1574	ICC vehicle speed sensor	The difference between the two vehicle speed signals is out of the specified range.	 Harness or connectors (The CAN communication line is open or shorted.) Unified meter and A/C amp. ABS actuator and electric unit (control unit) Wheel sensor TCM ECM 	Н

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- M 1. Start engine (VDC switch OFF). Drive the vehicle at more than 40 km/h (25 MPH). 2. **CAUTION:** Ν Always drive vehicle at a safe speed. NOTE: This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle. 3. Check DTC. Is DTC detected? YFS >> Go to EC-455, "Diagnosis Procedure". Ρ >> INSPECTION END NO Diagnosis Procedure INFOID:000000004250988
- **1.**CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-165, "Diagnosis Description".

Is the inspection result normal?

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P1574 ICC VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

 $2. {\sf CHECK} \ {\sf DTC} \ {\sf WITH} \ {\sf ``ABS} \ {\sf ACTUATOR} \ {\sf AND} \ {\sf ELECTRIC} \ {\sf UNIT} \ ({\sf CONTROL} \ {\sf UNIT})"$

Refer to BRC-26, "CONSULT-III Function".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Check combination meter function. Refer to <u>MWI-37, "CONSULT-III Function (METER/M&A)"</u>.

>> INSPECTION END

P1606 VVEL CONTROL MODULE

Description

The VVEL control module consists of a microcomputer and connectors for signal input and output and for power supply. The VVEL control module controls VVEL system.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1606	VVEL control module	 VVEL control module calculation function is malfunctioning. VVEL EEP-ROM system is malfunc- tioning. 	VVEL control module	G
	IFIRMATION PROCEDURE			

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conduct	ted, always perform the following procedure
before conducting the next test.	

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 1 second. 2. Check DTC. Is DTC detected? >> Go to EC-457, "Diagnosis Procedure". YES >> INSPECTION END NO **Diagnosis** Procedure 1.PERFORM DTC CONFIRMATION PROCEDURE 1. Turn ignition switch ON. 2. Erase DTC. Perform DTC Confirmation Procedure. 3.
- See EC-457, "DTC Logic".

Is the DTC P1606 displayed again?

- YES >> GO TO 2.
- NO >> INSPECTION END

2.REPLACE VVEL CONTROL MODULE

1. Replace VVEL control module.

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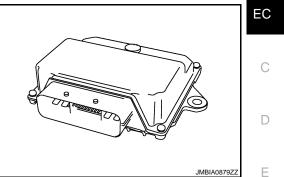
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P1606 VVEL CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

2. Go to <u>EC-17</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> INSPECTION END

P1607 VVEL CONTROL MODULE

Description

The VVEL control module consists of a microcomputer and connectors for signal input and output and for power supply. The VVEL control module controls VVEL system.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1607	VVEL control module circuit	• The internal circuit of the VVEL con- trol module is malfunctioning.	VVEL control module
DTC CONF	FIRMATION PROCEDURE		
1.PRECON	NDITIONING		
before cond 1. Turn igr 2. Turn igr 3. Turn igr	firmation Procedure has be ucting the next test. hition switch OFF and wait at hition switch ON. hition switch OFF and wait at		perform the following procedure
		dure, confirm that battery voltag	e is more than 10 V at idle.
	GO TO 2.		
~	M DTC CONFIRMATION PR	OCEDURE	
	gine and let it idle for at least		
Is DTC dete	-		
	Go to <u>EC-459, "Diagnosis Pr</u> INSPECTION END	ocedure".	
Diagnosis	s Procedure		INFOID:00000004250994
	M DTC CONFIRMATION PR		
	nition switch ON.		
2. Erase D	DTC.		
	DTC Confirmation Procedure	е.	
	P1607 displayed again?		
	GO TO 2.		
-	INSPECTION END		
2 REPLAC	E VVEL CONTROL MODULE	=	

1. Replace VVEL control module.

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INFOID:000000004250993

P1607 VVEL CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

2. Go to <u>EC-17</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> INSPECTION END

P1608 VVEL SENSOR POWER SUPPLY

DTC Logic

[VQ37VHR]

INFOID:000000004250995

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1608	VVEL sensor power supply circuit	VVEL control module detects a voltage of power source for sensor is excessively low or high.	 Harness or connectors (VVEL control shaft position sensor power supply circuit is open or shorted.) VVEL control shaft position sensor VVEL control module
DTC CO	NFIRMATION PROCEDUR	E	
1.PREC	ONDITIONING		
before co 1. Turn 2. Turn 3. Turn TESTING	nducting the next test. ignition switch OFF and wait a ignition switch ON. ignition switch OFF and wait a CONDITION:	t least 10 seconds.	s perform the following procedure ge is more than 10 V at idle.
•	>> GO TO 2.		
2.PERF	ORM DTC CONFIRMATION P	ROCEDURE	
	ignition switch ON and wait at k DTC.	least 1 second.	
Is DTC de			
YES >	>> Go to <u>EC-461, "Diagnosis F</u> >> INSPECTION END	Procedure".	
Diagnos	sis Procedure		INFOID:00000004250996
1.снес	K GROUND CONNECTION		
	K GROUND CONNECTION		
1. Turn 2. Chec	ignition switch OFF. k ground connection M95. Ref	er to Ground Inspection in <u>GI-44.</u> "	Circuit Inspection".
1. Turn 2. Chec Is the inst	ignition switch OFF. k ground connection M95. Ref pection result normal?	er to Ground Inspection in <u>GI-44, "</u>	Circuit Inspection".
1. Turn 2. Chec Is the insp YES	ignition switch OFF. k ground connection M95. Ref <u>pection result normal?</u> >> GO TO 2.		Circuit Inspection".
1. Turn 2. Chec Is the insp YES NO	ignition switch OFF. k ground connection M95. Ref <u>pection result normal?</u> >> GO TO 2. >> Repair or replace ground co	onnection.	
1. Turn 2. Chec Is the insp YES NO 2.CHEC	ignition switch OFF. k ground connection M95. Ref <u>pection result normal?</u> >> GO TO 2. >> Repair or replace ground co K VVEL CONTROL SHAFT Po	onnection. OSITION SENSOR POWER SUPF	
1. Turn 2. Chec Is the insp YES NO 2.CHEC 1. Disco 2. Turn	ignition switch OFF. k ground connection M95. Ref <u>pection result normal?</u> >> GO TO 2. >> Repair or replace ground co K VVEL CONTROL SHAFT Po onnect VVEL control shaft posi ignition switch ON.	onnection.	PLY CIRCUIT

VVEL	VVEL control shaft position sensor		Ground	Voltage (V)
Bank	Connector	Terminal	Ground	voltage (v)
1	F46	3		
I	F40	6	Ground	Approx. 5
2	F47	3	Ground	Approx. 5
2	Γ4/	6		

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3. Ο

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P1608 VVEL SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

3.CHECK VVEL CONTROL SHAFT POSITION SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect VVEL control module harness connector.
- 3. Check the continuity between VVEL control shaft position sensor harness connector and VVEL control module harness connector.

VVEL co	VVEL control shaft position sensor			VVEL control module	
Bank	Connector	or Terminal Con		Terminal	Continuity
1	F46	3		9	
I		6	E15	22	Existed
0	F47	3		7	Existed
2		6		20	

4. Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F1, E3
- Harness for open or short between VVEL control shaft position sensor and VVEL control module

>> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair or replace.

6.REPLACE VVEL CONTROL MODULE

- 1. Replace VVEL control module.
- Go to <u>EC-17</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace.

8.REPLACE VVEL ACTUATOR SUB ASSEMBLY

- 1. Replace VVEL actuator sub assembly.
- 2. Go to EC-462, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1.PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

P1608 VVEL SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
Refer to EC-21. "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Specia	
<u>ment"</u> .	A
>> GO TO 2.	
2. PERFORM IDLE AIR VOLUME LEARNING	EC
Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	
>> END	С
>> END	
	D
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P1805 BRAKE SWITCH

Description

INFOID:000000004251001

[VQ37VHR]

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is being driven.

DTC Logic

INFOID:000000004251002

INFOID:000000004251003

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805	Brake switch	A brake switch signal is not sent to ECM for ex- tremely long time while the vehicle is being driv- en.	(Stop Jamp switch circuit is open or sport-

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

- 2. Fully depress the brake pedal for at least 5 seconds.
- 3. Erase the DTC.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-464, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

1. CHECK STOP LAMP SWITCH CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Disconnect stop lamp switch harness connector.
- 2. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage	
Connector Terminal		Giouna	voltage	
E110	E110 1		Battery voltage	
Is the inspection result normal?				

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10 A fuse (No. 7)

P1805 BRAKE SWITCH

DTC/CI	RCUIT DIA	GNOSIS >				[VQ37VHR]
Harness	for open o	r short betwe	een sto	p lamp switch	and battery	
					,	
>	> Repair o	pen circuit, sł	hort to	ground or sho	rt to power in harness or	connectors.
.CHECK	STOP LA	MP SWITCH	I INPU	T SIGNAL CIF	CUIT FOR OPEN AND S	SHORT
		lamp switch l				
		harness con			rness connector and ECM	I harness connector
			l otop ie			
Stop larr	np switch	ECM		Continuity		
Connector	Terminal	Connector Te	erminal	Continuity		
E110	2	M107	122	Existed		
			to grou	nd and short t	o power.	
	<u>ection resu</u> > GO TO 6					
-	> GO TO 6 > GO TO 5					
DETEC		NCTIONING	PART			
heck the	following.					
Fuse blo	ck (J/B) co	nnector E103	3, M2	Manalatara	ma owitch	
Harness	tor open o	r snort betwe	en EC	M and stop la	np switch	
	·					
		sen circuit st	hort to	around or she	rt to power in harness or (connectors
>	> Repair o	•		ground or sho	rt to power in harness or	connectors.
< CHECK	> Repair o (STOP LA	MP SWITCH	ł		·	connectors.
CHECk	> Repair o (STOP LA C-465, "Co	MP SWITCH	ł	ground or sho	·	connectors.
> CHECk efer to <u>E</u> the insp YES >	> Repair o (STOP LA <u>C-465, "Co</u> ection resu > GO TO 7	MP SWITCH	l spectior		·	connectors.
> CHECk efer to <u>E</u> the insp YES > NO >	> Repair o (STOP LA <u>C-465, "Co</u> ection resu > GO TO 7 > Replace	MP SWITCH mponent Ins ult normal? stop lamp sw	H spection witch.		·	connectors.
> CHECk efer to <u>E</u> the insp YES > NO >	> Repair o (STOP LA <u>C-465, "Co</u> ection resu > GO TO 7 > Replace	MP SWITCH mponent Ins Ilt normal?	H spection witch.		·	connectors.
> CHECK efer to <u>E</u> the insp YES > NO > CHECK	> Repair of (STOP LA <u>C-465, "Co</u> ection resu > GO TO 7 > Replace (INTERMI	MP SWITCH mponent Ins ult normal? stop lamp sw	l spection witch. DENT		·	connectors.
> CHECK Refer to <u>E</u> Sthe insp YES > NO > CHECK Refer to <u>G</u>	> Repair of K STOP LA C-465, "Co ection resu > GO TO 7 > Replace K INTERMI I-41, "Inter	MP SWITCH mponent Ins ult normal? stop lamp sw TTENT INCI mittent Incide	l spection witch. DENT		·	connectors.
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> CHECk efer to <u>E</u> the insp YES > YES > NO > .CHECk efer to <u>G</u>	> Repair of (STOP LA <u>C-465, "Co</u> ection resu > GO TO 7 > Replace (INTERMI <u>I-41, "Inter</u> > INSPEC	MP SWITCH mponent Ins ult normal? stop lamp sw TTENT INCIE mittent Incide TION END	l spection witch. DENT ent".		<u>Switch)"</u> .	INFOID:00000004251004
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 CHECk cefer to E the insp YES > YES > NO > CHECk cefer to G compon CHECk 	> Repair of (STOP LA <u>C-465, "Co</u> ection resu > GO TO 7 > Replace (INTERMI <u>I-41, "Inter</u> > INSPEC ent Insp (STOP LA	MP SWITCH mponent Ins It normal? stop lamp sw TTENT INCIE mittent Incide TION END ection (Sto MP SWITCH	H spection witch. DENT ent".	n (Stop Lamp :	<u>Switch)"</u> .	
> CHECK sefer to E the insp YES > NO > CHECK cefer to G > COMPON CHECK . Turn ig . Discoi	> Repair of (STOP LA <u>C-465, "Co</u> ection resu > GO TO 7 > Replace (INTERMI <u>I-41, "Inter</u> > INSPEC ent Insp (STOP LA gnition swith nect stop	MP SWITCH mponent Ins ilt normal? stop lamp sw TTENT INCII mittent Incide TION END ection (Sto MP SWITCH ich OFF. lamp switch I	H spection witch. DENT ent". op La Harnes	mp Switch	<u>Switch)"</u> .	INFOID:00000004251004
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CHECK cefer to E the insp YES > NO > CHECK cefer to G COMPON CHECK . Turn ig . Disco	> Repair of (STOP LA <u>C-465, "Co</u> ection resu > GO TO 7 > Replace (INTERMI <u>I-41, "Inter</u> > INSPEC ent Insp (STOP LA gnition swith nect stop	MP SWITCH mponent Ins ilt normal? stop lamp sw TTENT INCII mittent Incide TION END ection (Sto MP SWITCH ich OFF. lamp switch h uity between Condition	H spection witch. DENT ent". op La H-I harnes harnes	mp Switch s connector. amp switch ter Continuity	<u>Switch)"</u> .	INFOID:00000004251004
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P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

Terminals	С	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
i anu z	Diake pedai	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

P2122, P2123 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-368, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	ŀ
P2122	Accelerator pedal posi- tion sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	 Harness or connectors (APP sensor 1 circuit is open or shorted.) 	
P2123	Accelerator pedal posi- tion sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	 Accelerator pedal position sensor (APP sensor 1) 	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure kefore conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to <u>EC-467. "Diagnosis Procedure"</u>. NO >> INSPECTION END

NO >> INSPECTION END

Diagnosis Procedure

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

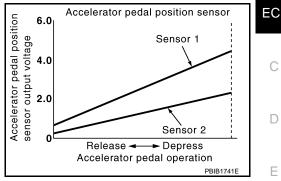
Check ground connection M95. Refer to Ground Inspection in <u>GI-44, "Circuit Inspection"</u>.

Is the inspection result normal?

[VQ37VHR]

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P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage (V)
Connector Terminal		Ciouna	voltage (v)
E112	5	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E112	4	M107	100	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

• Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

${f 6}.$ CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP s	ensor	EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E112	3	M107	97	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7. **7.** DETECT MALFUNCTIONING PART

P2122, P2123 APP SENSOR

< DTC/CII	RCUIT DIAGNOS	SIS >				[VQ37VHR]
	following. connectors M6, E for open or short		CM and accelerat	or pedal positior	n sensor	ŀ
	. Donoir onon oir	wit abort to	around or abort	to nower in hern	and or connectors	E
•	APP SENSOR	Juit, Short to	ground or short		ess or connectors.	
Refer to E	C-469, "Compone	nt Inspectio	n".			
	ection result norm					(
-	> GO TO 10. > GO TO 9.					
-	CE ACCELERAT	OR PEDAL	ASSEMBLY			E
 Repla Go to 	ce accelerator peo EC-469, "Special	dal assembly <u>Repair Req</u> i	y. <u>uirement"</u> .			E
4.0	> INSPECTION E					F
			IT			
Refer to G	il-41, "Intermittent	Incident".				
	> INSPECTION E	ND				(
_						
	ent Inspectior					INFOID:000000004251008
1.CHECH	ACCELERATOR	PEDAL PC	SITION SENSO	R		
 Recort Turn in 	gnition switch OFF nect all harness of gnition switch ON. < the voltage ECM	connectors d		s as per the follo	wing.	
	ECM					
	+	_	 Con	dition	Voltage (V)	1
Connector	Terminal	Terminal	_			ŀ
		100		Fully released	0.45 - 1.0	
M107	97 (APP sensor 1)	100	- Accelerator pedal	Fully depressed	4.2 - 4.8	l
WITO7	98 (APP sensor 2)	104		Fully released	0.22 - 0.50	
		104		Fully depressed	2.1 - 2.5	Ν
YES > NO >	ection result norm > INSPECTION E > GO TO 2. .CE ACCELERAT(ND	ASSEMBLY			1
	ce accelerator peo					
	EC-469, "Special					(
>	> INSPECTION E	ND				F
Special	Repair Requir	ement				INFOID:000000004251009
1.PERFC	ORM ACCELERAT	OR PEDAL	RELEASED PO	SITION LEARNI	NG	
Refer to E	C-18, "ACCELER	ATOR PEDA	AL RELEASED P	OSITION LEAR	NING : Special Repa	<u>ir Requirement".</u>

>> GO TO 2.

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-18. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

< DTC/CIRCUIT DIAGNOSIS >

P2127, P2128 APP SENSOR

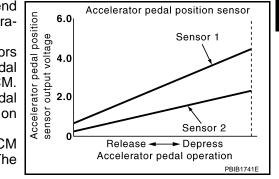
Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.

DTC Logic



DTC DETECTION LOGIC



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal posi- tion sensor 2 circuit low input	An excessively low voltage from the APP sen- sor 2 is sent to ECM.	Harness or connectors (APP sensor 2 circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.]
P2128	Accelerator pedal posi- tion sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	 (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 2) (Brake booster pressure sensor circuit is shorted) Crankshaft position sensor (POS) EVAP control system pressure sensor Refrigerant pressure sensor Brake booster pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.

2. Check DTC.

Is DTC detected?

YES >> Go to EC-472, "Diagnosis Procedure".

NO >> INSPECTION END

INFOID:000000004251010

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P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000004251012

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP	sensor	Ground	Voltage (V)	
Connector Terminal		Ciouna	voltage (v)	
E112	6	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E112	6	M107	103	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit.

5.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

E	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F101	45	Brake booster pressure sensor	E48	1
46		CKP sensor (POS)	F2	1
	103	APP sensor	E112	6
M107	107	EVAP control system pressure sensor	B30	3
	107	Refrigerant pressure sensor	E77	3

Is the inspection result normal?

YES >> GO TO 6.

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS			[VQ37VHR]
^	ound or sh	ort to power in harness or connectors.	
6. CHECK COMPONENTS			
 Brake booster pressure sensitive EVAP control system pressure 	sor (Refer re sensor	er to <u>EC-276. "Component Inspection"</u> .) to <u>EC-361. "Component Inspection"</u> .) (Refer to <u>EC-315. "Component Inspection"</u> .)	
 Refrigerant pressure sensor <u>Is the inspection result normal</u> YES >> GO TO 13. NO >> Replace malfunction 	?	EC-520. "Diagnosis Procedure".)	
7. CHECK APP SENSOR 2 G		CIRCUIT FOR OPEN AND SHORT	
 Turn ignition switch OFF. Disconnect ECM harness Check the continuity betw 		sensor harness connector and ECM harness conn	ector.
APP sensor E	СМ	Continuity	
Connector Terminal Connector			
E112 2 M107	104	Existed	
4. Also check harness for sh	•	ind and short to power.	
Is the inspection result normal YES >> GO TO 9.	<u> </u>		
NO >> GO TO 9. NO >> GO TO 8. 8.DETECT MALFUNCTIONII	NG PART		
Check the following. • Harness connectors M6, E10 • Harness for open or short be		M and accelerator pedal position sensor	
>> Repair open circu	it, short to	ground or short to power in harness or connectors	5.
9. CHECK APP SENSOR 2 II	NPUT SIG	NAL CIRCUIT FOR OPEN AND SHORT	
1. Check the continuity betw	een APP s	sensor harness connector and ECM harness connector	ector.
APP sensor E	СМ		
Connector Terminal Connector	Terminal	- Continuity	
E112 1 M107	98	Existed	
2. Also check harness for sh	-	nd and short to power.	
Is the inspection result normal	<u>?</u>		
YES >> GO TO 11.			
NO >> GO TO 10. 10.DETECT MALFUNCTION	NING PAR	Т	
Check the following.			
• Harness connectors M6, E1		M and accelerator pedal position sensor	
>> Repair open circu 11.CHECK APP SENSOR	it, short to	ground or short to power in harness or connectors	5.
Refer to EC-474, "Component	Inspection	ר"	

Refer to EC-474, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12. < DTC/CIRCUIT DIAGNOSIS >

12.REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-474, "Special Repair Requirement".

>> INSPECTION END

13. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:000000004460730

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals as per the following.

ECM						
Connector	+	-	Condition		Voltage (V)	
Connector	Terminal	Terminal				
	97 (APP sensor 1)	100	Accelerator podel	Fully released	0.45 - 1.0	
M107				Fully depressed	4.2 - 4.8	
WI07	98 (APP sensor 2)	404	Accelerator pedal	Fully released	0.22 - 0.50	
	90 (AFF Selisor 2)	104		Fully depressed	2.1 - 2.5	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace accelerator pedal assembly

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-469, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000004251014

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-18, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

< DTC/CIRCUIT DIAGNOSIS >

P2138 APP SENSOR

Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-368, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal posi- tion sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	 Harness or connectors (APP sensor 2 circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 2) (Brake booster pressure sensor circuit is shorted) Crankshaft position sensor (POS) EVAP control system pressure sensor Brake booster pressure sensor Refrigerant pressure sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.

2. Check DTC.

Is DTC detected?

- YES >> Go to <u>EC-476, "Diagnosis Procedure"</u>.
- NO >> INSPECTION END



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Accelerator pedal position sensor 6.0 Sensor 1 C Sensor 2 C Release Depress Accelerator pedal position sensor C D Bub 1741E

А

[VQ37VHR]

INFOID:000000004251015

< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:000000004251017

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect accelerator pedal position (APP) sensor harness connector. 1.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP	sensor	Ground	Voltage (V)	
Connector Terminal		Ciouna	voltage (v)	
E112	5	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 4. NO

>> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

· Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.

Check the voltage between APP sensor harness connector and ground. 2.

APP s	sensor	Ground	Voltage (V)	
Connector	Terminal	Ciouna	voltage (v)	
E112	6	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 5.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

- Disconnect ECM harness connector. 2.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E112	6	M107	103	Existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > · Harness for open or short between ECM and accelerator pedal position sensor А >> Repair open circuit. 7. CHECK SENSOR POWER SUPPLY CIRCUIT EC Check harness for short to power and short to ground, between the following terminals. ECM Sensor Connector Terminal Name Connector Terminal 45 Brake booster pressure sensor E48 1 F101 D 46 CKP sensor (POS) F2 1 103 APP sensor E112 6 M107 EVAP control system pressure sensor B30 3 E 107 3 Refrigerant pressure sensor E77 Is the inspection result normal? F YES >> GO TO 8. NO >> Repair short to ground or short to power in harness or connectors. 8.CHECK COMPONENTS Check the following. Crankshaft position sensor (POS) (Refer to EC-276, "Component Inspection".) Brake booster pressure sensor (Refer to <u>EC-361, "Component Inspection"</u>.) Н • EVAP control system pressure sensor (Refer to EC-315, "Component Inspection".) • Refrigerant pressure sensor (Refer to EC-520, "Diagnosis Procedure".) Is the inspection result normal? YES >> GO TO 15. NO >> Replace malfunctioning component. 9.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. Disconnect ECM harness connector. 2. 3. Check the continuity between APP sensor harness connector and ECM harness connector. Κ APP sensor ECM Continuity Connector Terminal Connector Terminal 4 100 E112 M107 Existed 2 104 M Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 11. Ν NO >> GO TO 10. 10. DETECT MALFUNCTIONING PART Check the following. Harness connectors M6, E106 Harness for open or short between ECM and accelerator pedal position sensor >> Repair open circuit, short to ground or short to power in harness or connectors. 11.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between APP sensor harness connector and ECM harness connector. 1.

APP s	ensor	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F112	3	M107	97	Existed
LIIZ	1		98	LAISIGU

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

13.CHECK APP SENSOR

Refer to EC-478, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

14.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Go to EC-479, "Special Repair Requirement".

>> INSPECTION END

15.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals as per the following.

ECM						
Connector	+	_	Cone	Voltage (V)		
Connector	Terminal	Terminal				
M107	97 (APP sensor 1)	100		Fully released	0.45 - 1.0	
	ST (AFF Selisor I)	100		Fully depressed	0.45 - 1.0	
	98 (APP sensor 2)	104	Accelerator pedal	Fully released	0.22 - 0.50	
	30 (AFF SUISUI 2)	104		Fully depressed	0.45 - 1.0 4.2 - 4.8	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

Revision: 2009 October

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
2.REPLACE ACCELERATOR PEDAL ASSEMBLY	
1. Replace accelerator pedal assembly.	<i>F</i>
2. Go to EC-469, "Special Repair Requirement".	E
>> INSPECTION END	E
Special Repair Requirement	INFOID:00000004251019
1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARN	NG
Refer to EC-18. "ACCELERATOR PEDAL RELEASED POSITION LEAR	NING : Special Repair Requirement".
>> GO TO 2.	
2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	E
Refer to EC-18, "THROTTLE VALVE CLOSED POSITION LEARNING :	Special Repair Requirement".
>> GO TO 3.	F
3. PERFORM IDLE AIR VOLUME LEARNING	
Refer to EC-19, "IDLE AIR VOLUME LEARNING : Special Repair Requir	ement".
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< DTC/CIRCUIT DIAGNOSIS >

P2A00, P2A03 A/F SENSOR 1

Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

DTC Logic

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not it will shift to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P2A00	Air fuel ratio (A/F) sensor 1 (bank 1) circuit range/per- formance	• The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.	 A/F sensor 1 A/F sensor 1 heater Fuel pressure
P2A03	Air fuel ratio (A/F) sensor 1 (bank 2) circuit range/per- formance	 The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a specified period. 	Fuel injectorIntake air leaks

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

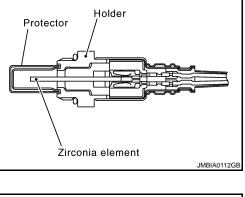
>> GO TO 2.

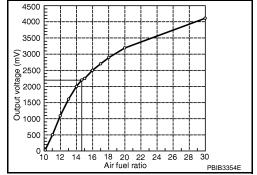
2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-22</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".
- 2. Turn ignition switch OFF and wait at least 10 seconds.

EC-480







P2A00, P2A03 A/F SENSOR 1

P2A00, P2A03 A/F SENSOR 1	
< DTC/CIRCUIT DIAGNOSIS > [VQ	37VHR]
 Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no loa Let engine idle for 1 minute. 	d.
 Keep engine speed between 2,500 and 3,000 rpm for 20 minutes. Check 1st trip DTC. <u>Is 1st trip DTC detected?</u> 	EC
YES >> Go to <u>EC-481, "Diagnosis Procedure"</u> . NO >> INSPECTION END	С
Diagnosis Procedure	000000004251022 D
1. CHECK GROUND CONNECTION	
 Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in <u>GI-44, "Circuit Inspection"</u>. <u>Is the inspection result normal?</u> 	E
YES >> GO TO 2. NO >> Repair or replace ground connection. 2. RETIGHTEN A/F SENSOR 1	F
1. Loosen and retighten the A/F sensor 1. Refer to EM-34, "Removal and Installation".	G
>> GO TO 3. 3.CHECK FOR INTAKE AIR LEAK	Н
 Start engine and run it at idle. Listen for an intake air leak after the mass air flow sensor. <u>Is intake air leak detected?</u> YES >> Repair or replace. NO >> GO TO 4. 	I
4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE	J
 Clear the mixture ratio self-learning value. Refer to <u>EC-22, "MIXTURE RATIO SELF-LEARNING</u> <u>CLEAR : Special Repair Requirement"</u>. Run engine for at least 10 minutes at idle speed. 	<u>g value</u> K
Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine? YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-241, "E</u> <u>Procedure"</u> or <u>EC-245, "Diagnosis Procedure"</u> . NO >> GO TO 5.	Diagnosis L
5. CHECK HARNESS CONNECTOR	M
 Turn ignition switch OFF. Disconnect A/F sensor 1 harness connector. Check harness connector for water. 	N
Water should not exit.	-
Is the inspection result normal? YES >> GO TO 6.	0
NO >> Repair or replace harness connector.	-
6.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT	Р
1. Turn ignition switch ON.	

2. Check the voltage between A/F sensor 1 harness connector and ground.

P2A00, P2A03 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

DTC		A/F sensor	· 1	Ground	Voltage
DIC	Bank	Connector	Terminal	Giouna	voltage
P2A00	1	F3	4	Ground	Battery voltage
P2A03	2	F20	4	Ground	Dattery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E3, F1
- IPDM E/R harness connector E7
- 15 A fuse (No. 46)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

$\mathbf{8}$.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC		A/F sensor	1	EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P2A00	1 F3			57		
FZA00		ГJ	2	F102	61	Existed
P2A03	P2A03 2 F2	2 F20	1	F102	65	EXISIEU
P2A03	2	120	2		66	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor	1	Ground Continuity		
DIC	Bank	Connector	Terminal	Giouna	Continuity	
P2A00	1	F3	1		Continuity Not existed	
FZA00	I	ГJ	2	Ground		
P2A03	2	F20	1	Ground	NOL EXISTED	
FZAU3	2	F20	2			

DTC		ECM		Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P2A00	1		57		Not existed
PZAUU	I	F102	61	Ground	
P2A03	2	FIUZ	65	Giouna	NUL EXISTED
PZAUS	2		66		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

9.CHECK A/F SENSOR 1 HEATER

P2A00, P2A03 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
Refer to EC-161, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 10.	
NO $>>$ GO TO 11.	=
10.CHECK INTERMITTENT INCIDENT	
Perform <u>GI-41, "Intermittent Incident"</u> .	
Is the inspection result normal?	(
YES >> GO TO 11. NO >> Repair or replace.	
11.REPLACE AIR FUEL RATIO (A/F) SENSOR 1	
Replace air fuel ratio (A/F) sensor 1. CAUTION:	
• Discard any A/F sensor which has been dropped from a height of more than 0.5 n	n (19.7 in) onto a
hard surface such as a concrete floor; use a new one.	
 Before installing new A/F sensor, clean exhaust system threads using Oxyger Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Ant (commercial service tool). 	n Sensor Thread i-seize Lubricant
Do vou have CONSULT-III?	
YES >> GO TO 12.	(
NO >> GO TO 13.	
12.CONFIRM A/F ADJUSTMENT DATA	
With CONSULT-III	
1. Turn ignition switch ON.	
 Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III. Make sure that "0.000" is displayed on CONSULT-III screen. 	
Is "0.000" displayed?	
YES >> INSPECTION END	
NO $>>$ GO TO 13.	
13. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE	
Clear the mixture ratio self-learning value. Refer to EC-22, "MIXTURE RATIO SELF-LI	FARNING VALUE
<u>CLEAR : Special Repair Requirement"</u> .	
Do you have CONSULT-III?	
YES >> GO TO 14.	
NO >> INSPECTION END	
14. CONFIRM A/F ADJUSTMENT DATA	
With CONSULT-III	ſ
 Turn ignition switch ON. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III. 	
3. Make sure that "0.000" is displayed on CONSULT-III screen.	
>> INSPECTION END	
	(

Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to <u>EC-63</u>, "System Description" for the ASCD function.

Component Function Check

1.CHECK ASCD BRAKE SWITCH FUNCTION

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition	Indication	
BRAKE SW1	Brake pedal (A/T) Brake pedal or clutch pedal (M/T)	Slightly depressed	OFF
BRARE SWI	Brake pedal (A/T) Brake pedal and clutch pedal (M/T)	Fully released	ON

Without CONSULT-III

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as per the following.

	ECM				
Connector + - Terminal Terminal		Condition		Voltage (V)	
		Terminal			
M107	126		Brake pedal (A/T) Brake pedal or clutch pedal (M/T)	Slightly depressed	Approx. 0
M107 (/	(ASCD brake switch signal)	128	Brake pedal (A/T) Brake pedal and clutch pedal (M/T)	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-484, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Check which type of transmission the vehicle is equipped with.

Which type of transmission?

A/T >> GO TO 2. M/T >> GO TO 7.

2. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ike switch	Ground	Voltage
Connector	Terminal	Giodila	voltage
E109	1	Ground	Battery voltage

Is the inspection result normal?

INFOID:000000004251023

COTC/CIRCUIT DI					
	AGNOSI	S >		[VG	237VHR]
YES >> GO TO					
NO >> GO TO		_			
B. DETECT MALFU	NCTIONI	NG PART			
Check the following.		E102			
Fuse block (J/B) c 10 A fuse (No. 3)	Shhectori	E103			
Harness for open	or short be	etween ASC	CD brake switch a	nd fuse	
	•		o ground in harne		
			JT SIGNAL CIRC	UIT FOR OPEN AND SHORT	
. Turn ignition sw 2. Disconnect ECN		connector			
			brake switch harr	ness connector and ECM harness connec	tor.
ASCD brake switch		ECM	Continuity		
Connector Terminal	Connector				
E109 2	M107	126	Existed		
Also check harn the inspection res			nd and short to po	wer.	
YES >> GO TO		<u>1 </u>			
NO >> GO TO					
DETECT MALFU	NCTIONI	NG PART			
heck the following.					
Harness connecto Harness for open			and ASCD brok	o owitch	
riamess for open o				e switch	
>> Repair (open circu	uit, short to g	ground or short to	power in harness or connectors.	
CHECK ASCD B	•	-	-		
ACHEOR ASCU B					
			(ASCD Brake Sv		
efer to <u>EC-487, "C</u>	omponent	t Inspection	(ASCD Brake Sv		
efer to <u>EC-487, "C</u> the inspection res YES >> GO TO	omponent ult norma 15.	t Inspection I?			
efer to <u>EC-487, "C</u> the inspection res YES >> GO TO NO >> Replace	omponent ult normal 15. ASCD br	<u>t Inspection</u> <u>I?</u> rake switch.			
efer to <u>EC-487. "C</u> the inspection res YES >> GO TO NO >> Replace CHECK ASCD B	omponent ult normal 15. ASCD br RAKE SW	<u>t Inspection</u> <u>I?</u> rake switch.			
efer to <u>EC-487, "C</u> the inspection res YES >> GO TO NO >> Replace CHECK ASCD B Turn ignition sw	omponent ult normal 15. ASCD br RAKE SW itch OFF.	<u>t Inspection</u> <u>I?</u> rake switch. VITCH CIRC	CUIT		
efer to <u>EC-487, "C</u> <u>the inspection res</u> YES >> GO TO NO >> Replace .CHECK ASCD B Turn ignition sw Disconnect ASC Turn ignition sw	omponent ult normal 15. ASCD br RAKE SW itch OFF. CD brake s itch ON.	<u>t Inspection</u> <u>I?</u> rake switch. VITCH CIRC switch harne	CUIT ess connector.	<u>'itch)"</u>	
efer to <u>EC-487, "C</u> <u>the inspection res</u> YES >> GO TO NO >> Replace .CHECK ASCD B Turn ignition sw Disconnect ASC Turn ignition sw	omponent ult normal 15. ASCD br RAKE SW itch OFF. CD brake s itch ON.	<u>t Inspection</u> <u>I?</u> rake switch. VITCH CIRC switch harne	CUIT ess connector.		
efer to <u>EC-487, "C</u> the inspection res YES >> GO TO NO >> Replace CHECK ASCD B Turn ignition sw Disconnect ASC Turn ignition sw Check the voltag	omponent ult normal 15. ASCD br RAKE SW itch OFF. CD brake s itch ON.	<u>t Inspection</u> <u>I?</u> rake switch. VITCH CIRC switch harne	CUIT ess connector.	<u>'itch)"</u>	
efer to <u>EC-487. "C</u> the inspection res YES >> GO TO NO >> Replace CHECK ASCD B Turn ignition sw Disconnect ASC Turn ignition sw Check the voltage ASCD brake switch	omponent ult normal 15. ASCD br RAKE SW itch OFF. CD brake s itch ON. ge betwee	t Inspection I? rake switch. VITCH CIRC switch harne en ASCD br	CUIT ess connector.	<u>'itch)"</u>	
efer to <u>EC-487, "C</u> the inspection res YES >> GO TO NO >> Replace . CHECK ASCD B . Turn ignition sw . Disconnect ASC . Turn ignition sw . Check the voltage	omponent ult normal 15. ASCD br RAKE SW itch OFF. CD brake s itch ON. ge betwee	t Inspection I? rake switch. VITCH CIRC switch harne en ASCD br	CUIT ess connector. ake switch harnes	<u>vitch)"</u> ss connector and ground.	
efer to <u>EC-487. "C</u> the inspection res YES >> GO TO NO >> Replace CHECK ASCD B Turn ignition sw Disconnect ASC Turn ignition sw Check the voltage ASCD brake switch	omponent ult normal 15. ASCD br RAKE SW itch OFF. CD brake s itch ON. ge betwee	t Inspection I? rake switch. VITCH CIRC switch harne en ASCD br	CUIT ess connector. ake switch harne: Condition Slightly depressed	<u>(itch)"</u> ss connector and ground. Voltage (V) Approx. 0	
Refer to EC-487. "C s the inspection res YES >> GO TO NO >> Replace CHECK ASCD B . Turn ignition sw Disconnect ASC . Turn ignition sw . Check the voltage ASCD brake switch Connector Terminal E109 1	omponent ult normal 15. ASCD br RAKE SW itch OFF. D brake s itch ON. ge betwee Ground	t Inspection I? rake switch. VITCH CIRC switch harne en ASCD br	CUIT ess connector. ake switch harnes	<u>vitch)"</u> ss connector and ground.	
efer to EC-487. "C s the inspection res YES >> GO TO NO >> Replace .CHECK ASCD B . Turn ignition sw . Disconnect ASC . Turn ignition sw . Check the voltage ASCD brake switch Connector Terminal E109 1 s the inspection res	omponent ult normal 15. ASCD br RAKE SW itch OFF. CD brake s itch ON. ge betwee Ground Ground	t Inspection I? rake switch. VITCH CIRC switch harne en ASCD br	CUIT ess connector. ake switch harne: Condition Slightly depressed	<u>(itch)"</u> ss connector and ground. Voltage (V) Approx. 0	
efer to <u>EC-487. "C</u> the inspection res YES >> GO TO NO >> Replace CHECK ASCD B Turn ignition sw Disconnect ASC Turn ignition sw Check the voltage ASCD brake switch Connector Terminal	omponent ult normal 15. ASCD br RAKE SW itch OFF. D brake s itch ON. ge betwee Ground Ground ult normal 12.	t Inspection I? rake switch. VITCH CIRC switch harne en ASCD br	CUIT ess connector. ake switch harne: Condition Slightly depressed	<u>(itch)"</u> ss connector and ground. Voltage (V) Approx. 0	

Turn ignition switch OFF.
 Disconnect ASCD clutch switch harness connector.

3. Turn ignition switch ON.

< DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clu	tch switch	Ground	Voltage	
Connector	Terminal	Giouna	vollage	
E108	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.

• Fuse block (J/B) connector E103

• 10A fuse (No. 3)

Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between ASCD clutch switch harness connector and ASCD brake switch harness connector.

ASCD clu	tch switch	ASCD brake switch		Continuity
Connector	Terminal	Connector Terminal		Continuity
E108	2	E109	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

11.CHECK ASCD CLUTCH SWITCH

Refer to EC-487, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace ASCD clutch switch.

 $12. {\sf check} \ {\sf ascd} \ {\sf brake} \ {\sf switch} \ {\sf input} \ {\sf signal} \ {\sf circuit} \ {\sf for} \ {\sf open} \ {\sf and} \ {\sf short}$

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		EC	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
E109	1	M107	126	Existed	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E106, M6

Harness for open or short between ECM and ASCD brake switch

			ASCD BRA	KE SWITCH		
< DTC/CIF		GNOSIS >			[VQ37VHR]	
		en circuit, short to RAKE SWITCH	ground or sh	ort to power in harness or connectors.		А
		nponent Inspectio	n (ASCD Brak	<u>ke Switch)"</u> .		
· · ·	ection resul					EC
	> GO TO 15 > Replace A	5. ASCD brake switc	h.			
15.сне						С
Refer to <u>G</u>	I-41, "Intern	nittent Incident".				
>	> INSPECT	ION END				D
		ection (ASCD	Brake Swit	ch)	INFOID:000000004251026	Е
1.CHECK	ASCD BR	AKE SWITCH-I				
2. Discor		brake switch har		or. In terminals under the following conditions.		F
Terminals	C	Condition	Continuity			G
1 and 2	Brake pedal	Fully released	Existed			
T and Z	Blake pedal	Slightly depressed	Not existed			Н
YES > NO > 2.CHECK		ION END AKE SWITCH-II				I
				<u>R-8, "Inspection and Adjustment"</u> . terminals under the following conditions.		J
Terminals	C	Condition	Continuity			
1 and 2	Brake pedal	Fully released	Existed			K
	-	Slightly depressed	Not existed			
YES >	<u>ection resul</u> > INSPECT > Replace <i>A</i>		h.			L
Compon	ent Inspe	ection (ASCD	Clutch Swi	tch)	INFOID:000000004251027	Μ
1.CHECK	ASCD CLU	JTCH SWITCH-I				NI
2. Discor		clutch switch har		or. In terminals under the following conditions.		N
Terminals	C	Condition	Continuity			
1 and 2	Clutch pedal	Fully released Slightly depressed	Existed Not existed			Ρ
Is the insp	ection resul					
YES >	> INSPECT > GO TO 2.	ION END				
2.CHECK	ASCD CLU	JTCH SWITCH-II				

1. Adjust ASCD clutch switch installation. Refer to CL-5, "Inspection and Adjustment".

< DTC/CIRCUIT DIAGNOSIS >

2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 Clu	Clutch pedal	Fully released Existed	
	Clutch pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch.

ASCD INDICATOR

< DTC/CIRCUIT DIAGNOSIS >

ASCD INDICATOR

Description

ASCD operation status is indicated by two indicators (CRUISE and SET) and CRUISE lamp in combination meter.

CRUISE indicator is displayed to indicated that ASCD system is ready for operation when MAIN switch on ASCD steering switch is turned ON.

SET indicator is displayed when the following conditions are met.

- CRUISE indicator is displayed.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of the ASCD setting.

SET indicator is displayed during ASCD control.

Refer to EC-63, "System Description" for the ASCD function.

Component Function Check

1.CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR CONDITION SPECIFICATION · MAIN switch: Pressed at the CRUISE LAMP · Ignition switch: ON $\mathsf{ON} \to \mathsf{OFF}$ 1st time \rightarrow at the 2nd time · ASCD: Operating · MAIN switch: ON ON Н · When vehicle speed is be-SET LAMP tween 40 km/h (25 MPH) and ASCD: Not operating OFF 144 km/h (89 MPH) Is the inspection result normal? YES >> INSPECTION END >> Go to EC-489, "Diagnosis Procedure". NO **Diagnosis** Procedure INFOID:000000004251030 1.CHECK DTC Κ Check that DTC UXXXX is not displayed. Is the inspection result normal? L YES >> GO TO 2. NO >> Perform trouble diagnosis for DTC UXXXX. 2.CHECK DTC WITH "UNIFIED METER AND A/C AMP." M Refer to MWI-37, "CONSULT-III Function (METER/M&A)". Is the inspection result normal? YES Ν >> GO TO 3. NO >> Repair or replace. ${
m 3.}$ CHECK INTERMITTENT INCIDENT Refer to GI-41, "Intermittent Incident". Is the inspection result normal? YES >> Replace combination meter. Ρ NO >> Repair or replace.

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< DTC/CIRCUIT DIAGNOSIS >

COOLING FAN

Description

COOLING FAN CONTROL MODULE

Cooling fan control module receives ON/OFF pulse duty signal from IPDM E/R. Corresponding to this ON/OFF pulse duty signal, cooling fan control module sends cooling fan motor operating voltage to cooling fan motor. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

COOLING FAN MOTOR

Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

Component Function Check

INFOID:000000004251032

1.CHECK COOLING FAN FUNCTION

With CONSULT-III

1. Turn ignition switch ON.

- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT-III

- 1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-9</u>, "Diagnosis <u>Description</u>".
- 2. Make sure that cooling fan operates.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to <u>EC-490, "Diagnosis Procedure"</u>.

Diagnosis Procedure

INFOID:000000004251033

1. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan control module harness connector E37.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module harness connector and ground.

Cooling fan c	ontrol module	Ground	Voltage	
Connector	Terminal	Ground		
E37	E37 3		Battery voltage	

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK COOLING FAN CONTROL MODULE GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between cooling fan control module harness connector and ground.

Cooling fan co	ontrol module	Ground	Continuity	
Connector	Connector Terminal		Continuity	
E37	1	Ground	Existed	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to power in harness or connectors.

EC-490

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

 3.CHECK IPDM E/R GROUND CIRCUIT 1. Disconnect IPDM E/R harness connectors E5, E6. 2. Check the continuity between IPDM E/R harness connector and ground. 	
Check the continuity between IPDM E/R harness connector and ground.	1
	Е
IPDM E/R Ground Continuity	
E5 12	(
E6 41 Ground Existed	
3. Also check harness for short to power.	
Is the inspection result normal?	
YES >> GO TO 4.	
NO >> Repair open circuit or short to power in harness or connectors.	
4. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT	
1. Disconnect IPDM E/R harness connector E9.	
 Check the continuity between IPDM E/R harness connector and cooling fan control module harness con- nector. 	
IPDM E/R Cooling fan control module	(
Connector Terminal Connector Terminal	
E9 97 E37 2 Existed	
3. Also check harness for short to ground and short to power.	
Is the inspection result normal?	
YES >> GO TO 5. NO >> Repair open circuit, short to ground or short to power in harness or connectors.	
NO >> Repair open circuit, short to ground or short to power in harness or connectors. 5.CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT	
 Reconnect all harness connectors disconnected. Disconnect cooling fan control module harness connectors E301, E302. 	
3. Turn ignition switch ON.	
4. Check the voltage between cooling fan control module harness connector and ground.	
Cooling fan control module	
Connector Terminal Ground Voltage	
<u> </u>	
Ground Battery voltage	ſ
Is the inspection result normal?	
YES >> GO TO 6.	
NO	
NO >> Replace cooling fan control module.	
6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-492, "Component Inspection (Cooling Fan Motor)".	
6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to <u>EC-492, "Component Inspection (Cooling Fan Motor)"</u> . Is the inspection result normal?	
6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-492, "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11.	
6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-492. "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11. NO >> Replace cooling fan motor.	
6.CHECK COOLING FAN MOTORS -1 AND -2 Refer to EC-492, "Component Inspection (Cooling Fan Motor)". Is the inspection result normal? YES >> GO TO 11.	

Disconnect cooling fan relay.
 Turn ignition switch ON.

4. Check the voltage between cooling fan relay harness connector and ground.

Cooling fan relay		Ground	Voltage	
Connector	Terminal	Ground	vollage	
F17	1	Ground	Battery voltage	
	3	Ground	Dattery voltage	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

10A fuse (No. 42)

- IPDM E/R harness connector E7
- 50A fusible link (letter F)

• Harness for open or short between cooling fan relay and fuse

· Harness for open or short between cooling fan relay and battery

>> Repair open circuit, short to ground or short to power in harness or connectors.

$9. {\sf CHECK} \ {\sf COOLING} \ {\sf FAN} \ {\sf CONTROL} \ {\sf MODULE} \ {\sf POWER} \ {\sf SUPPLY} \ {\sf CIRCUIT-III}$

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector E6.
- 3. Check the continuity between cooling fan relay harness connector and IPDM E/R harness connector.

Cooling f	an relay	IPDM E/R		Continuity
Connector	Terminal	Connector Terminal		Continuity
E17	2	E6	42	Existed

4. Check the continuity between cooling fan relay harness connector and cooling fan control module harness connector.

Cooling fan relay		Cooling fan c	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E17	5	E37	3	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

10.CHECK COOLING FAN RELAY

Refer to EC-493, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace cooling fan relay.

11.CHECK INTERMITTENT INCIDENT

Perform GI-41, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R.
- NO >> Repair or replace harness connectors.

Component Inspection (Cooling Fan Motor)

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.

COOLING FAN

< DTC/CIRCUIT DIAGNOSIS >

- 2. Disconnect cooling fan control module harness connectors E301, E302.
- 3. Supply cooling fan control module terminals with battery voltage and check operation.

Coo	ling fan contro			
Motor	Connector	Terminal		Operation
WOU	Connector	(+)	(–)	
1	E301	4	5	Cooling fan operates.
2	E302	6	7	Cooling fan operates.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace cooling fan motor.

Component Inspection (Cooling Fan Relay)

1.CHECK COOLING FAN RELAY

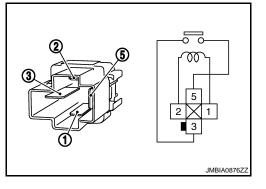
- 1. Turn ignition switch OFF.
- 2. Remove cooling fan relay.
- 3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
5 and 5	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan relay.



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ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

ELECTRICAL LOAD SIGNAL

Description

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- 1. Turn ignition switch ON.
- 2. Connect CONSULT-III and select "DATA MONITOR" mode.
- 3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition		Indication
	Rear window defogger switch	ON	ON
LOAD SIGNAL	Iteal window delogger switch	OFF	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-494, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Co	Indication	
	Lighting switch	ON at 2nd position	ON
LOAD SIGNAL	Lighting Switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-494, "Diagnosis Procedure".

3. CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select "HEATER FAN SW" and check indication under the following conditions.

Monitor item	Condition	Indication	
HEATER FAN SW	Heater fan control switch	ON	ON
HEATER FAILOW	Theater fair control switch	OFF	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-494, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-494, "Compo-nent Function Check"</u>.

Which circuit is related to the incident?

Rear window defogger>>GO TO 2.

Headlamp>>GO TO 3. Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to <u>DEF-3</u>, "Work Flow".

INFOID:000000004251038

INFOID:000000004251036

INEOID:000000004251037

ELECTRICAL LOAD SIGNAL

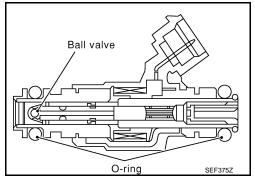
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
>> INSPECTION END	
3. CHECK HEADLAMP SYSTEM	A
Refer to EXL-5, "Work Flow".	
	EC
>> INSPECTION END 4.CHECK HEATER FAN CONTROL SYSTEM	
Refer to <u>HAC-4, "Work Flow"</u> .	C
Kolor to <u>mile 4, wont now</u> .	
>> INSPECTION END	D
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< DTC/CIRCUIT DIAGNOSIS >

FUEL INJECTOR

Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:000000004251040

1.INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

YES >> GO TO 2.

NO >> Go to EC-496, "Diagnosis Procedure".

2. CHECK FUEL INJECTOR FUNCTION

With CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

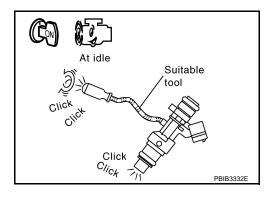
- 1. Start engine.
- 2. Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-496, "Diagnosis Procedure".



INFOID:000000004251041

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

Diagnosis Procedure

- 2. Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel injector harness connector and ground.

INFOID:000000004251039

[VQ37VHR]

FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

	Fuel injecto)r			
Cylinder	Connector	Terminal	Ground	Voltag	ge
1	F121	1			
2	F122	1	_		
3	F123	1		-	
4	F124	1	- Ground	Battery vo	oltage
5	F125	1			
6	F126	1			
	pection res		?		
	>> GO TO >> GO TO				
-	CT MALFL				
			NG PARI		
	e following s connecto				
 Harnes 	s connecto	ors F10, F ²			
	E/R harnes se (No. 44)		or E7		
	s for open		etween fu	el injector	and fuse
~	•	•		-	or short to power in harness or connectors.
3.CHEC	K FUEL IN	IJECTOR	OUTPUT	SIGNAL (CIRCUIT FOR OPEN AND SHORT
	ignition sw				
	onnect EC				rnass connector and ECM bornass connector
3. Cheo		nully betw	een luei i	njector na	irness connector and ECM harness connector.
	Evel in instant				
	Fuel injector		E	СМ	
Cylinder	Connector	Terminal	E(Connector	CM Terminal	Continuity
Cylinder 1					Continuity
	Connector	Terminal		Terminal	Continuity
1	Connector F121	Terminal 2	Connector	Terminal 89	
1 2	Connector F121 F122	Terminal 2 2		Terminal 89 85	Existed
1 2 3	Connector F121 F122 F123	Terminal 2 2 2 2	Connector	Terminal 89 85 81	
1 2 3 4	Connector F121 F122 F123 F124	Terminal 2 2 2 2 2	Connector	Terminal 89 85 81 90	
1 2 3 4 5 6	Connector F121 F122 F123 F124 F125 F126	Terminal 2 2 2 2 2 2 2 2 2	F102	Terminal 89 85 81 90 86 82	
1 2 3 4 5 6 4. Also Is the ins	Connector F121 F122 F123 F124 F125 F126 check harr pection res	Terminal 2 2 2 2 2 2 2 mess for sh sult norma	F102	Terminal 89 85 81 90 86 82	Existed
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1 2 3 4 5 6 4. Also Is the ins YES NO 4.DETE Check th • Harnes • Harnes	Connector F121 F122 F123 F124 F125 F126 check harr pection res >> GO TO >> GO TO >> GO TO CT MALFL e following is connecto is connecto	Terminal 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 5. 4 5. 4	F102 F102 F102 F107 F107 F107 F107 F107 F107	Terminal 89 85 81 90 86 82 und and s	Existed short to power.
1 2 3 4 5 6 4. Also Is the ins YES NO 4.DETE Check th • Harnes • Harnes	Connector F121 F122 F123 F124 F125 F126 check harr pection res >> GO TO >> GO TO CT MALFL e following ss connector	Terminal 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 5. 4 5. 4	F102 F102 F102 F107 F107 F107 F107 F107 F107	Terminal 89 85 81 90 86 82 und and s	Existed short to power.
1 2 3 4 5 6 4. Also Is the ins YES NO 4.DETE Check th • Harnes • Harnes	Connector F121 F122 F123 F124 F125 F126 check harr pection res >> GO TO >> GO TO >> GO TO CT MALFL e following ss connector ss connector ss for open	Terminal 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	F102 F102 F102 NG PART	Terminal 89 85 81 90 86 82 und and s	Existed short to power.
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FUEL INJECTOR

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 6.

NO >> Replace malfunctioning fuel injector.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

Component Inspection

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.

2. Disconnect fuel injector harness connector.

3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance (Ω)		
1 and 2	11.1 - 14.3 [at 10 - 60°C (60 - 140°F)]		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector.

FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS > FUEL PUMP

Description

INFOID:000000004251043

				EC.
Sensor	Input signal to ECM	ECM Function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓	С
Battery	Battery voltage*		Fuel pump	_

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation	
Ignition switch is turned to ON.	Operates for 1 second.	
Engine running and cranking	Operates.	
When engine is stopped	Stops in 1.5 seconds.	G
Except as shown above	Stops.	

Component Function Check

1.CHECK FUEL PUMP FUNCTION

- 1. Turn ignition switch ON.
- 2. Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

ls	<u>s the</u>	inspec	tion res	<u>sult normal</u>	?
		•			

- YES >> INSPECTION END
- NO >> <u>EC-499</u>, "Diagnosis Procedure".

Diagnosis Procedure



- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ECM harness connector and ground.

E	CM	Ground	Voltage	
Connector	Connector Terminal		voltage	
F101	22	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

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FUEL PUMP

< DTC/CIRCUIT DIAGNOSIS >

Check the voltage between IPDM E/R harness connector and ground.

IPDN	/IE/R	Ground	Voltage
Connector Terminal		Ground	voltage
E7	77	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 10.

3.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

Harness connectors F104, F105

Harness for open or short between IPDM E/R and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 4. Turn ignition switch ON.
- 5. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

	nsor unit and pump	Ground	Voltage	
Connector	Terminal			
B22	1	Ground	Battery voltage should exist for 1 second after ignition switch is turned ON.	

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 5.

5.CHECK 15A FUSE

- 1. Turn ignition switch OFF.
- 2. Disconnect 15A fuse (No. 41) from IPDM E/R.
- 3. Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuse.

 $\mathbf{6}.$ CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

- 1. Disconnect IPDM E/R harness connector E5.
- Check the continuity between IPDM E/R harness connector and "fuel level sensor unit and fuel pump" harness connector.

IPDM	E/R	Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E5	13	B22	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

FUEL PUMP

7.DETECT MALFUNCTIONING PART	Λ
Check the following. • Harness connectors E104, B4	A
 IPDM E/R harness connector E5 Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump" 	EC
>> Repair open circuit, short to ground or short to power in harness or connectors. 8. CHECK FUEL PUMP GROUND CIRCUIT	С
 Turn ignition switch OFF. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and ground. 	D
Fuel level sensor unit and fuel pump Ground Continuity Connector Terminal	E
B22 3 Ground Existed	F
 Also check harness for short to power. <u>Is the inspection result normal?</u> YES >> GO TO 9. 	G
NO >> Repair open circuit or short to power in harness or connectors. 9.CHECK FUEL PUMP	
Refer to EC-501, "Component Inspection".	Н
Is the inspection result normal? YES >> GO TO 10. NO >> Replace fuel pump.	I
10.CHECK INTERMITTENT INCIDENT	
Refer to <u>GI-41, "Intermittent Incident"</u> . Is the inspection result normal?	J
YES >> Replace IPDM E/R. NO >> Repair or replace harness or connectors.	K
Component Inspection	
1.CHECK FUEL PUMP	L
 Turn ignition switch OFF. Disconnect "fuel level sensor unit and fuel pump" harness connector. Check resistance between "fuel level sensor unit and fuel pump" terminals as follows. 	Μ
Terminals Resistance (Ω)	Ν
1 and 3 0.2 - 5.0 [at 25°C (77°F)]	
Is the inspection result normal? YES >> INSPECTION END NO >> Replace "fuel level sensor unit and fuel pump"	0
	Ρ

< DTC/CIRCUIT DIAGNOSIS >

< DTC/CIRCUIT DIAGNOSIS >

ICC BRAKE SWITCH

Description

When the brake pedal is depressed, ICC brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to <u>CCS-17, "System Description"</u> for the ICC function.

Component Function Check

1. CHECK ICC BRAKE SWITCH FUNCTION

With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition	Indication	
BRAKE SW1	Brake pedal (A/T) Brake pedal or clutch pedal (M/T)	Slightly depressed	OFF
BRARE SWI	Brake pedal (A/T) Brake pedal and clutch pedal (M/T)	Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.

2. Check the voltage between ECM harness connector terminals as per the following.

	ECM		Condition		
Connector	+	-			Voltage (V)
CONNECTOR	Terminal	Terminal			
M107	126	100	Brake pedal (A/T) Brake pedal or clutch pedal (M/T)	Slightly depressed	Approx. 0
101	(ICC brake switch signal)	128	Brake pedal (A/T) Brake pedal and clutch pedal (M/T)	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-502, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Check which type of transmission the vehicle is equipped with.

Which type of transmission?

A/T >> GO TO 2. M/T >> GO TO 7.

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2. CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

- 2. Disconnect ICC brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ICC brake switch harness connector and ground.

ICC brake switch Connector Terminal		Ground	Voltage
		Ciouna	
E114	1	Ground	Battery voltage

EC-502

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ICC BRAKE SWITCH

She inspection result normal? YES >> GO TO 3. JETECT MALFUNCTIONING PART Sheck the following. Fuse block (J/B) connector E103 10A fuse (No. 3) Harness for open or short between ICC brake switch and fuse >> Repair open circuit or short to ground in harness or connectors. -CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Turn ignition switch OFF. Disconnect ECM harness connector. Check the continuity between ICC brake switch harness connector and ECM harness connector ICC brake switch ECM Connector Terminal Connector	237VHR]
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Refer to EC-505, "Component Inspection (ICC Brake Switch)". s the inspection result normal?	
s the inspection result normal?	<u> </u>
•	
YES >> GO TO 15.	
NO >> Replace ICC brake switch.	
CHECK ICC BRAKE SWITCH CIRCUIT	
. Turn ignition switch OFF.	
 Disconnect ICC brake switch harness connector. Turn ignition switch ON. 	
. Check the voltage between ICC brake switch harness connector and ground.	
ICC brake switch Ground Condition Voltage (V)	
Connector Terminal	
E114 1 Ground Brake pedal	
s the inspection result normal?	

YES >> GO TO 12. NO >> GO TO 8.

 $\mathbf{8}$.Check ICC brake switch power supply circuit

1. Turn ignition switch OFF.

2. Disconnect ICC clutch switch harness connector.

ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

ICC clutch switch		Ground	Voltage	
Connector	Terminal	Ciouna	Voltage	
E113	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10 A fuse (No. 3)

Harness for open or short between ICC clutch switch and fuse

>> Repair open circuit or short to ground in harness or connectors.

10. Check ICC brake switch input signal circuit for open and short-i

- 1. Turn ignition switch OFF.
- Check the continuity between ICC clutch switch harness connector and ICC brake switch harness connector.

ICC clutch switch		ICC brake switch		Continuity
Connector	Terminal	Connector Terminal		Continuity
E113	2	E114	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

11.CHECK ICC CLUTCH SWITCH

Refer to EC-505, "Component Inspection (ICC Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace ICC clutch switch.

12. CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ICC brake switch harness connector and ECM harness connector.

ICC brake switch		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E109	1	M107	126	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E106, M6

Harness for open or short between ICC brake switch and ECM

EC-504

ICC BRAKE SWITCH

		en circuit, short to AKE SWITCH	ground or sh	ort to power in harness or connectors.		A
Refer to E	C-505, "Com	nponent Inspectior	n (ICC Brake	Switch)".		EC
Is the inspe	ection result	normal?				20
	> GO TO 15					
·		CC brake switch.				С
1 5. CHEC	CK INTERM	ITTENT INCIDEN	Т			
Refer to G	I-41, "Interm	<u>iittent Incident"</u> .				D
>:	> INSPECTI	ION END				
Compon	ent Inspe	ection (ICC Bra	ake Switch)	INFOID:000000004251050	Е
1.снеск	ICC BRAK	E SWITCH-I				
	nition switc					F
		ake switch harnes		erminale under the following conditions		
3. Check	the continu	ity between ICC b	rake switch to	erminals under the following conditions.		G
Terminals	(Condition	Continuity			0
		Fully released	Existed			
1 and 2	Brake pedal	Slightly depressed	Not existed			Н
le the inend	ection result		Not existed			
	> INSPECTI					
	> GO TO 2.					I
2.снеск	ICC BRAK	E SWITCH-II				
			Refer to BR-	8, "Inspection and Adjustment".		J
				erminals under the following conditions.		
Terminals	(Condition	Continuity			K
1 and 2	Proko podol	Fully released	Existed			
1 and 2	Brake pedal	Slightly depressed	Not existed			L
Is the inspe	ection result	normal?				
	> INSPECTI					
NO >:	> Replace IC	CC brake switch.				M
Compon	ent Inspe	ection (ICC Clu	itch Switch	ר)	INFOID:000000004251051	
1.снеск		CH SWITCH-I				Ν
	nition switc					
		utch switch harnes				0
3. Check	the continu	ity between ICC c	IUICH SWIICH I	erminals under the following conditions.		
Terminals	(Condition	Continuity			
		Fully released	Existed			Ρ
1 and 2	Clutch pedal					
lo the !===	antion no !!	Slightly depressed	Not existed			
•	ection result					
	> INSPECTI > GO TO 2.					
-		CH SWITCH-II				

ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

- 1. Adjust ICC clutch switch installation. Refer to <u>CL-5. "Inspection and Adjustment"</u>.
- 2. Check the continuity between ICC clutch switch terminals under the following conditions.

Terminals	C	Continuity		
1 and 2	Clutch pedal	Fully released	Existed	
	Cluten pedar	Slightly depressed	Not existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC clutch switch.

< DTC/CIRCUIT DIAGNOSIS >

IGNITION SIGNAL

Description

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Component Function Check			
I.INSPECTION START			
Turn ignition switch OFF, and restart engine.			
Does the engine start? YES-1 >> With CONSULT-III: GO TO 2. YES-2 >> Without CONSULT-III: GO TO 3. No >> Go to EC-507, "Diagnosis Procedure".			
2. CHECK IGNITION SIGNAL FUNCTION	F	-	
 With CONSULT-III Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III. Make sure that each circuit produces a momentary engine speed drop. 			
Is the inspection result normal? YES >> INSPECTION END NO >> Go to EC-507, "Diagnosis Procedure". 3.CHECK IGNITION SIGNAL FUNCTION			
 Without CONSULT-III Let engine idle. Read the voltage signal between ECM harness connector terminals under the following conditions with an oscilloscope. 			
ECM			
+ – Voltage signal			
Connector Terminal Connector Terminal	K	r 1	

Connector	Terminal	Connector	Terminal			
	11					
	12			50mSec/div		
F101	15		128			
FIUI	16 M107	120	÷			
	19					
	20			2V/div JMBIA0035GB		

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-507, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.

2. Check the voltage between ECM harness connector terminals as per the following.

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[VQ37VHR]

INFOID:000000004251052

EC-507

INFOID:000000004251054

Connector	+	-	Voltage
Connector	Terminal	Terminal	
M107	125	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>EC-507</u>, "Diagnosis Procedure".

2. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between condenser harness connector and ground.

Cond	lenser	Ground	Voltage	
Connector	Terminal			
F8	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 3.

3.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.

- 2. Disconnect IPDM E/R harness connector E7.
- 3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM	E/R	Cond	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E7	53	F8	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Go to <u>EC-507, "Diagnosis Procedure"</u>. NO >> GO TO 4.

NO >> GO IO 4

4.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

Harness for open or short between IPDM E/R and condenser

>> Repair open circuit, short to ground or short to power in harness or connectors.

5. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between condenser harness connector and ground.

Cond	enser	Ground	Continuity	
Connector	Terminal	Croana		
F8	2	Ground	Existed	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair open circuit or short to power in harness or connectors.



[VQ37VHR]

6.CHECK CONDENSER Refer to EC-511. "Component Inspection (Condenser)" Is the inspection result normal? YES >> GO TO 7. NO >> Replace condenser. 7.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV 1. Reconnect all harness connectors disconnected. 2. Disconnect ignition coil harness connector.	A
Is the inspection result normal? YES >> GO TO 7. NO >> Replace condenser. 7.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV 1. Reconnect all harness connectors disconnected.	
YES >> GO TO 7. NO >> Replace condenser. 7.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV 1. Reconnect all harness connectors disconnected.	EC
NO >> Replace condenser. 7.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV 1. Reconnect all harness connectors disconnected.	EC
1. Reconnect all harness connectors disconnected.	
2. Disconnect ignition coil harness connector.	C
 Turn ignition switch ON. Check the voltage between ignition coil harness connector and ground. 	D
Ignition coil Ground Voltage	_
Cylinder Connector Terminal Ground Voltage	E
1 F11 3	
2 F12 3	F
3 F13 3 Ground Battery voltage	
4 F14 3	
5 F15 3	G
6 F16 3	
Is the inspection result normal?	Н
YES >> GO TO 9. NO >> GO TO 8.	
8. DETECT MALFUNCTIONING PART	
Check the following.	
Harness connector F1	
 Harness for open or short between ignition coil and harness connector F1 	J
>> Repair or replace harness or connectors.	К
9. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT	
1. Turn ignition switch OFF.	
2. Check the continuity between ignition coil harness connector and ground.	L
2. Check the continuity between ignition coil harness connector and ground.	L
2. Check the continuity between ignition coil harness connector and ground.	L
2. Check the continuity between ignition coil harness connector and ground.	L
2. Check the continuity between ignition coil harness connector and ground. Ignition coil Ground Cylinder Connector	
2. Check the continuity between ignition coil harness connector and ground. Ignition coil Ground Continuity Qlinder Connector Terminal 1 F11 2 2 F12 2 3 F13 2	L M N
2. Check the continuity between ignition coil harness connector and ground. Ignition coil Ground Continuity Cylinder Connector Terminal Continuity 1 F11 2 1 2 F12 2 1	
2. Check the continuity between ignition coil harness connector and ground. Ignition coil Ground Continuity Cylinder Connector Terminal 1 F11 2 2 F12 2 3 F13 2 Ground Existed	
2. Check the continuity between ignition coil harness connector and ground. Ignition coil Ground Continuity Qlinder Connector Terminal 1 F11 2 2 F12 2 3 F13 2 4 F14 2	Ν
 2. Check the continuity between ignition coil harness connector and ground. Ignition coil Ignition coil Ground Continuity 1 F11 2 Arrow Connector Terminal Continuity 2 F12 2 Ground Ground Ground Existed 3. Also check harness for short to power. 	N
 2. Check the continuity between ignition coil harness connector and ground. Ignition coil Ignition coil Ground Continuity Continuity F11 2 F12 2 F13 2 Ground Existed F16 Conteck harness for short to power. Is the inspection result normal? 	Ν
2. Check the continuity between ignition coil harness connector and ground. Ignition coil Ground Continuity 1 F11 2 2 F12 2 3 F13 2 4 F14 2 5 F15 2 6 F16 2 3. Also check harness for short to power. Is the inspection result normal? YES >> GO TO 10.	N
 2. Check the continuity between ignition coil harness connector and ground. Ignition coil Ignition coil Ground Continuity Continuity F11 2 F12 2 F13 2 Ground Existed F16 Continuity Existed Also check harness for short to power. Is the inspection result normal? 	0

< DTC/CIRCUIT DIAGNOSIS >

EC-509

< DTC/CIRCUIT DIAGNOSIS >

	Ignition coil		EC		
	0	T			Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F11	1		20	
2	F12	1		16	
3	F13	1	F101	12	Existed
4	F14	1	FIUI	11	EXISTED
5	F15	1		15	
6	F16	1		19	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F104, F105

Harness for open or short between ignition coil and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

12. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-510, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning ignition coil with power transistor.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:000000004251055

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.

2. Disconnect ignition coil harness connector.

3. Check resistance between ignition coil terminals as per the following.

Terminals	Resistance (Ω) [at 25°C (77°F)]	
1 and 2	Except 0 or ∞	
1 and 3	Except 0	
2 and 3	Except 0	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor.

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

< DTC/CIRCUIT DIAGNOSIS >

Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.
 NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 4. Start engine.
- 5. After engine stalls, crank it two or three times to release all fuel pressure.
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 8. Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made. NOTE:

When the gap is less than 13 mm (0.52 in), spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser)

1.CHECK CONDENSER

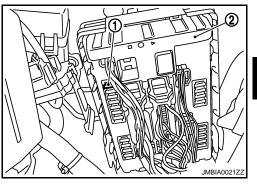
- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- 3. Check resistance between condenser terminals as per the following.

Terminals	Resistance (M Ω)	
1 and 2	Above 1 [at 25°C (77°F)]	
le the increation requit remodel		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser.



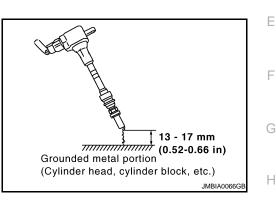
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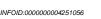
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< DTC/CIRCUIT DIAGNOSIS >

MALFUNCTION INDICATOR LAMP

Description

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should turn off. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.

For details, refer to EC-112, "Diagnosis Description".



Component Function Check

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.

2. Make sure that MIL illuminates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-512, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC UXXXX.

2. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-37, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter.

NO >> Repair or replace.

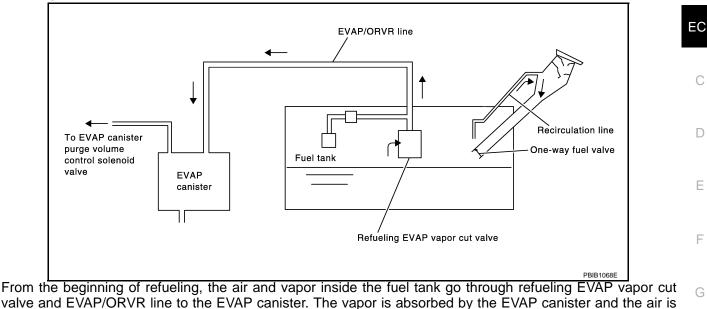
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< DTC/CIRCUIT DIAGNOSIS >

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Description



released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

 When conducting inspections below, be sure to observe the following: Put a "CAUTION: FLAMMABLE" sign in workshop. Never smoke while servicing fuel system. Keep open flames and sparks away from wo Always furnish the workshop with a CO₂ fire extinguisher. CAUTION: 	rk area.	l J
 Before removing fuel line parts, carry out the following procedures: Put drained fuel in an explosion-proof container and put lid on securely. Release fuel pressure from fuel line. Refer to <u>EC-614, "Inspection"</u>. Disconnect battery ground cable. Always replace O-ring when the fuel gauge retainer is removed. Never kink or twist hose and tube when they are installed. Never tighten hose and clamps excessively to avoid damaging hoses. 		K
 After installation, run engine and check for fuel leaks at connections. Never attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire Component Function Check 	9.	Μ
1.check orver function	INFOID:000000004251061	Ν
Check whether the following symptoms are present.Fuel odor from EVAP canister is strong.Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.		0
Are any symptoms present? YES >> Go to EC-513, "Diagnosis Procedure". NO >> INSPECTION END		Ρ
Diagnosis Procedure	INFOID:000000004251062	
1.INSPECTION START		

Check whether the following symptoms are present. A: Fuel odor from EVAP canister is strong. INFOID:000000004251060

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

A >> GO TO 2. B >> GO TO 7.

2. CHECK EVAP CANISTER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 4.

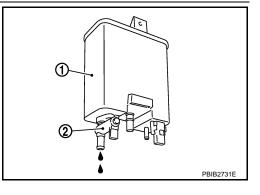
3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister (1).

2 : EVAP canister vennt control valve

Does water drain from the EVAP canister?

YES >> GO TO 4. NO >> GO TO 6.



4.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

6.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-516. "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

7.CHECK EVAP CANISTER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 9.

 $\mathbf{8}$.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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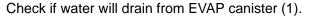
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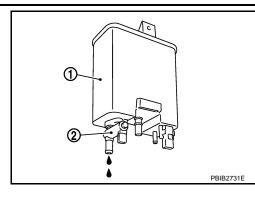
Ρ



2 : EVAP canister vent control valve

Does water drain from the EVAP canister?

YES >> GO TO 9. NO >> GO TO 11.



9.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose. 11.CHECK VENT HOSES AND VENT TUBES Check hoses and tubes between EVAP canister and refueling control valve for clogging, kinks, looseness and improper connection. Is the inspection result normal? YES >> GO TO 12. NO >> Repair or replace hoses and tubes. 12.CHECK FILLER NECK TUBE Check recirculation line for clogging, dents and cracks. Is the inspection result normal? YES >> GO TO 13. NO >> Replace filler neck tube. 13.CHECK REFUELING EVAP VAPOR CUT VALVE Refer to EC-516, "Component Inspection". Is the inspection result normal? YES >> GO TO 14. NO >> Replace refueling EVAP vapor cut valve with fuel tank. 14.CHECK FUEL FILLER TUBE Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks. Is the inspection result normal? YES >> GO TO 15.

NO >> Replace fuel filler tube.

15.CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair or replace one-way fuel valve with fuel tank.

16.CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.

2. Remove fuel filler tube and hose.

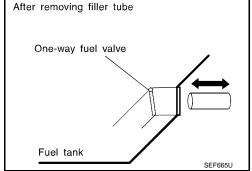
< DTC/CIRCUIT DIAGNOSIS >

 Check one-way fuel valve for operation as follows. When a stick is inserted, the valve should open, when removing stick it should close.

Do not drop any material into the tank.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Component Inspection

INFOID:000000004251063

[VQ37VHR]

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

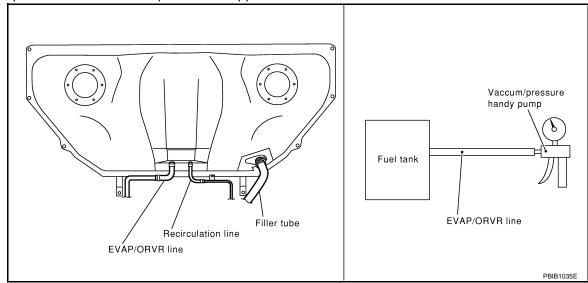
2.CHECK REFUELING EVAP VAPOR CUT VALVE

BWith CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Remove fuel tank. Refer to FL-10, "Removal and Installation".
- 3. Drain fuel from the tank as follows:
- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
- Check refueling EVAP vapor cut valve for being stuck to close as follows. Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
- 5. Check refueling ÉVAP vapor cut valve for being stuck to open as follows.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

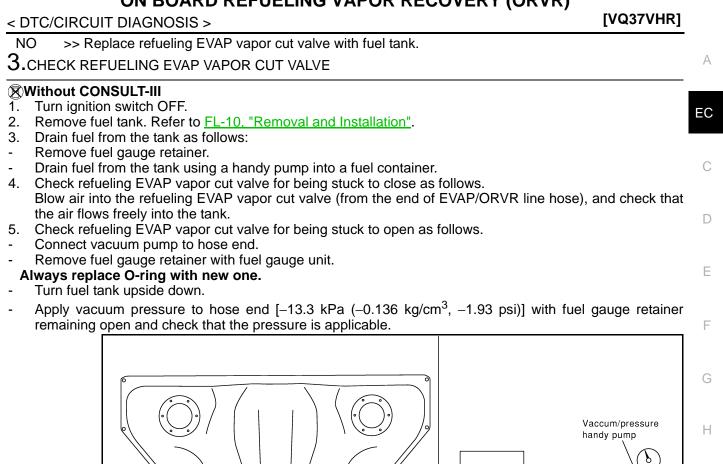
Always replace O-ring with new one.

- Turn fuel tank upside down.
- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm³, -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



Is the inspection result normal? YES >> INSPECTION END

Revision: 2009 October



Filler tube

Récirculation line

Fuel tank

EVAP/ORVR line

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace refueling EVAP vapor cut valve with fuel tank.

EVÁP/ORVR line

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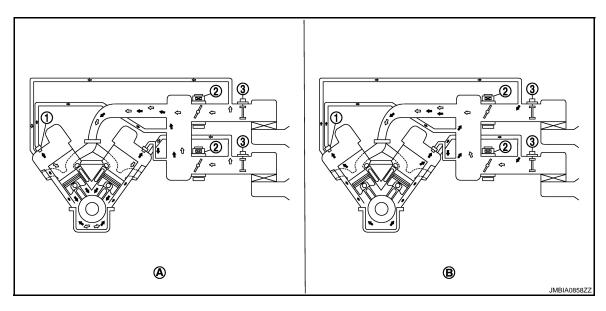
< DTC/CIRCUIT DIAGNOSIS >

POSITIVE CRANKCASE VENTILATION

Description

INFOID:000000004251064

[VQ37VHR]



1. PCV valve

- 2. Electric throttle control actuator
- Mass air flow sensor

3

A. Normal condition

B. Hi-load condition

- √
 □: Fresh air
- 🖛 : Blow-by air

This system returns blow-by gas to the intake manifold.

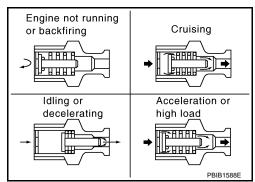
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Component Inspection

INFOID:000000004251065

1.CHECK PCV VALVE

POSITIVE CRANKCASE VENTILATION

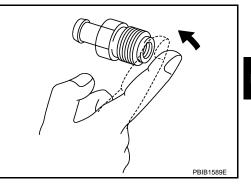
< DTC/CIRCUIT DIAGNOSIS >

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace PCV valve.



[VQ37VHR]

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< DTC/CIRCUIT DIAGNOSIS >

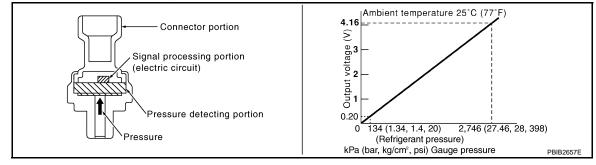
REFRIGERANT PRESSURE SENSOR

Description

INFOID:000000004251066

IVQ37VHR

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Component Function Check

INFOID:000000004251067

1.CHECK REFRIGERANT PRESSURE SENSOR FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn A/C switch and blower fan switch ON.
- 3. Check the voltage between ECM harness connector terminals as per the following.

Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
M107	105 (Refrigerant pressure sensor signal)	112	1.0 - 4.0

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-520, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000004251068

1.CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Turn ignition switch OFF.
- 3. Check ground connection M95. Refer to Ground Inspection in GI-44, "Circuit Inspection".

Is the inspection result normal?

NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect refrigerant pressure sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pr	Refrigerant pressure sensor		Voltage (V)
Connector	Terminal	Ground	voltage (v)
E77	3	Ground	Approx. 5
		10	

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

REFRIGERANT PRESSURE SENSOR

[VQ37VHR < DTC/CIRCUIT DIAGNOSIS > **3.** DETECT MALFUNCTIONING PART Check the following. Harness connectors M6, E106 Harness for open or short between ECM and refrigerant pressure sensor EC >> Repair open circuit, short to ground or short to power in harness or connectors. ${f 4}.$ CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. Disconnect ECM harness connector. 2. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connec-3. D tor Е Refrigerant pressure sensor ECM Continuity Connector Terminal Connector Terminal E77 M107 112 1 Existed Also check harness for short to ground and short to power. 4. Is the inspection result normal? YES >> GO TO 6. NO >> GO TO 5. **5.**DETECT MALFUNCTIONING PART Н Check the following. Harness connectors M6, E106 Harness for open or short between ECM and refrigerant pressure sensor >> Repair open circuit, short to ground or short to power in harness or connectors. ${f 6}.$ CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector. Κ Refrigerant pressure sensor ECM Continuity Connector Terminal Terminal Connector E77 2 M107 105 Existed Also check harness for short to ground and short to power. Is the inspection result normal? M YES >> GO TO 8. NO >> GO TO 7.

I.DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors M6, E106

· Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.

NO >> Repair or replace.

Ν

SNOW MODE SWITCH

Description

INFOID:000000004609739

[VQ37VHR]

The snow mode switch signal is sent to the "unified meter and A/C amp." from the snow mode switch. The "unified meter and A/C amp." then sends the signal to the ECM via the CAN communication line. The snow mode is used for driving or starting the vehicle on snowy roads or slippery areas. If the snow mode is activated, the vehicle speed will not accelerats as quickly as normal to avoid vehicle slip. In other words, ECM controls rapid engine torque change by controlling the electric throttle control actuator operating speed.

Component Function Check

INFOID-000000004609740

CHECK SNOW MODE SWITCH FUNCTION

- 1. Turn ignition switch ON.
- Select "SNOW MODE SW" in "DATA MONITOR" mode with CONSULT-III. 2.
- Check "SNOW MODE SW" indication under the following conditions. 3.

Monitor item	Condition		Indication
SNOW MODE SW	Snow mode switch	ON	ON
SNOW MODE SW	Show mode switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-522, "Diagnosis Procedure".

2.CHECK SNOW MODE INDICATOR FUNCTION

- 1. Turn ignition switch ON.
- Check the snow mode indicator in the snow mode switch under the following condition. 2.

Condition		Snow mode indicator
Snow mode switch	ON	ON
Show mode switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

>> Go to EC-522, "Diagnosis Procedure". NO

Diagnosis Procedure

INFOID:000000004609741

1.CHECK SNOW MODE SWITCH OVERALL FUNCTION

Confirm the malfunctioning circuit (snow mode switch or snow mode indicator). Refer to EC-522, "Component Function Check".

Which circuit is related to the incident?

Snow mode switch>>GO TO 2. Snow mode indicator>>GO TO 6.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-37, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to MWI-4. "Work flow".

 ${\it 3.}$ check snow mode switch power supply circuit

1. Turn ignition switch OFF.

Disconnect snow mode switch harness connector. 2.

3. Turn ignition switch ON.

4. Check the voltage between snow mode switch harness connector and ground.

EC-522

SNOW MODE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

	ode switch			-		
Connector	Terminal	Ground	Voltage			
M139	1	Ground	Battery voltage	-		
Is the inspe	ection resu			-		E
YES >>	> GO TO 5 > GO TO 4	5.				
4			9 PART			(
	connector R harness	s E106, M6 connector E	27			
		r short betw	veen snow m	ode switch ar	d fuse.	
_	•		0		power in harness or connectors.	
J. CHECK	SNOW M	ODE SWIT	CH INPUT S	GNAL CIRC	JIT FOR OPEN AND SHORT	
 Discon Check 		ed meter ar nuity betwee	nd A/C amp." en snow moo		nector. ness connector and "unified meter and A/C amp."	(
Snow mod	de switch	Unified meter	r and A/C amp.			I
Connector	Terminal	Connector	Terminal	Continuity		
M139	4	M66	23	Existed		
4. Also ch	neck harne	ess for shor	t to ground a	d short to po	wer.	
Is the inspe	ection resu	<u>ilt normal?</u>				
	> GO TO 8					
~	•		•	id or short to	power in harness or connector.	
		CONNEC	HON			
	nition swit		05 Dofor to	Sround Incod	ation in CL 44. "Circuit Inspection"	
2. Check Is the inspe	-		95. Kelel 10 v	siounu inspe	ction in <u>GI-44, "Circuit Inspection"</u> .	
	> GO TO 7					
			ound connec	ion.		
7.снеск	SNOW M	ODE INDIC	ATOR LAMP	GROUND C	IRCUIT FOR OPEN AND SHORT	
					ess connector and ground.	
Snow mod	he switch					
Connector	Terminal	Ground	Continuity			
M139	2	Ground	Existed			
		ess for shore				(
Is the inspe						
-	> GO TO 8					
			or short to po	ver in harnes	s or connectors.	
8.CHECK	SNOW M	ODE SWIT	СН			
Refer to EC	C-524, "Co	mponent In	spection".			
Is the inspe						
VEQ)				

YES >> GO TO 9.

NO >> Replace snow mode switch.

SNOW MODE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

9. CHECK INTERMITTENT INCIDENT

Refer to GI-41, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK SNOW MODE SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect snow mode switch harness connector.

3. Check the continuity between snow mode switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 4		ON	Existed
1 410 4	Show mode switch	OFF	Not Existed

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace snow mode switch.

2.CHECK SNOW MODE SWITCH-II

Check the continuity between snow mode switch terminals under the following conditions.

Terminals (Polarity)	Continuity
2 (+) - 4 (-)	Existed
4 (+) - 2 (–)	Not Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace snow mode switch.

INFOID:000000004609742

ECU DIAGNOSIS INFORMATION ECM

Reference Value

А

INFOID:000000004251069 EC

[VQ37VHR]

С

- VALUES ON THE DIAGNOSIS TOOL **NOTE**:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector. * Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIM-ING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

CONSULT-III MONITOR ITEM

Monitor Item	Co	Values/Status			
ENG SPEED	Run engine and compare CONSUL	Almost the same speed as the tachometer indication			
MAS A/F SE-B1	See EC-137, "Description".				
MAS A/F SE-B2	See EC-137, "Description".	See EC-137, "Description".			
B/FUEL SCHDL	See EC-137, "Description".				
A/F ALPHA-B1	See EC-137, "Description".				
A/F ALPHA-B2	See EC-137, "Description".				
COOLAN TEMP/S	Ignition switch: ON		Indicates engine coolant temperature		
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V		
A/F SEN1 (B2)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V		
HO2S2 (B1)	are met. - Engine: After warming up	 Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. Engine: After warming up After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at 			
HO2S2 (B2)	 Revving engine from idle up to 3,00 are met. Engine: After warming up After keeping engine speed betwee idle for 1 minute under no load 	0 - 0.3 V ←→ Approx. 0.6 - 1.0 V			
HO2S2 MNTR (B1)	 Revving engine from idle up to 3,00 are met. Engine: After warming up After keeping engine speed betwee idle for 1 minute under no load 	$LEAN \leftarrow \rightarrow RICH$			
HO2S2 MNTR (B2)	 Revving engine from idle up to 3,00 are met. Engine: After warming up After keeping engine speed betwee idle for 1 minute under no load 	$LEAN \leftarrow \rightarrow RICH$			
VHCL SPEED SE	Turn drive wheels and compare CO cation.	Almost the same speed as speedometer indication			
BATTERY VOLT	Ignition switch: ON (Engine stopped	11 - 14 V			
ACCEL SEN 4	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.00 V		
ACCEL SEN 1	(Engine stopped)	Accelerator pedal: Fully depressed	4.4 - 4.8 V		
Ignition switch: ON		Accelerator pedal: Fully released	0.45 - 1.00 V		
ACCEL SEN 2*1	(Engine stopped)	Accelerator pedal: Fully depressed	4.3 - 4.8 V		

< ECU DIAGNOSIS INFORMATION >

Monitor Item	Co	ondition	Values/Status
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B1	(Engine stopped)Selector lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B1 ^{*1}	(Engine stopped)Selector lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank tempera- ture
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temper- ature
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 - 4.8 V
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow OI$	N	$OFF\toON\toOFF$
	Ignition switch: ON	Accelerator pedal: Fully released	ON
CLSD THL POS	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF
		Air conditioner switch: OFF	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates.)	ON
		Selector lever: P or N (A/T), Neutral (M/T)	ON
P/N POSI SW	Ignition switch: ON	Selector lever: Except above	OFF
	• Engine: After warming up, idle the	Steering wheel: Not being turned	OFF
PW/ST SIGNAL	engine	Steering wheel: Being turned	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON\toOFF\toON$
HEATER FAN SW	• Engine: After warming up, idle the	Heater fan switch: ON	ON
HEATER FAIN SW	engine	Heater fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
BRARE SW	• Ignition switch. ON	Brake pedal: Slightly depressed	ON
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B1	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B2	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	1.9 - 2.9 msec
IGN TIMING	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF 	Idle 2,000 rpm	7° BTDC 25° - 45° BTDC
	No load		
	 Engine: After warming up Selector lever: P or N (A/T), Neu- 	Idle	5% - 35%
CAL/LD VALUE	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,500 rpm	5% - 35%

< ECU DIAGNOSIS INFORMATION >

Monitor Item	Co	ondition	Values/Status
	Engine: After warming up	Idle	2.0 - 6.0 g⋅m/s
MASS AIRFLOW	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,500 rpm	7.0 - 20.0 g⋅m/s
PURG VOL C/V	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF 	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	-
INT/V TIM (B1)	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) 	Idle	– 5 - 5°CA
	Air conditioner switch: OFFNo load	2,000 rpm	Approx. 0 - 30°CA
	 Engine: After warming up Selector lever: P or N (A/T), Neu- 	Idle	– 5 - 5°CA
INT/V TIM (B2)	 Selector level: F of N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0 - 30°CA
	Engine: After warming up Selector lever: P or N (A/T), Neu-	Idle	0 - 2%
INT/V SOL (B1)	tral (M/T)Air conditioner switch: OFFNo load	2,000 rpm	Approx. 0 - 50%
	 Engine: After warming up Selector lever: P or N (A/T), Neu- 	Idle	0 - 2%
INT/V SOL (B2)		2,000 rpm	Approx. 0 - 50%
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B2	(Engine stopped)Selector lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V
	Ignition switch: ON (Engine standed)	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B2* ¹	(Engine stopped)Selector lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V
	Engine: After warming up, idle the	Air conditioner switch: OFF	OFF
AIR COND RLY	engine	Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	 For 1 second after turning ignition s Engine running or cranking 	witch: ON	ON
	Except above		OFF
VENT CONT/V	Ignition switch: ON		OFF
THRTL RELAY	Ignition switch: ON		ON
HO2S2 HTR (B1)	 Engine speed: Below 3,600 rpm after the following conditions are met. Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		ON
	• Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B2)	 Engine speed: Below 3,600 rpm after the following conditions are met. Engine: After warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 		ON
	Engine speed: Above 3,600 rpm		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h ((12 MPH)	Almost the same speed as the tachometer indication

< ECU DIAGNOSIS INFORMATION >

Monitor Item	(Condition	Values/Status
VEHICLE SPEED	Turn drive wheels and compare Conception.	ONSULT-III value with the speedometer indi-	Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: Running	Idle air volume learning has not been per- formed yet.	YET
IDE AV LEARIN	• Engine. Running	Idle air volume learning has already been performed successfully.	CMPLT
SNOW MODE SW		Snow mode switch: Pressed	ON
SNOW MODE SW	Ignition switch: ON	Snow mode switch: Released	OFF
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illumi- nated.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	Engine: After warming up, idle the (More than 140 seconds after star		4 - 100%
A/F S1 HTR (B2)	Engine: After warming up, idle the (More than 140 seconds after star		4 - 100%
AC PRESS SEN	Engine: IdleBoth A/C switch and blower fan sw	vitch: ON (Compressor operates)	1.0 - 4.0 V
VHCL SPEED SE	Turn drive wheels and compare Conception.	ONSULT-III value with the speedometer indi-	Almost the same speed as the speedometer indication
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
	Ignition switch: ON	MAIN switch: Pressed	ON
MAIN SW		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
CANCEL SW	· Ignition switch. ON	CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
RESUME/ACC SW	• Ignition switch. ON	RESUME/ACCELERATE switch: Re- leased	OFF
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
5ET 5W	Ignition switch: ON	SET/COAST switch: Released	OFF
BRAKE SW1		Brake pedal: Fully released	ON
(ICC/ASCD brake switch)	Ignition switch: ON	Brake pedal: Slightly depressed	OFF
BRAKE SW2		Brake pedal: Fully released	OFF
(Stop lamp switch)	Ignition switch: ON	Brake pedal: Slightly depressed	ON
		DISTANCE switch: Pressed	ON
DIST SW	Ignition switch: ON	DISTANCE switch: Released	OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON \rightarrow OFF$
BAT CUR SEN	 Engine speed: Idle Battery: Fully charged*² Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 		Approx. 2,600 - 3,500 mV
ALT DUTY	Engine: Idle		0 - 80%
ATOM PRES SEN	This item is displayed but is not ap	oplicable to this model.	
BRAKE BST PRES SE	This item is displayed but is not ap	oplicable to this model.	

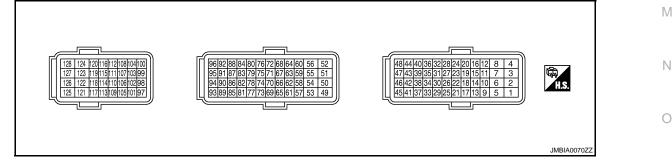
< ECU DIAGNOSIS INFORMATION >

Monitor Item Condition Values/Status А Approx. 0.25 - 1.40 V · Engine: After warming up Idle Selector lever: P or N (A/T), Neu-**VVEL POSITION** tral (M/T) When revving engine up to 2,000 rpm SEN-B1 Approx. 0.25 - 4.75 V · Air conditioner switch: OFF EC quickly No load · Engine: After warming up Idle Approx. 0.25 - 1.40 V Selector lever: P or N (A/T), Neu-**VVEL POSITION** tral (M/T) When revving engine up to 2,000 rpm SEN-B2 Approx. 0.25 - 4.75 V Air conditioner switch: OFF quickly · No load D · Engine: After warming up Idle Approx. 0 - 20 deg • Selector lever: P or N (A/T), Neu-VVEL TIM-B1 tral (M/T) When revving engine up to 2,000 rpm Approx. 0 - 90 deg · Air conditioner switch: OFF quickly No load · Engine: After warming up Approx. 0 - 20 deg Idle ٠ Selector lever: P or N (A/T), Neu-VVEL TIM-B2 F tral (M/T) When revving engine up to 2,000 rpm Approx. 0 - 90 deg Air conditioner switch: OFF quickly No load VVEL learning has not been performed YET yet. Ignition switch: OFF → ON **VVEL LEARN** (After warming up) VVEL learning has already been per-DONE formed successfully. Н VVEL SEN LEARN-· VVEL learning has already been performed successfully Approx. 0.30 - 0.80 V B1 **VVEL SEN LEARN-**Approx. 0.30 - 0.80 V VVEL learning has already been performed successfully B2 A/F ADJ-B1 · Engine: Running -0.330 - 0.330 A/F ADJ-B2 · Engine: Running -0.330 - 0.330 FAN DUTY Engine: Running 0 - 100% ON Power generation voltage variable control: Operating ALT DUTY SIG Κ OFF · Power generation voltage variable control: Not operating

*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

TERMINAL LAYOUT



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NOTE:

- ECM is located behind the instrument assist lower panel. For this inspection, remove passenger side instrument lower panel.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

PHYSICAL VALUES

EC-529

IVQ37VHR

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
1 (W)	128 (B)	A/F sensor 1 heater (bank 1)	Output	 [Engine is running] Warm-up condition Idle speed (More than 140 seconds after starting engine) 	2.9 - 8.8 V★ 50mSec/div 50mSec/div 50mSec/div 50mSec/div 50mSec/div JMBIA0030GB
2	2 128 Th	Throttle control motor		 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully depressed 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0031GB
(G)	(B)	(Open) (bank 1)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully released 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div
3 (R)	128 (B)	Throttle control motor power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
4 (BR)	128 (B)	Throttle control motor (Close) (bank 1)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: In the middle of releasing operation 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0033GB
5 (GR)	128 (B)	A/F sensor 1 heater (bank 2)	Output	 [Engine is running] Warm-up condition Idle speed (More than 140 seconds after starting engine) 	2.9 - 8.8 V★ 50mSec/div 50mSec/div 50mSec/div 50mSec/div 50mSec/div JMBIA0030GB
8 (B)		ECM ground	_	_	_

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

	inal No. e color)	Description		Condition	Value	A
+		Signal name	Input/ Output	Condition	(Approx.)	
11 (GR)		Ignition signal No. 4		[Engine is running]	0 - 0.2 V★ 50mSec/div_	EC
12 (L)		Ignition signal No. 3		 Warm-up condition Idle speed NOTE: 		С
15 (V)	128	Ignition signal No. 5		The pulse cycle changes depending on rpm at idle	2V/div JMBIA0035GB	D
16 (G)	(B)	Ignition signal No. 2	Output		0.1 - 0.4 V★ 50mSec/div	_
19 (SB)		Ignition signal No. 6		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm		E
20 (Y)		Ignition signal No. 1			2V/div JMBIA0036GB	F
17 (P)	128 (B)	Heated oxygen sensor 2 heater (bank 1)	Output	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10 V★ 50mSec/div € 50mSec/div 50mSec/div 50mSec/div JMBIA0037GB	G H
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)	J
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)	K
	128 (B)	Intake valve timing con- trol solenoid valve (bank Output 1)	Output	[Engine is running]Warm-up conditionEngine speed: 2,000rpm	7 - 12 V★	L

0

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< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
21	128	EVAP canister purge vol-		[Engine is running]Idle speedAccelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € 10V/div JMBIA0039GB
(GR)	(B)	ume control solenoid valve	Output	 [Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div ÷ 10V/div JMBIA0040GB
22 (R)	128 (B)	Fuel pump relay	Output	 [Ignition switch: ON] For 1 second after turning ignition switch ON [Engine is running] 	0 - 1.5 V
(1)	(0)			[Ignition switch: ON]More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
24	128 (D)	ECM relay (Self shut-off)	Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.5 V
(P)	(B)			[Ignition switch: OFF]More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
25 (O)	128 (B)	Throttle control motor re- lay	Output	[Ignition switch: $ON \rightarrow OFF$]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V
				[Ignition switch: ON]	0 - 1.0 V
28 (BR)	128 (B)	VVEL actuator motor re- lay abort signal [VVEL control module]	Output	[Engine is running]Warm-up conditionIdle speed	0 V
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
29 (G)	128 (B)	Intake valve timing con- trol solenoid valve (bank 2)	Output	[Engine is running]Warm-up conditionEngine speed: 2,000rpm	7 - 12 V★

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Oraclitica	Value
+		Signal name	Input/ Output	Condition	(Approx.)
30	40	Throttle position sensor	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
(Y)	(R)	1 (bank 1)	mput	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V
31	48	Throttle position sensor	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
(R)	(B)	1 (bank 2)	mput	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V
33 (SB)	128 (B)	Heated oxygen sensor 2 heater (bank 2)	Output	 [Engine is running] Engine speed: Below 3,600 rpm after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	10 V★ 50mSec/div = = 50mSec/div = = 50mSec/div 50mSec/div 5
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
34	40	Throttle position sensor	loput	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
(B)	(R)	2 (bank 1)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V
35	48	Throttle position sensor	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
(W)	(B)	2 (bank 2)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V
36 (O)		Sensor ground [Brake booster pressure sensor]		_	_

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value								
+		Signal name	Input/ Output	Condition	(Approx.)								
37	128	Crankshaft position sen-	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 - 5.0 V★ 1mSec/div ↓ ↓ ↓ ↓ 2V/div JMBIA0041GB								
(W)	(B)	sor (POS)	niput	[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0 V★ 1mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓								
38	96	Manifold absolute pres-	Manifold absolute pres-	Manifold absolute pres-	Manifold absolute pres-	Manifold absolute pres-	Manifold absolute pres-	Manifold absolute pres-			Input	[Engine is running]Warm-up conditionIdle speed	1.2 V
(O)	(P)	sure (MAP) sensor	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	1.5 V								
39	36	Brake booster pressure	Input	[Engine is running]Warm-up conditionIdle speedBrake pedal: Fully released	1.2 V								
(P)	(O)	sensor	mput	[Engine is running]Warm-up conditionIdle speedBrake pedal: Fully depressed	3.0 V								
40 (R)	_	Sensor ground [Throttle position sensor (bank 1)]	_	_	_								
43 (G)	48 (B)	Sensor power supply [Throttle position sensor (bank 2)]	_	[Ignition switch: ON]	5 V								
44 (L)	40 (R)	Sensor power supply [Throttle position sensor (bank 1)]	_	[Ignition switch: ON]	5 V								
45 (LG)	36 (O)	Sensor power supply [Brake booster pressure sensor]	_	[Ignition switch: ON]	5 V								
46 (R)	128 (B)	Sensor power supply [Crankshaft position sensor (POS)]	_	[Ignition switch: ON]	5 V								
47 (Y)	_	Sensor ground [Crankshaft position sensor (POS)]	_	_	_								
48 (B)	_	Sensor ground [Throttle position sensor (bank 2)]	_		_								

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Oradition	Value	A
+		Signal name	Input/ Output	Condition	(Approx.)	
49 (GR)	128 (B)	Throttle control motor (Close) (bank 2)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: In the middle of releasing operation 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0033GB	C D
50 (V)	128 (B)	Throttle control motor (Open) (bank 2)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully depressed 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0031GB	E
(*)				 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully released 	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0032GB	G H I
52 (R)	128 (B)	Throttle control motor power supply (bank 2)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
53 (W)	128 (B)	Ignition switch	Input	[Ignition switch: OFF] [Ignition switch: ON]	0 V BATTERY VOLTAGE (11 - 14 V)	J
54 (Y)		CAN communication line [VVEL control module]	Input/ output	_		Κ
55 (LG)	_	CAN communication line [VVEL control module]	Input/ output	_	_	L
57 (L)	128 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2 V	
59	128	Camshaft position sen-		 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	3.0 - 5.0 V★ 20mSec/div = 	M N O
(O)	128 (B)	Camshaft position sen- sor (PHASE) (bank 1)	Input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div 20mSec/div 20mSec/div 20mSec/div 20mSec/div	Ρ

< ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
60 (G)	128 (B)	Sensor power supply [Camshaft position sen- sor (PHASE) (bank 1), Manifold absolute pres- sure (MAP) sensor, Pow- er steering pressure sensor]	_	[Ignition switch: ON]	5 V
61 (R)	128 (B)	A/F sensor 1 (bank 1)	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.
63 (L)	128 (B)	Camshaft position sen- sor (PHASE) (bank 2)	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	3.0 - 5.0 V★ 20mSec/div 5 2V/div JMBIA0045GB 3.0 - 5.0 V★
				[Engine is running] • Engine speed: 2,000 rpm	20mSec/div 20mSec/div 2V/div JMBIA0046GB
64 (SB)	128 (B)	Sensor power supply [Camshaft position sen- sor (PHASE) (bank 2), Battery current sensor]	_	[Ignition switch: ON]	5 V
65 (LG)	128 (B)	A/F sensor 1 (bank 2)	Input	[Ignition switch: ON]	2.2 V
66 (V)	128 (B)	A/F sensor 1 (bank 2)	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.
67 (P)	128 (B)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
68 (LG)	_	Sensor ground [Mass air flow sensor (bank 1), Intake air tem- perature sensor]	_	_	_
69 (W)	128 (B)	Knock sensor (bank 2)	Input	[Engine is running] • Idle speed	2.5 V* ¹
71 (Y)	128 (B)	Engine coolant tempera- ture sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
72 (—)	_	Sensor ground (Knock sensor)	_	_	
73 (W)	128 (B)	Knock sensor (bank 1)	Input	[Engine is running] • Idle speed	2.5 V* ¹

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
76 (W)	128 (B)	Heated oxygen sensor 2 (bank 1)	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 1.0 V	EC C D
77 (SB)	68 (LG)	Mass air flow sensor (bank 1)	Input	[Engine is running] • Warm-up condition • Idle speed [Engine is running]	0.7 - 1.2 V	E
				Warm-up conditionEngine speed: 2,500 rpm	1.3 - 1.7 V	_
78 (G)	84 (B)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.	F
79	94	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.7 - 1.2 V	G
(BR)	(Y)	(bank 2)	Input	[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.3 - 1.7 V	Н
80 (O)	128 (B)	Heated oxygen sensor 2 (bank 2)	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met Engine: after warming up Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load 	0 - 1.0 V	J
81 (R)		Fuel injector No. 3			BATTERY VOLTAGE (11 - 14 V)★	K
82 (V)		Fuel injector No. 6		 [Engine is running] Warm-up condition Idle speed NOTE: 	50mSec/div	L
85 (BR)	100	Fuel injector No. 2		The pulse cycle changes depending on rpm at idle	10V/div JMBIA0047GB	M
86 (W)	128 (B)	Fuel injector No. 5	Output		BATTERY VOLTAGE (11 - 14 V)★	Ν
89 (GR)		Fuel injector No. 1		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	50mSec/div	0
90 (O)		Fuel injector No. 4		Lingine speed. 2,000 ipin	10V/div JMBIA0048GB	Ρ
84 (B)		Sensor ground (Heated oxygen sensor 2, Engine coolant tem- perature sensor, Engine oil temperature sensor)		_	_	

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
87		Power steering pressure	Output	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5 V
(Y)	(P)	sensor	Output	[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8 V
91 (SB)	95 (G)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged ^{*2} • Idle speed	2.6 - 3.5 V
92 (G)	_	Sensor ground [Camshaft position sen- sor (PHASE) (bank 2)]	_	-	_
93 (P)	128 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
94 (Y)		Sensor ground [Mass air flow sensor (bank 2)]	—	_	_
95 (G)	_	Sensor ground (Battery current sensor)	_	_	-
96 (P)	_	Sensor ground [Camshaft position sen- sor (PHASE) (bank 1),Manifold absolute pressure (MAP) sensor, Power steering pressure sensor]	_	_	_
97	100	Accelerator pedal posi-	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.45 - 1.00 V
(R)	(W)	tion sensor 1	mput	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	4.2 - 4.8 V
98	104	Accelerator pedal posi-	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.22 - 0.50 V
(P)	(GR)	tion sensor 2	mput	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	2.1 - 2.5 V
99 (L)	100 (W)	Sensor power supply (Accelerator pedal posi- tion sensor 1)	_	[Ignition switch: ON]	5 V
100 (W)	_	Sensor ground (Accelerator pedal posi- tion sensor 1)	_	_	_

< ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description			Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
				[Ignition switch: ON] • ICC steering switch: OFF	4.3 V	EC
				[Ignition switch: ON] • MAIN switch: Pressed	0 V	С
101	108	ICC steering switch		[Ignition switch: ON] • CANCEL switch: Pressed	1.3 V	_
(SB)	(Y)	(models with ICC sys- tem)	Input	[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3.7 V	D
				[Ignition switch: ON] • SET/COAST switch: Pressed	3 V	Е
				[Ignition switch: ON] • DISTANCE switch: Pressed	2.2 V	F
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V	-
				[Ignition switch: ON] • MAIN switch: Pressed	0 V	G
101 (SB)	108 (Y)	ASCD steering switch (models with ASCD sys- tem)	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V	Н
				[Ignition switch: ON]RESUME/ACCELERATE switch: Pressed	3 V	
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V	
102 (GR)	112 (SB)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V	J
103 (G)	104 (GR)	Sensor power supply (Accelerator pedal posi- tion sensor 2)	_	[Ignition switch: ON]	5 V	K
104 (GR)	_	Sensor ground (Accelerator pedal posi- tion sensor 2)	_	_	_	L
105 (L)	116 (P)	Refrigerant pressure sensor	Input	 [Engine is running] Warm-up condition Both A/C switch and blower fan motor switch: ON (Compressor operates) 	1.0 - 4.0 V	M
106 (W)	128 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.	N
107 (BR)	112 (SB)	Sensor power supply (EVAP control system pressure sensor,Refrig- erant pressure sensor)	_	[Ignition switch: ON]	5 V	0
108 (Y)	_	Sensor ground (ASCD/ICC steering switch)		_	_	Ρ
109 (G)	128 (B)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N (A/T), Neutral (M/ T) [Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V) 0 V	
				Selector lever: Except above		ı

< ECU DIAGNOSIS INFORMATION >

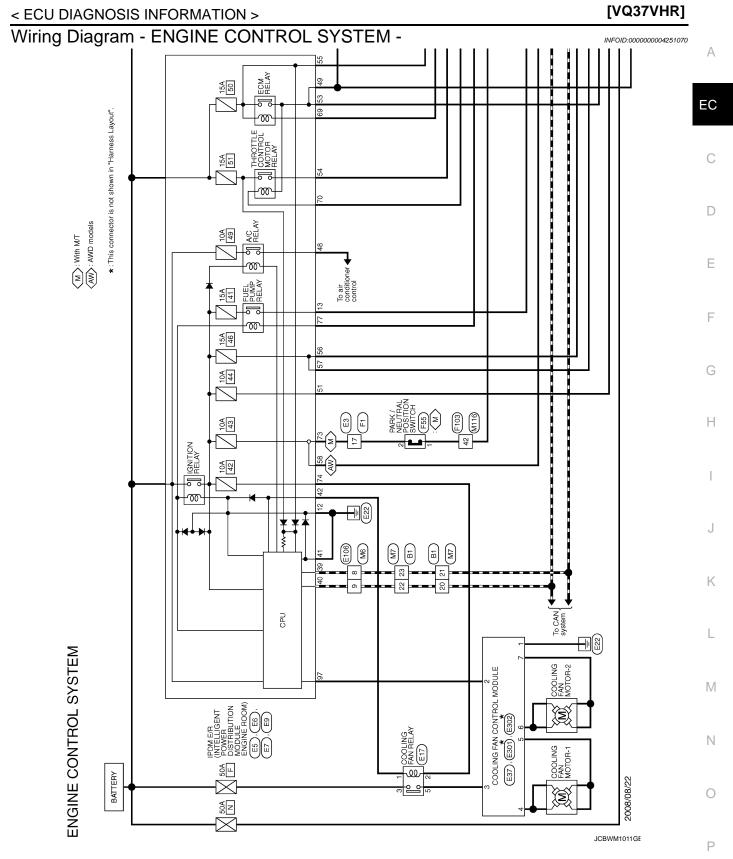
[VQ37VHR]

Terminal No. (Wire color)		Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
110	128	Engine speed output sig-	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	1 V★ 10mSec/div € 2V/div JMBIA0076GB
(R)	(B)	nal	Gupu	[Engine is running] • Engine speed is 2,000 rpm	1 V★ 10mSec/div 2V/div JMBIA0077GB
112 (SB)		Sensor ground (EVAP control system pressure sensor, Refrig- erant pressure sensor)	_	_	_
113 (P)	_	CAN communication line	Input/ Output	_	_
114 (L)	_	CAN communication line	Input/ Output	_	_
117 (V)	128 (B)	Data link connector	Input/ Output	_	_
121 (LG)	128 (B)	EVAP canister vent con- trol valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
122 (P)	128 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released [Ignition switch: OFF]	0 V BATTERY VOLTAGE
123 (B) 124 (B)		ECM ground		Brake pedal: Slightly depressed	(11 - 14 V) —
125 (R)	128 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
126 (BR)	128 (B)	ICC brake switch (mod- els with ICC system) ASCD brake switch (models with ASCD sys- tem)	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed [Ignition switch: ON] • Brake pedal: Fully released	0 V BATTERY VOLTAGE (11 - 14 V)
127 (B) 128 (B)	_	ECM ground	_	_	_

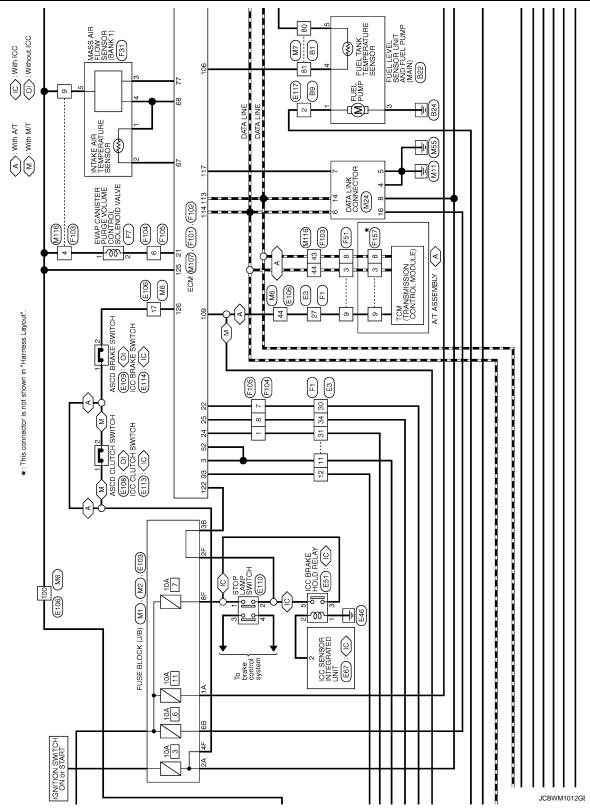
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

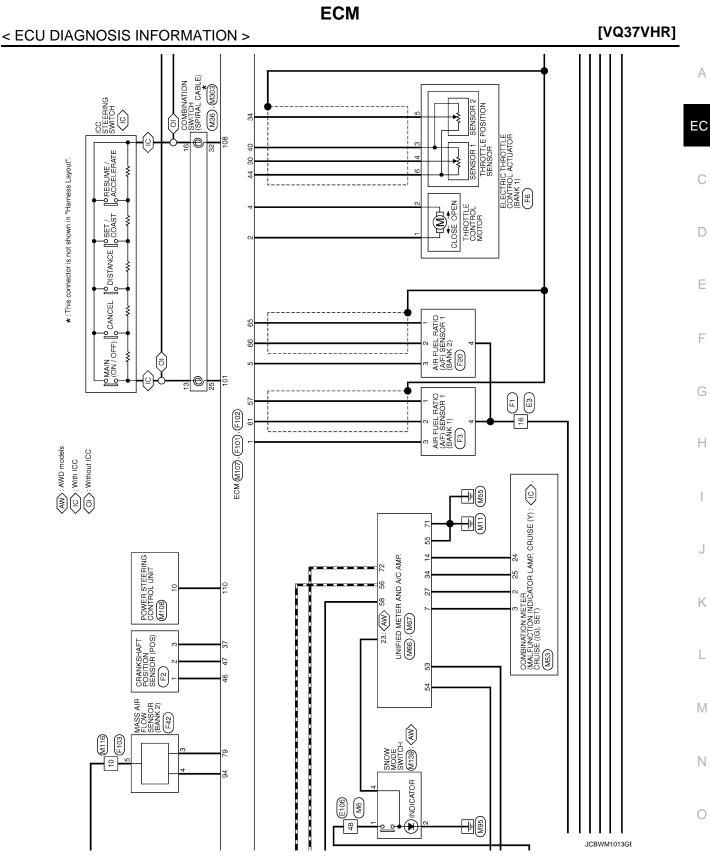
*1: This may vary depending on internal resistance of the tester.

**2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3. "How to Handle Battery".









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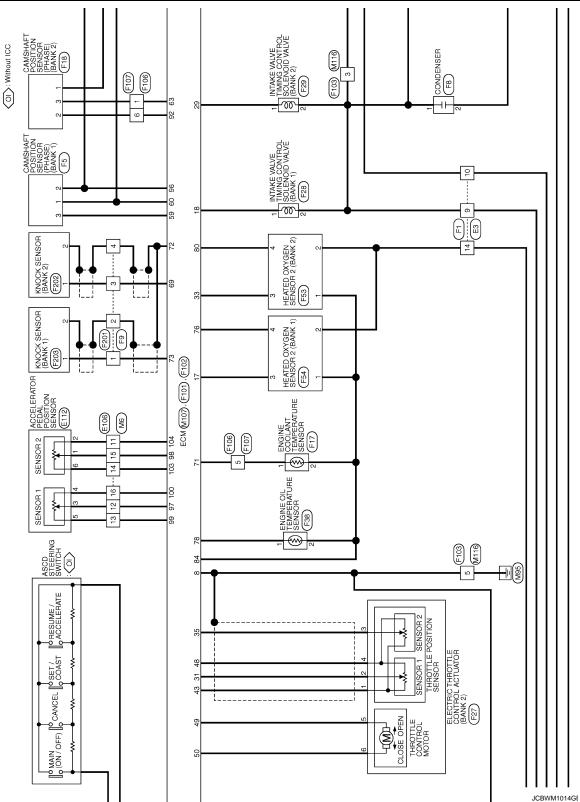
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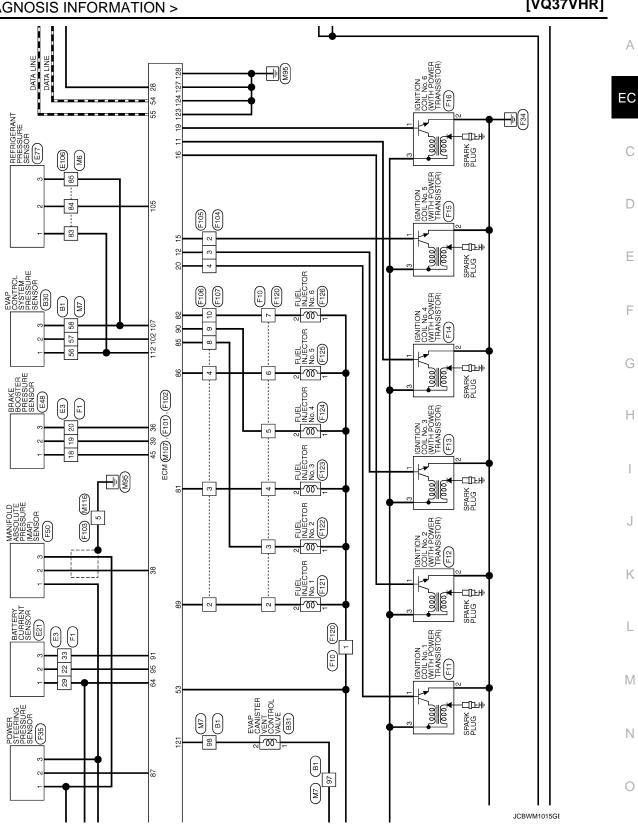
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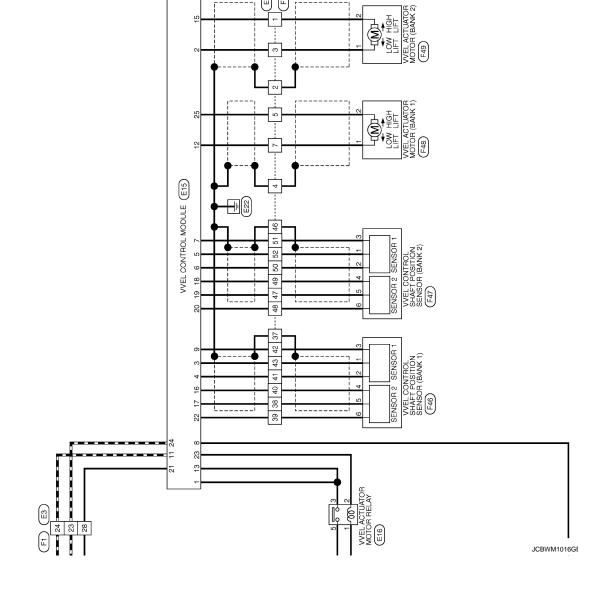
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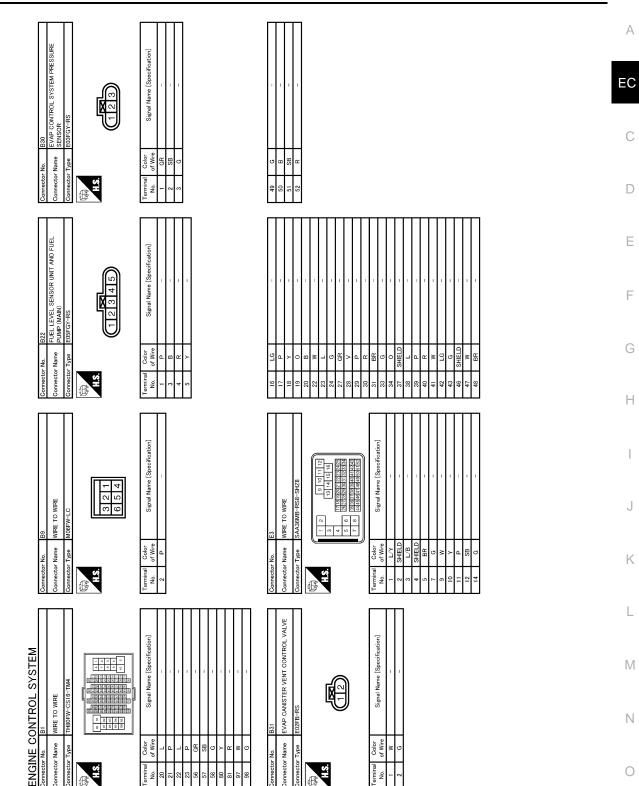


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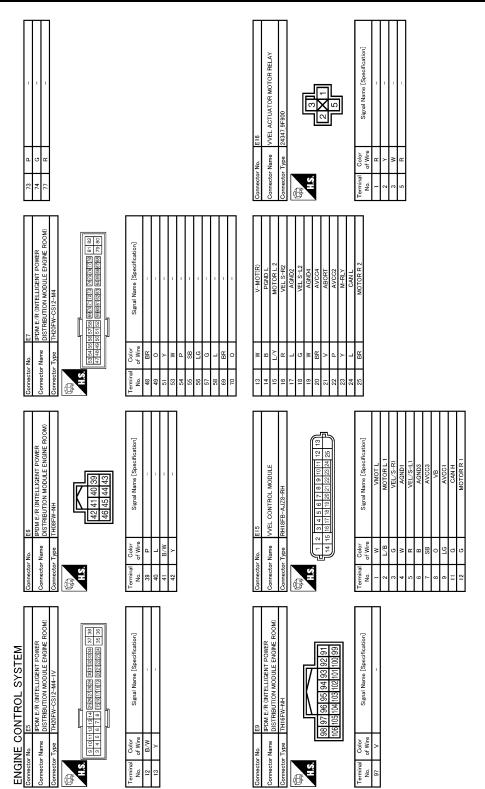
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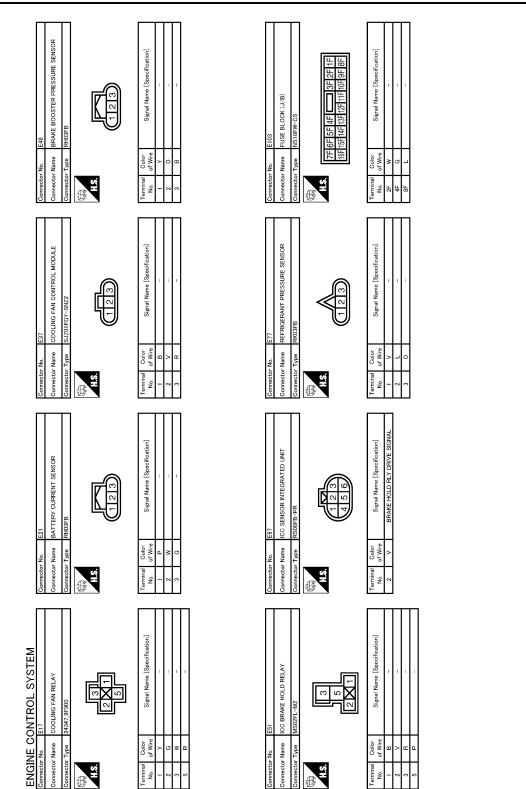
[VQ37VHR]

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Revision: 2009 October



JCBWM1018GE



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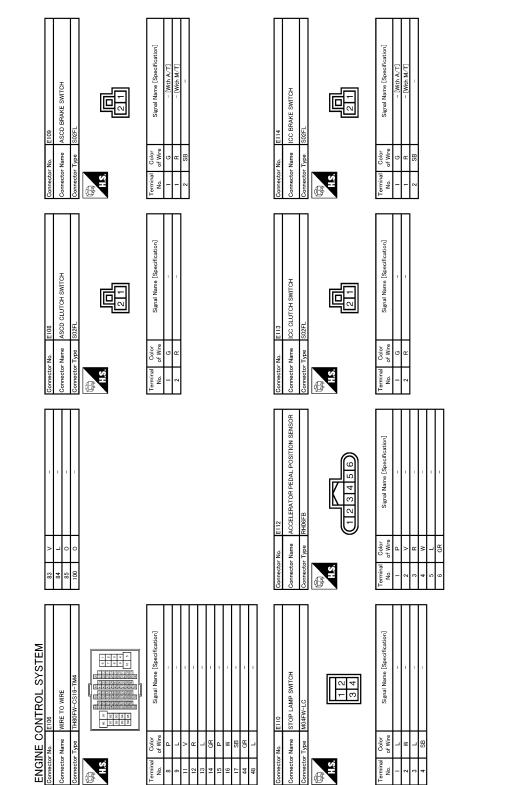
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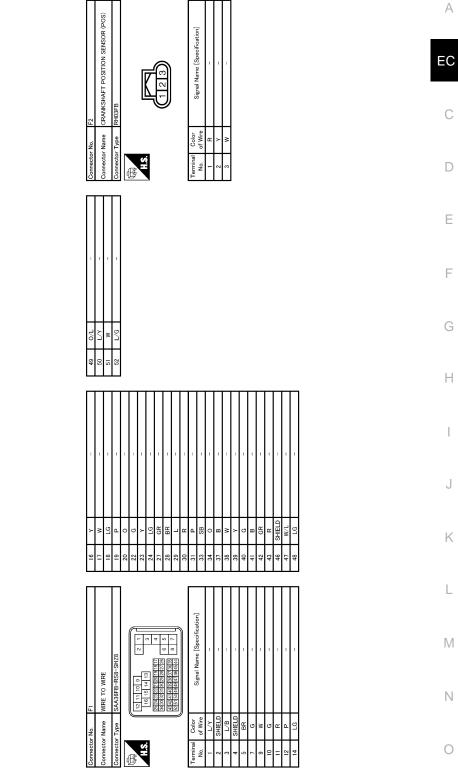
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ECM

JCBWM1020GE



JCBWM1021GE

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COOLING FAN CONTROL MODULE (COOLING FAN MOTOR-2)

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200LING FAN CONTROL MODULE (COOLING FAN MOTOR-1)

nector Name 9g

ENGINE CONTROL SYSTEM

WIRE TO WIRE

nector Name

Signal Name [Specification]

Color of Wire

Terminal No.

Signal Name [Specification]

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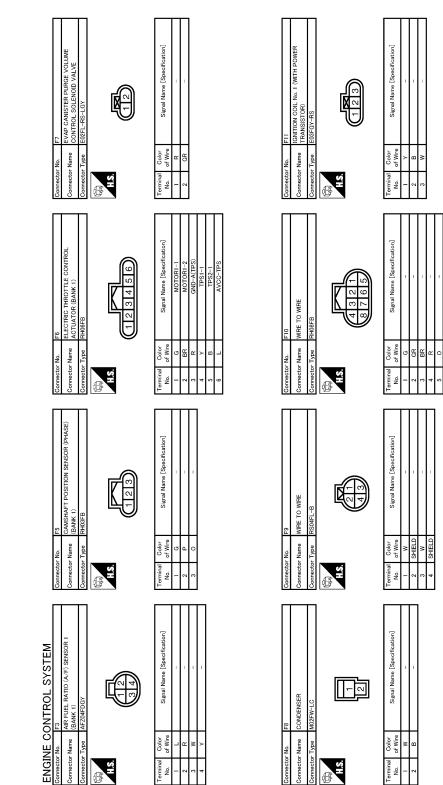
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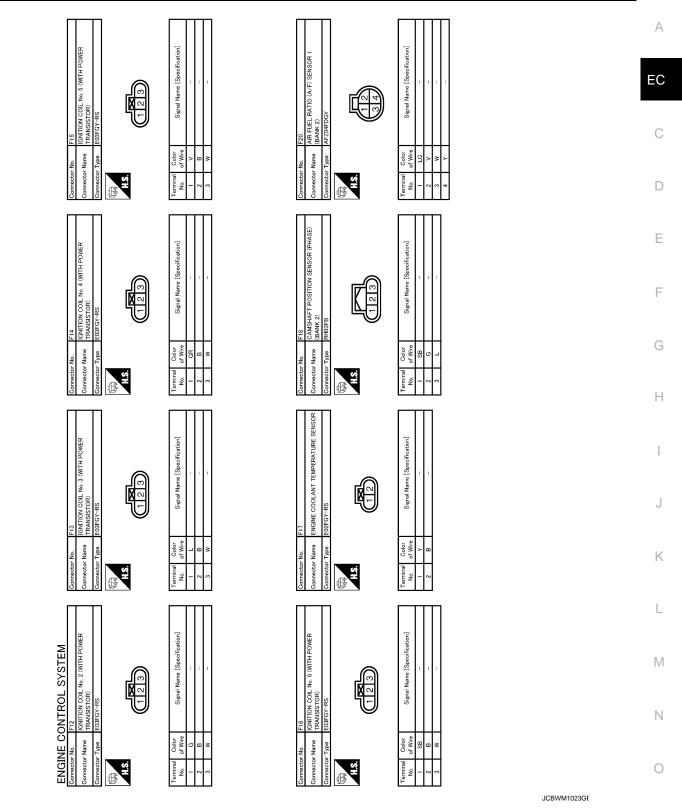


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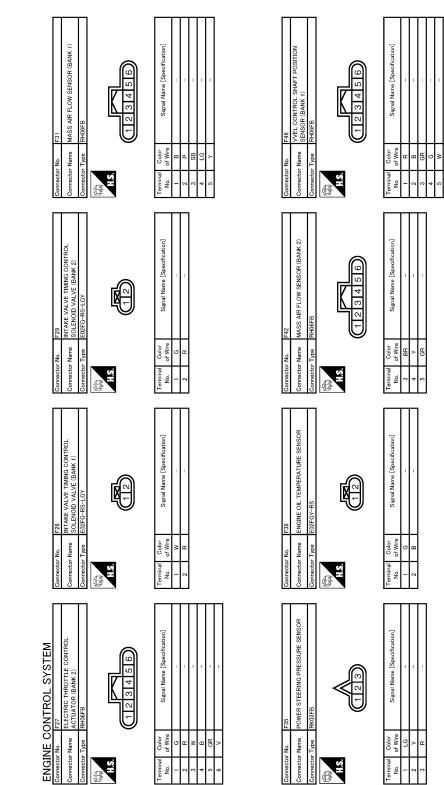
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[VQ37VHR]

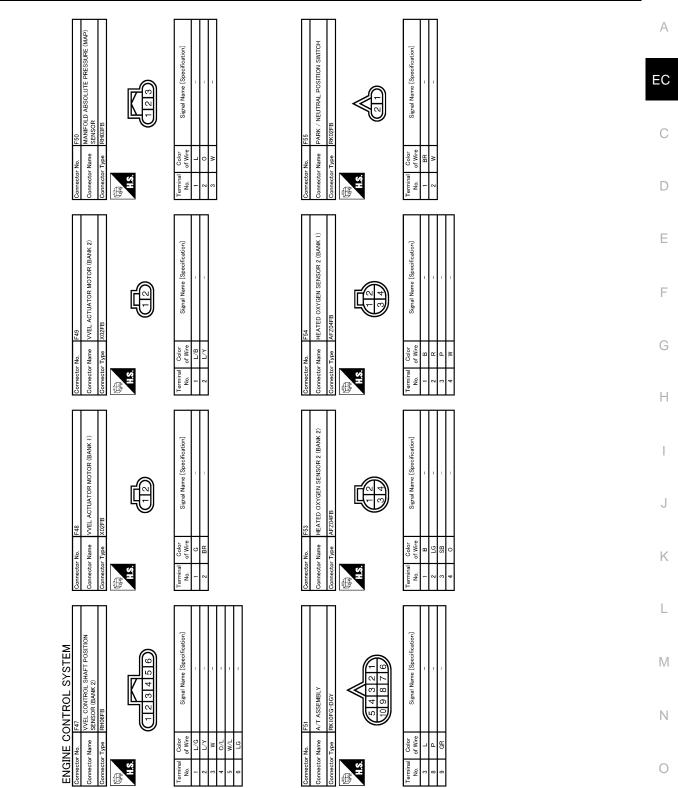


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JCBWM1024GE



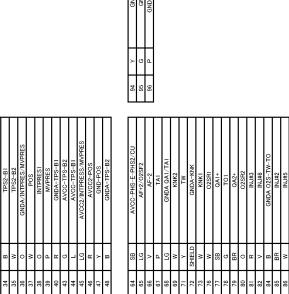


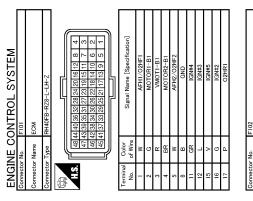
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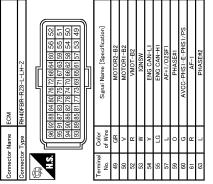
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[VQ37VHR]







INJ#5 INJ#5 SPRE: INJ#1 INJ#4

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JCBWM1026GE



F103	WIRE TO WIRE	TK36FW-NS10			33[32[31[30] 20[19[18[17]16[15[14]13[12]17
Connector No.	Connector Name	Connector Type	ſ	ΗS	38 37 38 38 34
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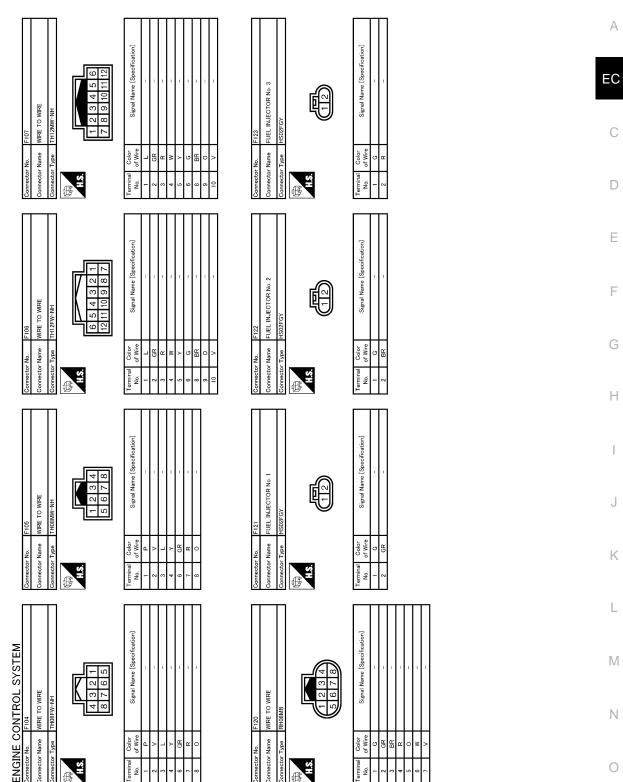
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4 0	0 2019 18 17 16 15 14 13 12 11 5 29 28 27 28 25 24 23 22 21 10		Signal Name [Specification]	1	-	-	-	
	38 37 38 35 34		Color of Wire	M	ч	в	٢	ŝ
2		IJ	Terminal No.	3	4	5	6	

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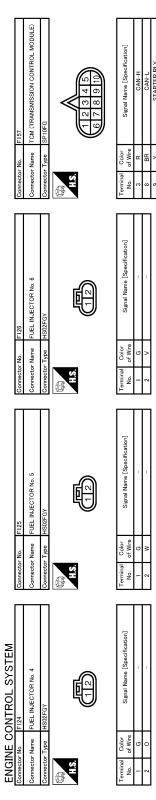


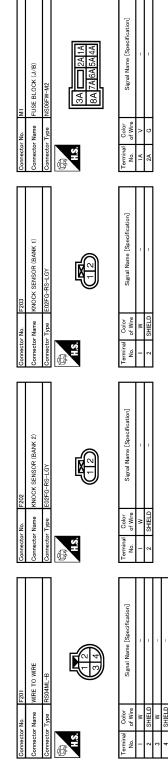
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[VQ37VHR]

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WIRE TO WIRE

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ENGINE CONTROL SYSTEM

FUSE BLOCK (J/B)

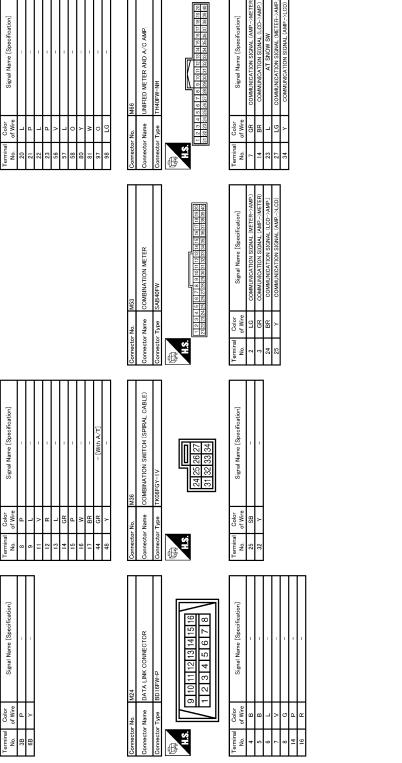
inector Name

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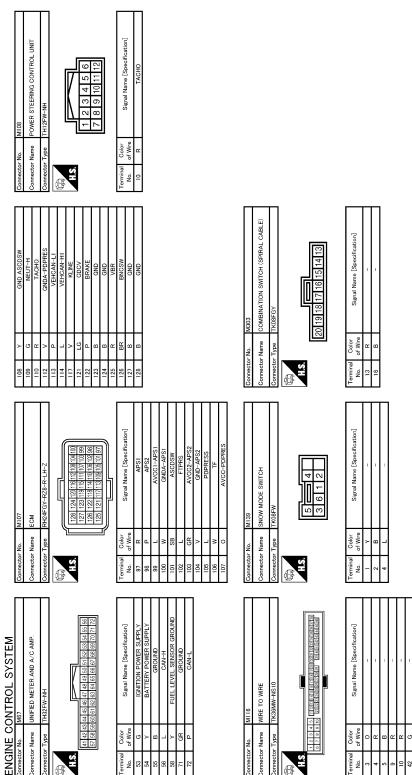
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JCBWM1030GE

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Fail safe

NON DTC RELATED ITEM

[VQ37VHR]

Engine operating condi- tion in fail-safe mode	Detected items	Remarks	Reference page	А
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator lamp circuit	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating MIL when there is malfunction on engine control system.		EC
		Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating the fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	<u>EC-512</u>	С

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode				
U0113 U1003 U1024	Can communication circuit	VVEL actuator motor relay is turned off, and VVEL value is become at a minimam angle. Engine speed will not rise more than 3,500 rpm due to the fuel cut.				
P0011 P0021	Intake valve timing control	The signal is not energized to the int control does not function.	ake valve timing control solenoid valve and the valve			
P0102 P0103 P010C P010D	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.				
P0117 P0118	Engine coolant tempera- ture sensor circuit	Engine coolant temperature will be determined by ECM based on the following CONSULT-III displays the engine coolant temperature decided by ECM.				
		Condition	Engine coolant temperature decided (CONSULT-III display)			
		Just as ignition switch is turned ON or START	40°C (104°F)			
		Approx 4 minutes or more after en- gine starting	80°C (176°F)			
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)			
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.				
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening ir order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. Therefore, the acceleration will be poor.				
P0500	Vehicle speed sensor	The cooling fan operates (Highest)	while engine is running.			
P0524	Engine oil pressure	The signal is not energized to the int control does not function. Engine speed will not rise more that	take valve timing control solenoid valve and the valve n 2,400 rpm due to the fuel cut.			
P0605	ECM	ECM stops the electric throttle contr	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.			
P0607	ECM	VVEL actuator motor relay is turned Engine speed will not rise more that	l off, and VVEL value is become at a minimum angle. n 2,500 rpm due to the fuel cut.			
P0643	Sensor power supply	ECM stops the electric throttle contr fixed opening (approx. 5 degrees) b	ol actuator control, throttle valve is maintained at a y the return spring.			



< ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine opera	ating condition in fail-safe mode				
P1087 P1088	VVEL control function	VVEL of normal bank is controlled a Engine speed will not rise more that	0				
P1089 P1092	VVEL control shaft position sensor		VVEL value is maintained at a fixed angle. Engine speed will not rise more than 3,500 rpm due to the fuel cut				
P1608	VVEL control shaft position sensor	VVEL actuator motor relay is turned Engine speed will not rise more that	d off, and VVEL value is become at a minimam angle. In 3,500 rpm due to the fuel cut				
P1090 P1093	VVEL actuator motor	VVEL of normal bank is controlled a Engine speed will not rise more that					
		VVEL actuator motor relay is turned Engine speed will not rise more that	d off, and VVEL value is become at a minimam angle. In 3,500 rpm due to the fuel cut.				
P1091	VVEL actuator motor relay		VVEL actuator motor relay is turned off, and VVEL value is become at a minimam angle. Engine speed will not rise more than 3,500 rpm due to the fuel cut.				
P1233 P2101	Electric throttle control function		ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.				
P1236 P2118	Throttle control motor		ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.				
P1238 P2119	Electric throttle control ac- tuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.					
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.					
		 (When ECM detects the throttle valve is stuck open:) While the vehicle is being driven, it slows down gradually because of fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more. 					
P1290 P2100 P2103	Throttle control motor relay	ECM stops the electric throttle cont fixed opening (approx. 5 degrees) b	rol actuator control, throttle valve is maintained at a by the return spring.				
P1606	VVEL control module	VVEL actuator motor relay is turned Engine speed will not rise more that	d off, and VVEL value is become at a minimam angle. In 3,500 rpm due to the fuel cut.				
P1805	Brake switch	ECM controls the electric throttle co small range. Therefore, acceleration will be poor	ontrol actuator by regulating the throttle opening to a r.				
		Vehicle condition	Driving condition				
		When engine is idling	Normal				
		When accelerating	Poor acceleration				
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. Therefore, the acceleration will be poor.					

DTC Inspection Priority Chart

INFOID:000000004251072

[VQ37VHR]

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

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riority	Detected items (DTC)	
1	U0101 U0113 U0164 U1001 U1003 CAN communication line	
	U1024 VVEL CAN communication line	
	P0101 P0102 P0103 P010B P010C P010D Mass air flow sensor	
	P010A Manifold absolute pressure (MAP) sensor	
	P0112 P0113 P0127 Intake air temperature sensor	_
	 P0117 P0118 P0125 Engine coolant temperature sensor 	
	• P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor	
	P0128 Thermostat function	
	P0181 P0182 P0183 Fuel tank temperature sensor	
	P0196 P0197 P0198 Engine oil temperature sensor	
	P0327 P0328 P0332 P0333 Knock sensor	
	P0335 Crankshaft position sensor (POS)	
	 P0340 P0345 Camshaft position sensor (PHASE) 	
	P0460 P0461 P0462 P0463 Fuel level sensor	
	P0500 Vehicle speed sensor	
	P0555 Brake booster pressure sensor	
	• P0605 P0607 ECM	
	P0643 Sensor power supply	
	• P0700 TCM	
	P0705 Transmission range switch	
	 P0850 Park/neutral position (PNP) switch 	
	 P1089 P1092 P1608 VVEL control shaft position sensor 	
	P1606 P1607 VVEL control module	
	 P1550 P1551 P1552 P1553 P1554 Battery current sensor 	
	• P1610 - P1615 NATS	
	P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor	

ECM

2009 G37 Coupe

< ECU DIAGNOSIS INFORMATION >

Priority	Detected items (DTC)
2	 P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater P0075 P0081 Intake valve timing control solenoid valve P0130 P0131 P0132 P0133 P0150 P0151 P0152 P0153 P2A00 P2A03 Air fuel ratio (A/F) sensor 1 P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2 P0441 EVAP control system purge flow monitoring P0443 P0444 P0445 EVAP canister vent control valve P0447 P0448 EVAP canister vent control valve P0451 P0452 P0453 EVAP control system pressure sensor P0603 ECM power steering pressure sensor P0603 ECM power supply P0710 P0717 P0720 P0731 P0732 P0733 P0734 P0735 P0740 P0744 P0745 P0750 P0775 P0780 P0795 P1730 P1734 P2713 P2722 P2731 P2807 A/T related sensors, solenoid valves and switches P1090 P1093 VVEL actuator motor P1091 VVEL actuator motor relay P1217 Engine over temperature (OVERHEAT) P1238 P2110 Electric throttle control function P1230 P2100 P2103 Throttle control motor relay P1290 P2100 P2103 Throttle control motor relay P1805 Brake switch
3	 P0011 P0021 Intake valve timing control P0171 P0172 P0174 P0175 Fuel injection system function P0300 - P0306 Misfire P0420 P0430 Three way catalyst function P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) P0455 EVAP control system (GROSS LEAK) P0506 P0507 Idle speed control system P0504 Engine oil pressure P100A P100B VVEL system P1148 P1168 Closed loop control P1211 TCS control unit P1212 TCS communication line P1238 P2119 Electric throttle control actuator P1421 Cold start control P1564 ICC steering switch / ASCD steering switch P1572 ICC brake switch / ASCD brake switch P1574 ICC vehicle speed sensor / ASCD vehicle speed sensor

DTC Index

INFOID:000000004251073

					×:Applicable -	-: Not applicable
DT	C* ¹	- Items				Reference
CONSULT-III GST* ²	ECM* ³	(CONSULT-III screen terms)	SRT code	Trip	MIL	page
U0101	0101* ⁴	LOST COMM (TCM)	—	1	×	
U0113	0113	CAN COMM CIRCUIT	_	1 (A/T models) 2 (M/T models)	\times (A/T models) — (M/T models)	<u>EC-149</u>
U0164	0164* ⁴	LOST COMM (HVAC)	—	1	×	
U1001	1001* ⁴	CAN COMM CIRCUIT	_	1 (with ASCD) 1 or 2 (with ICC)	_	<u>EC-152</u>
U1003	1003	CAN COMM CIRCUIT	—	2	_	<u>EC-149</u>
U1024	1024	VVEL CAN COMM CIRCUIT	—	1	×	<u>EC-153</u>
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing* ⁷	_
P0011	0011	INT/V TIM CONT-B1	—	2	×	<u>EC-155</u>
P0021	0021	INT/V TIM CONT-B2	—	2	×	<u>EC-155</u>

< ECU DIAGNOSIS INFORMATION >

DT	-C*1	ltomo				Reference	А
CONSULT-III	ECM* ³	 Items (CONSULT-III screen terms) 	SRT code	Trip	MIL	page	~
GST* ²	ECIM						
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	<u>EC-159</u>	EC
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	<u>EC-159</u>	
P0037	0037	HO2S2 HTR (B1)	_	2	×	<u>EC-162</u>	
P0038	0038	HO2S2 HTR (B1)	—	2	×	<u>EC-162</u>	С
P0051	0051	A/F SEN1 HTR (B2)	—	2	×	<u>EC-159</u>	_
P0052	0052	A/F SEN1 HTR (B2)	_	2	×	<u>EC-159</u>	D
P0057	0057	HO2S2 HTR (B2)	_	2	×	<u>EC-162</u>	
P0058	0058	HO2S2 HTR (B2)	—	2	×	<u>EC-162</u>	
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	<u>EC-165</u>	E
P0081	0081	INT/V TIM V/CIR-B2	—	2	×	<u>EC-165</u>	
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	<u>EC-168</u>	F
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	<u>EC-176</u>	
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	<u>EC-176</u>	
P010A	010A	ABSL PRES SEN/CIRC	_	2	×	<u>EC-182</u>	G
P010B	010B	MAF SEN/CIRCUIT-B2	_	2	×	<u>EC-168</u>	
P010C	010C	MAF SEN/CIRCUIT-B2	_	1	×	<u>EC-176</u>	
P010D	010D	MAF SEN/CIRCUIT-B2	—	1	×	<u>EC-176</u>	H
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	<u>EC-186</u>	
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	<u>EC-186</u>	
P0117	0117	ECT SEN/CIRC	_	1	×	<u>EC-191</u>	
P0118	0118	ECT SEN/CIRC	_	1	×	<u>EC-191</u>	
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	<u>EC-194</u>	J
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	<u>EC-194</u>	
P0125	0125	ECT SENSOR	_	2	×	<u>EC-198</u>	K
P0127	0127	IAT SENSOR-B1	_	2	×	<u>EC-201</u>	
P0128	0128	THERMSTAT FNCTN	_	2	×	EC-203	
P0130	0130	A/F SENSOR1 (B1)	_	2	×	<u>EC-205</u>	L
P0131	0131	A/F SENSOR1 (B1)		2	×	EC-209	-
P0132	0132	A/F SENSOR1 (B1)	_	2	×	EC-212	Μ
P0133	0133	A/F SENSOR1 (B1)	×	2	×	EC-215	IVI
P0137	0137	HO2S2 (B1)	×	2	×	<u>EC-220</u>	-
P0138	0138	HO2S2 (B1)	×	2	×	EC-226	N
P0139	0139	HO2S2 (B1)	×	2	×	EC-234	-
P0150	0150	A/F SENSOR1 (B2)	_	2	×	EC-205	
P0151	0151	A/F SENSOR1 (B2)	_	2	×	EC-209	0
P0152	0152	A/F SENSOR1 (B2)		2	×	EC-212	-
P0153	0153	A/F SENSOR1 (B2)	×	2	×	EC-215	Р
P0157	0157	HO2S2 (B2)	×	2	×	<u>EC-220</u>	
P0158	0158	HO2S2 (B2)	×	2	×	<u>EC-226</u>	
P0159	0159	HO2S2 (B2)	×	2	×	EC-234	
P0171	0171	FUEL SYS-LEAN-B1		2	×	EC-240	
P0172	0172	FUEL SYS-RICH-B1	_	2	×	EC-244	

< ECU DIAGNOSIS INFORMATION >

DT	C* ¹					5.4
CONSULT-III GST* ²	ECM* ³	Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
P0174	0174	FUEL SYS-LEAN-B2	—	2	×	<u>EC-240</u>
P0175	0175	FUEL SYS-RICH-B2	—	2	×	<u>EC-244</u>
P0181	0181	FTT SENSOR	—	2	×	<u>EC-248</u>
P0182	0182	FTT SEN/CIRCUIT	—	2	×	<u>EC-251</u>
P0183	0183	FTT SEN/CIRCUIT	_	2	×	<u>EC-251</u>
P0196	0196	EOT SENSOR	—	2	×	<u>EC-254</u>
P0197	0197	EOT SEN/CIRC	—	2	×	<u>EC-257</u>
P0198	0198	EOT SEN/CIRC	—	2	×	<u>EC-257</u>
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	<u>EC-260</u>
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	<u>EC-260</u>
P0227	0227	TP SEN 2/CIRC-B2	—	1	×	<u>EC-194</u>
P0228	0228	TP SEN 2/CIRC-B2	—	1	×	<u>EC-194</u>
P0300	0300	MULTI CYL MISFIRE	_	2	×	<u>EC-264</u>
P0301	0301	CYL 1 MISFIRE	_	2	×	<u>EC-264</u>
P0302	0302	CYL 2 MISFIRE	_	2	×	<u>EC-264</u>
P0303	0303	CYL 3 MISFIRE	_	2	×	<u>EC-264</u>
P0304	0304	CYL 4 MISFIRE	_	2	×	<u>EC-264</u>
P0305	0305	CYL 5 MISFIRE	—	2	×	<u>EC-264</u>
P0306	0306	CYL 6 MISFIRE		2	×	<u>EC-264</u>
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	<u>EC-270</u>
P0328	0328	KNOCK SEN/CIRC-B1	—	2	_	<u>EC-270</u>
P0332	0332	KNOCK SEN/CIRC-B2	—	2	—	<u>EC-270</u>
P0333	0333	KNOCK SEN/CIRC-B2	_	2	—	<u>EC-270</u>
P0335	0335	CKP SEN/CIRCUIT	—	2	×	<u>EC-273</u>
P0340	0340	CMP SEN/CIRC-B1	—	2	×	<u>EC-277</u>
P0345	0345	CMP SEN/CIRC-B2	_	2	×	<u>EC-277</u>
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-281
P0430	0430	TW CATALYST SYS-B2	×	2	×	EC-281
P0441	0441	EVAP PURG FLOW/MON	×	2	×	<u>EC-286</u>
P0442	0442	EVAP SMALL LEAK	×	2	×	<u>EC-291</u>
P0443	0443	PURG VOLUME CONT/V	—	2	×	<u>EC-297</u>
P0444	0444	PURG VOLUME CONT/V	—	2	×	<u>EC-302</u>
P0445	0445	PURG VOLUME CONT/V	—	2	×	<u>EC-302</u>
P0447	0447	VENT CONTROL VALVE	—	2	×	<u>EC-305</u>
P0448	0448	VENT CONTROL VALVE	_	2	×	<u>EC-309</u>
P0451	0451	EVAP SYS PRES SEN	—	2	×	EC-313
P0452	0452	EVAP SYS PRES SEN	—	2	×	<u>EC-316</u>
P0453	0453	EVAP SYS PRES SEN	—	2	×	EC-321
P0455	0455	EVAP GROSS LEAK	—	2	×	<u>EC-327</u>
P0456	0456	EVAP VERY SML LEAK	×* ⁶	2	×	<u>EC-333</u>
P0460	0460	FUEL LEV SEN SLOSH	—	2	×	<u>EC-340</u>
P0461	0461	FUEL LEVEL SENSOR		2	×	EC-342

< ECU DIAGNOSIS INFORMATION >

DT	°C* ¹	lian a				Deferrere	А
CONSULT-III GST* ²	ECM* ³	Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page	A
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	<u>EC-344</u>	EC
P0463	0463	FUEL LEVL SEN/CIRC	_	2	×	<u>EC-344</u>	20
P0500	0500	VEH SPEED SEN/CIRC*5	_	2	×	EC-346	
P0506	0506	ISC SYSTEM	_	2	×	<u>EC-348</u>	С
P0507	0507	ISC SYSTEM	_	2	×	EC-350	
P0524	0524	ENGINE OIL PRESSURE	_	2	×	EC-352	D
P0550	0550	PW ST P SEN/CIRC	_	2	_	EC-355	
P0555	0555	BRAKE BSTR PRES SEN/CIRC	_	2	×	EC-358	
P0603	0603	ECM BACK UP/CIRCUIT	_	2	×	<u>EC-363</u>	E
P0605	0605	ECM	_	1 or 2	× or —	EC-365	
P0607	0607	ECM	—	1 (A/T models) 2 (M/T models)	\times (A/T models) — (M/T models)	<u>EC-367</u>	F
P0643	0643	SENSOR POWER/CIRC	_	1	×	<u>EC-368</u>	
P0705	0705	T/M RANGE SENSOR A	—	2	×	<u>TM-176</u>	G
P0710	0710	ATF TEMP SEN/CIRC	—	2	×	<u>TM-177</u>	
P0717	0717	INPUT SPEED SENSOR A	_	2	×	<u>TM-179</u>	
P0720	0720	OUTPUT SPEED SENSOR*5	—	2	×	<u>TM-181</u>	Н
P0729	0729	AT 6TH FUNCTN	_	2	×	<u>TM-185</u>	
P0730	0730	BELT DAMG	—	2	×	<u>TM-187</u>	
P0731	0731	1GR INCORRECT RATIO	_	2	×	<u>TM-189</u>	
P0732	0732	2GR INCORRECT RATIO	—	2	×	<u>TM-191</u>	
P0733	0733	3GR INCORRECT RATIO	—	2	×	<u>TM-193</u>	J
P0734	0734	4GR INCORRECT RATIO	—	2	×	<u>TM-195</u>	
P0735	0735	5GR INCORRECT RATIO	_	2	×	<u>TM-197</u>	К
P0740	0740	TORQUE CONVERTER	—	2	×	<u>TM-199</u>	
P0744	0744	TORQUE CONVERTER	_	2	×	<u>TM-201</u>	
P0745	0745	PC SOLENOID A	—	2	×	<u>TM-202</u>	L
P0750	0750	SHIFT SOLENOID A	_	2	×	<u>TM-203</u>	
P0775	0775	PC SOLENOID B	—	2	×	<u>TM-205</u>	M
P0780	0780	SHIFT	—	1	×	<u>TM-206</u>	
P0795	0795	PC SOLENOID C	—	2	×	<u>TM-209</u>	
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	<u>EC-371</u>	Ν
P100A	100A	VVEL SYSTEM-B1	—	2	×	<u>EC-375</u>	
P100B	100B	VVEL SYSTEM-B2	_	2	×	<u>EC-375</u>	0
P1087	1087	VVEL SYSTEM-B1	_	1	×	<u>EC-379</u>	0
P1088	1088	VVEL SYSTEM-B2	_	1	×	<u>EC-379</u>	
P1089	1089	VVEL POS SEN/CIRC-B1	—	1	×	<u>EC-380</u>	Ρ
P1090	1090	VVEL ACTR MOT-B1	_	1	×	<u>EC-384</u>	
P1091	1091	VVEL ACTR MOT PWR	_	1 or 2	×	<u>EC-388</u>	
P1092	1092	VVEL POS SEN/CIRC-B2	_	1	×	<u>EC-380</u>	
P1093	1093	VVEL ACTR MOT-B2	—	1	×	<u>EC-384</u>	
P1148	1148	CLOSED LOOP-B1	—	1	×	<u>EC-391</u>	

< ECU DIAGNOSIS INFORMATION >

DTC*1							
CONSULT-III GST* ²	ECM* ³	Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page	
P1168	1168	CLOSED LOOP-B2		1	×	<u>EC-391</u>	
P1211	1211	TCS C/U FUNCTN	_	2		EC-392	
P1212	1212	TCS/CIRC	_	2		EC-393	
P1217	1217	ENG OVER TEMP	_	1	×	EC-394	
P1225	1225	CTP LEARNING-B1	_	2		EC-398	
P1226	1226	CTP LEARNING-B1		2		<u>EC-400</u>	
P1233	1233	ETC FNCTN/CIRC-B2		1	×	EC-402	
P1234	1234	CTP LEARNING-B2		2		EC-398	
P1235	1235	CTP LEARNING-B2	_	2		<u>EC-400</u>	
P1236	1236	ETC MOT-B2		1	×	EC-406	
P1238	1238	ETC ACTR-B2	_	1	×	EC-409	
P1239	1239	TP SENSOR-B2	_	1	×	EC-411	
P1290	1290	ETC MOT PWR-B2	_	1	×	EC-414	
P1421	1421	COLD START CONTROL	_	2	×	<u>EC-416</u>	
P1550	1550	BAT CURRENT SENSOR	_	2		<u>EC-418</u>	
P1551	1551	BAT CURRENT SENSOR	_	2		EC-421	
P1552	1552	BAT CURRENT SENSOR		2		EC-421	
P1553	1553	BAT CURRENT SENSOR		2		EC-424	
P1554	1554	BAT CURRENT SENSOR		2		EC-427	
P1564	1564	ASCD SW	_	1	_	<u>EC-431</u> (with ASCD) <u>EC-434</u> (with ICC)	
P1568	1568	ICC COMMAND VALUE	_	1		<u>EC-437</u>	
P1572	1572	ASCD BRAKE SW	_	1	_	<u>EC-438</u> (with ASCD) <u>EC-445</u> (with ICC)	
P1574	1574	ASCD VHL SPD SEN	_	1	_	<u>EC-453</u> (with ASCD) <u>EC-455</u> (with ICC)	
P1606	1606	VVEL CONTROL MODULE	_	1 or 2	× or —	<u>EC-457</u>	
P1607	1607	VVEL CONTROL MODULE		1	×	<u>EC-459</u>	
P1608	1608	VVEL SENSOR POWER/CIRC	_	1	×	<u>EC-461</u>	
P1610	1610	LOCK MODE		2		<u>SEC-39</u>	
P1611	1611	ID DISCARD IMM-ECM	_	2	_	<u>SEC-40</u>	
P1612	1612	CHAIN OF ECM-IMMU	_	2		<u>SEC-42</u>	
P1614	1614	CHAIN OF IMMU-KEY	_	2		<u>SEC-43</u>	
P1615	1615	DIFFERENCE OF KEY	_	2		<u>SEC-46</u>	
P1730	1730	INTERLOCK		2	×	<u>TM-214</u>	
P1734	1734	AT 7TH GR FNCTN		2	×	TM-216	
P1805	1805	BRAKE SW/CIRCUIT		2		EC-464	
P2100	2100	ETC MOT PWR-B1		1	×	EC-414	
P2101	2101	ETC FNCTN/CIRC-B1		1	×	<u>EC-402</u>	

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR

DTC*1		H				Defenses	А
CONSULT-III GST* ²	ECM* ³	Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page	A
P2103	2103	ETC MOT PWR	—	1	×	<u>EC-414</u>	EC
P2118	2118	ETC MOT-B1	—	1	×	<u>EC-406</u>	
P2119	2119	ETC ACTR-B1	—	1	×	<u>EC-409</u>	
P2122	2122	APP SEN 1/CIRC	—	1	×	<u>EC-467</u>	С
P2123	2123	APP SEN 1/CIRC	_	1	×	<u>EC-467</u>	
P2127	2127	APP SEN 2/CIRC	—	1	×	<u>EC-471</u>	D
P2128	2128	APP SEN 2/CIRC	—	1	×	<u>EC-471</u>	
P2132	2132	TP SEN 1/CIRC-B2	—	1	×	<u>EC-260</u>	
P2133	2133	TP SEN 1/CIRC-B2	_	1	×	<u>EC-260</u>	E
P2135	2135	TP SENSOR-B1	—	1	×	<u>EC-411</u>	
P2138	2138	APP SENSOR	—	1	×	<u>EC-475</u>	F
P2713	2713	PC SOLENOID D		2	×	<u>TM-224</u>	Г
P2722	2722	PC SOLENOID E	—	2	×	<u>TM-225</u>	
P2731	2731	PC SOLENOID F	_	2	×	<u>TM-226</u>	G
P2807	2807	PC SOLENOID G	—	2	×	<u>TM-227</u>	
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	<u>EC-480</u>	
P2A03	2A03	A/F SENSOR1 (B2)	—	2	×	<u>EC-480</u>	H

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*6: SRT code will not be set if the self-diagnostic result is NG.

*7: When the ECM is in the mode that displays SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

(P)WITH CONSULT-III

Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on "SRT Item".

WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained below. The driving pattern should be performed one or more times to set all SRT codes.

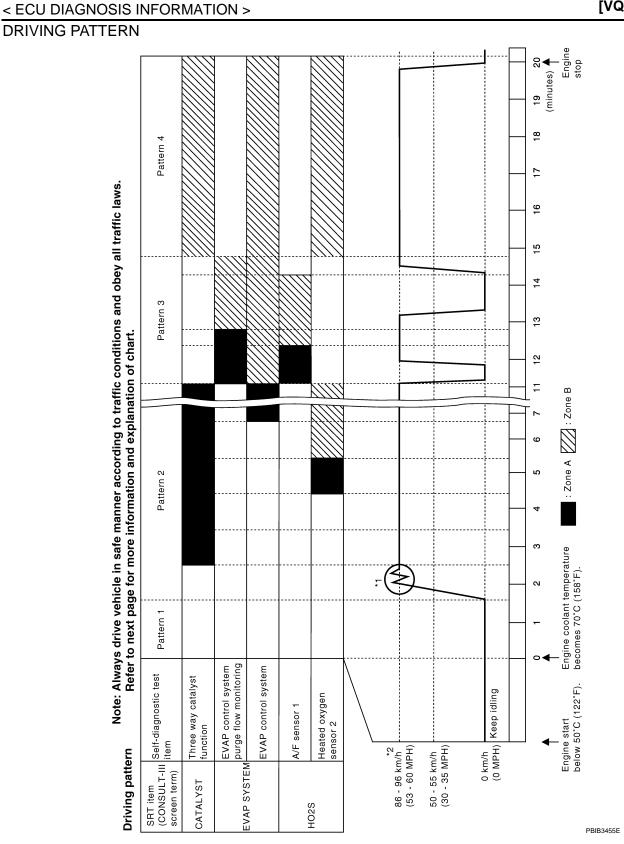
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• The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.

Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

EC-570

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)

 Diagnosis is performed as quickly as possible under normal conditions. Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

ECM

Pattern 1:

- The engine is started at the engine coolant temperature of -10 to 35°C (14 to 95°F) [where the voltage between the ECM terminals 71 (engine coolant temperature signal) and 84 (sensor ground) is 3.0 - 4.3 V)].
- The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) [where the voltage between the ECM terminals 71 (engine coolant temperature signal) and 84 (sensor ground) is lower than 1.4 V].
- The engine is started at the fuel tank temperature of warmer than 0°C (32°F) [where the voltage between the ECM terminals 106 (fuel temperature sensor signal) is less than 4.1 VI.

Pattern 2:

 When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

Pattern 4:

- The accelerator pedal must be held very steady during steadystate driving.
- If the accelerator pedal is moved, the test must be conducted adain.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T Models

Set the selector lever in the D position with the overdrive switch turned ON.

Suggested Upshift Speeds for M/T Models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

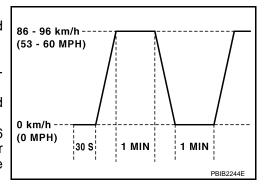
•	For quick acceleration in low altitude areas or in high altitude areas [over 1,219 m (4,000 ft)]	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]	Gear change
M	24 (15)	13 (8)	1st to 2nd
-	40 (25)	26 (16)	2nd to 3rd
N	64 (40)	40 (25)	3rd to 4th
	72 (45)	50 (30)	4th to 5th
-	80 (50)	53 (33)	5th to 6th

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure sage operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH)
1st	63 (39)
2nd	103 (64)



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Unit: km/h (MPH)

< ECU DIAGNOSIS INFORMATION >

Gear	km/h (MPH)
3rd	148 (92)
4th	_
5th	_
6th	_

Test Value and Test Limit

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The following is the information specified in Service \$06 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID(OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

Item	OBD-	Self-diagnostic test item	DTC	li	e and Test mit display)	Description
item	MID		DIG	TID	Unitand Scaling ID	Description
			P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
		Air fuel ratio (A/F) sensor 1	P0130	86H	0BH	Maximum sensor output voltage for test cycle
	01H	(Bank 1)	P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
HO2S			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
		Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
	02H		P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
		Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
	03H		P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

< ECU DIAGNOSIS INFORMATION >

	OBD-	Self-diadnostic test item		Test value and Test limit (GST display)		
Item	MID		DTC	TID	Unitand Scaling ID	Description
			P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
		Air fuel ratio (A/F) sensor 1	P0150	86H	0BH	Maximum sensor output voltage for test cycle
	05H	(Bank 2)	P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
HO2S			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
		Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
	06H		P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
		Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
	07H		P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
			P0420	80H	01H	O2 storage index
	21H	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust index value
21F	2111	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output volt- age
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst
_YST			P0430	80H	01H	O2 storage index
	22H	Three way catalyst function	P0430	82H	01H	Switching time lag engine exhaust index value
	2211	(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output volt- age
			P2424	84H	84H	O2 storage index in HC trap catalyst

< ECU DIAGNOSIS INFORMATION >

	OBD-	Self-diagnostic test item		li	e and Test mit display)	Description
ltem	MID		DTC	TID	Unitand Scaling ID	
			P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
EGR SYSTEM	31H	EGR function	P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
			P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
	35H	W/T Monitor (Ponk1)	P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	പറം	VVT Monitor (Bank1)	P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
VVT			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
SYSTEM	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
EVAP SYSTEM	201	3CH EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
0.0.2	301		P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric cur- rent to voltage
	42H	Heated oxygen sensor 2 heat- er (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric cur- rent to voltage
O2 SEN-	43H	Heated oxygen sensor 3 heat- er (Bank 1)	P0043	80H	0CH	Converted value of Heater electric cur- rent to voltage
SOR HEATER	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric cur- rent to voltage
	46H	Heated oxygen sensor 2 heat- er (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric cur- rent to voltage
·	47H	Heated oxygen sensor 3 heat- er (Bank 2)	P0063	80H	0CH	Converted value of Heater electric cur- rent to voltage

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ltom	OBD-		DTC	Test value and Test limit (GST display)		Description	А
nem	Item MID	Self-diagnostic test item	DIC	TID	Unitand Scaling ID	Description	EC
			P0411	80H	01H	Secondary Air Injection System Incor- rect Flow Detected	С
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow	C
		I Secondary Air system	P2445	82H	01H	Secondary Air Injection System Pump Stuck Off	D
SEC- OND- ARY AIR	71H		P2448	83H	01H	Secondary Air Injection System High Airflow	E
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switch- ing Valve Stuck Open	
			P2440	85H	01H	Secondary Air Injection System Switch- ing Valve Stuck Open	F
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On	0
	0.411	Fuel injection system function	P0171 or P0172	80H	2FH	Long term fuel trim	G
FUEL	81H	(Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped	
SYSTEM	82H	Fuel injection system function	P0174 or P0175	80H	2FH	Long term fuel trim	Н
	0211	(Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped	

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Revision: 2009 October

< ECU DIAGNOSIS INFORMATION >

		Self-diagnostic test item			e and Test mit	
Item	OBD-		DTC -		display)	Description
	MID			TID	Unitand Scaling ID	
			P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
		Multiple Cylinder Misfires	P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
MISFIRE	A1H		P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
MISFIRE	АП		P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

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< ECU DIAGNOSIS INFORMATION >

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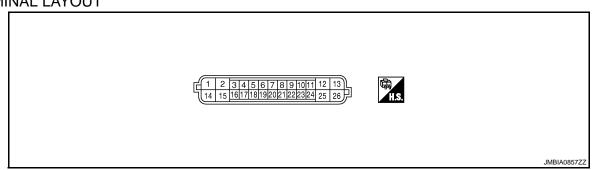
	OBD-			li	e and Test mit display)		А
ltem	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description	EC
	A2H	No. 1 Cylinder Misfire	P0301	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	С
			P0301	0CH	24H	Misfire counts for last/current driving cy- cles	
	АЗН	No. 2 Cylinder Misfire	P0302	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	D
			P0302	0CH	24H	Misfire counts for last/current driving cy- cles	E
	A4H	No. 3 Cylinder Misfire	P0303	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	F
			P0303	0CH	24H	Misfire counts for last/current driving cy- cles	G
	A5H	No. 4 Cylinder Misfire	P0304	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	Н
MISFIRE			P0304	0CH	24H	Misfire counts for last/current driving cy- cles	
MISFIRE	A6H	No. 5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	I
			P0305	0CH	24H	Misfire counts for last/current driving cy- cles	J
	A7H	No. 6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	K
			P0306	0CH	24H	Misfire counts for last/current driving cy- cles	
	A8H	No. 7 Cylinder Misfire	P0307	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	L
			P0307	0CH	24H	Misfire counts for last/current driving cy- cles	Μ
	A9H	No. 8 Cylinder Misfire	P0308	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	Ν
			P0308	0CH	24H	Misfire counts for last/current driving cy- cles	0

< ECU DIAGNOSIS INFORMATION >

Reference Value

INFOID:000000004251076

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

- VVEL control module is located behind the IPDM E/R. For this inspection, remove hoodledge cover (RH).
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

Term	inal No.	Description			Value
+		Signal name	Input/ Output	Condition	(Approx.)
1 (W)	14 (B)	VVEL actuator motor pow- er supply (bank 2)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
2	14	VVEL actuator motor	Output	[Engine is running] • Warm-up condition • Idle speed	0 - 14 V★ 100µSec/div € 5V/div JMBIA0854ZZ
(L/B)	(B)	(High lift) (bank 2)	Guiput	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100µSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
3	4	VVEL control shaft posi-		[Engine is running] • Warm-up condition • Idle speed	Approx.0.25 - 1.40 V
(G)	4 (W)	tion sensor 2 (bank 1)	Input	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	Approx.0.25 - 4.75 V
4 (W)	_	Sensor ground [VVEL control shaft posi- tion sensor 2 (bank 1)]	_	_	_

< ECU DIAGNOSIS INFORMATION >

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Termi	inal No.	Description) (aliva	
+		Signal name	Input/ Output	Condition	Value (Approx.)	A
5	6	VVEL control shaft posi-		[Engine is running]Warm-up conditionIdle speed	Approx.0.25 - 1.40 V	EC
(R)	(B)	tion sensor 2 (bank 2)	Input	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	Approx.0.25 - 4.75 V	(
6 (B)	_	Sensor ground [VVEL control shaft posi- tion sensor 2 (bank 2)]	_	_	_	
7 (SB)	6 (B)	Sensor power supply [VVEL control shaft posi- tion sensor 2 (bank 2)]	_	[Ignition switch: ON]	5 V	E
8 (O)	14 (B)	Power supply for VVEL control module		[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	F
9 (LG)	4 (W)	Sensor power supply [VVEL control shaft posi- tion sensor 2 (bank 1)]	_	[Ignition switch: ON]	5 V	(
11 (G)	_	CAN communication line [ECM]	Input/ Output	_	_	
12	14	VVEL actuator motor	Output	[Engine is running] • Warm-up condition • Idle speed	0 - 14 V★ 100µSec/div € 5V/div JMBIA0854ZZ	H
(G)	(B)	(High lift) (bank 1)		[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100µSec/div € 5V/div JMBIA08552Z	k
13 (W)	14 (B)	VVEL actuator motor pow- er supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	N
14 (B)	_	-	_	[Engine is running] • Idle speed	-	Ν

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< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

Termi	nal No.	Description			Value				
+		Signal name	Input/ Output	Condition	(Approx.)				
15	14	VVEL actuator motor (Low	Output	[Engine is running]Warm-up conditionIdle speed	0 - 14 V★ 100µSec/div 5V/div JMBIA0854ZZ				
(LYY)	(B)	lift) (bank 2)	Gupu	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100µSec/div 				
16 (R)	17 (L)	VVEL control shaft posi- tion sensor 1 (bank 1)	Input	 [Engine is running] Warm-up condition Idle speed [Engine is running] Warm-up condition When revving engine up to 2,000 rpm quickly 	3.50 - 4.75 ∨ 0.25 - 4.75 ∨				
17 (L)	_	Sensor ground [VVEL control shaft posi- tion sensor 1 (bank 1)]	_						
18	19	VVEL control shaft posi-	Input	[Engine is running] • Warm-up condition • Idle speed [Engine is running]	3.50 - 4.75 V				
(G)	(W)	tion sensor 1 (bank 2)	·	 Warm-up condition When revving engine up to 2,000 rpm quickly 	0.25 - 4.75 V				
19 (W)	_	Sensor ground [VVEL control shaft posi- tion sensor 1 (bank 2)]	_	_	_				
20 (BR)	19 (W)	Sensor power supply [VVEL control shaft posi- tion sensor 1 (bank 2)]	_	[Ignition switch: ON]	5 V				
21 (V)	14 (B)	VVEL actuator motor relay abort signal	Input	[Engine is running]Warm-up conditionIdle speed	0 V				
22 (P)	17 (L)	Sensor power supply [VVEL position sensor 1 (bank 1)]	_	[Ignition switch: ON]	5 V				
23 (Y)	14 (B)	VVEL control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V) 0 - 1.0 V				
24 (L)	_	CAN communication line	Input/ Output	[Ignition switch: ON]					

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

Term	inal No.	Description			Value	
+		Signal name	Input/ Output	Condition	(Approx.)	A
					0 - 14 V★ 100µSec/div	EC
25	14	VVEL control motor (Low		[Engine is running]Warm-up conditionIdle speed	SV/div JMBIA0854ZZ	С
25 (BR)	(B)	lift) (bank 1)	Output		0 - 14 V★	D
				[Engine is running]Warm-up conditionWhen revving engine up to 2,000	100µSec/div	Е
				rpm quickly	5V/div JMBIA0855ZZ	F
★: Avera	age voltage	e for pulse signal (Actual puls	e signal ca	n be confirmed by oscilloscope.)		G

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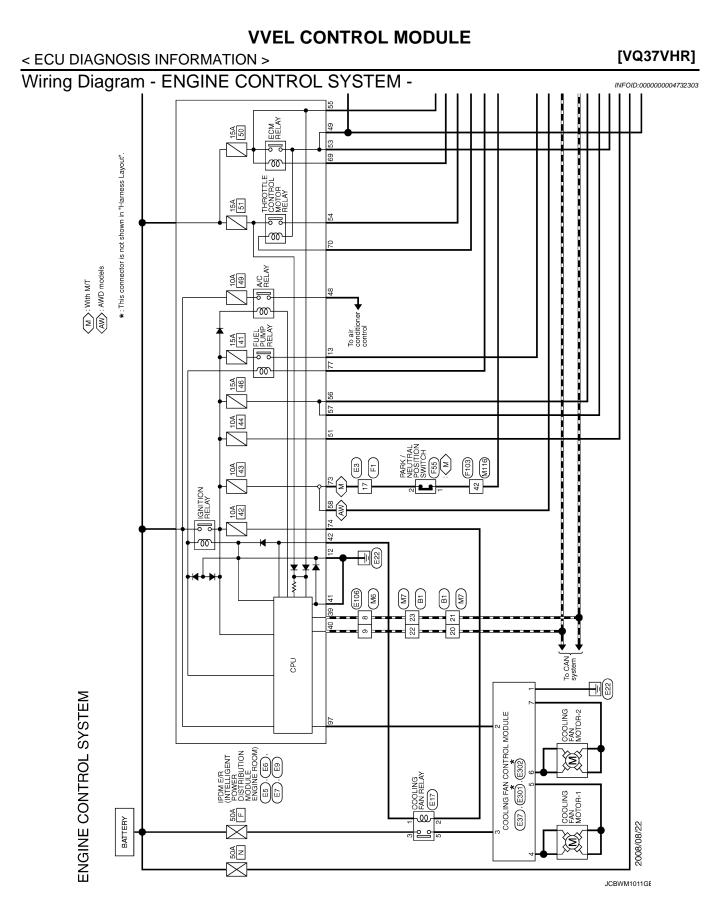
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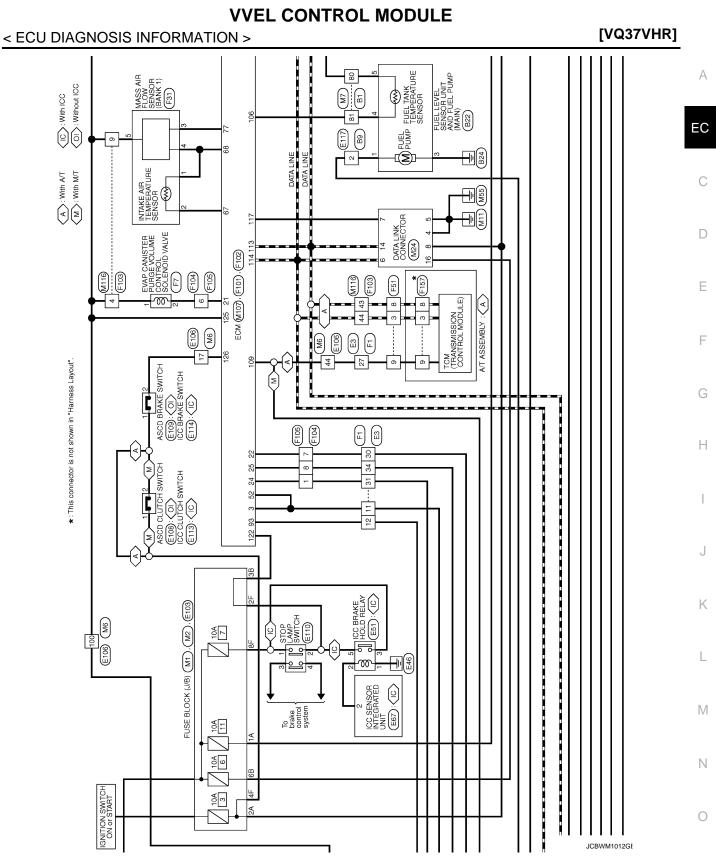
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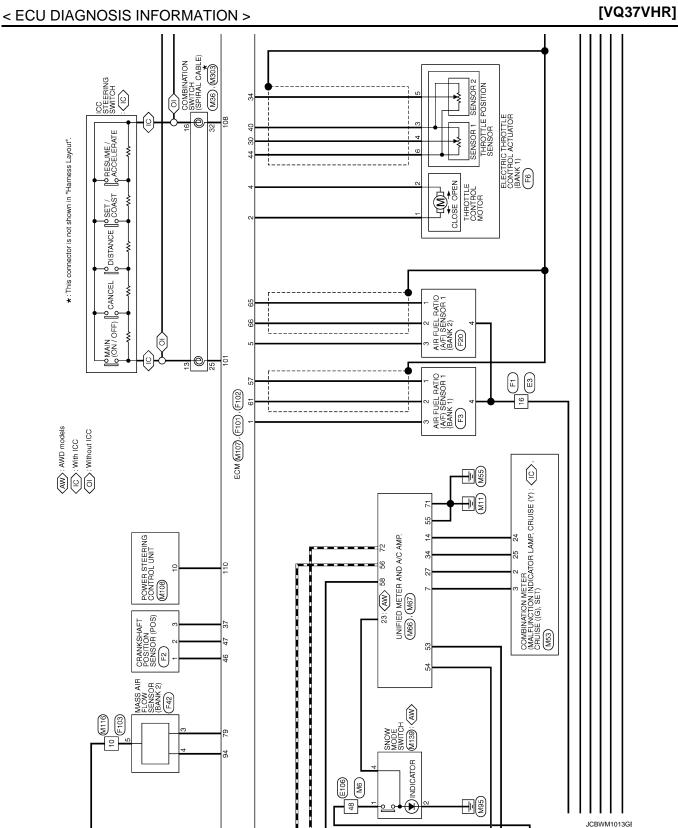
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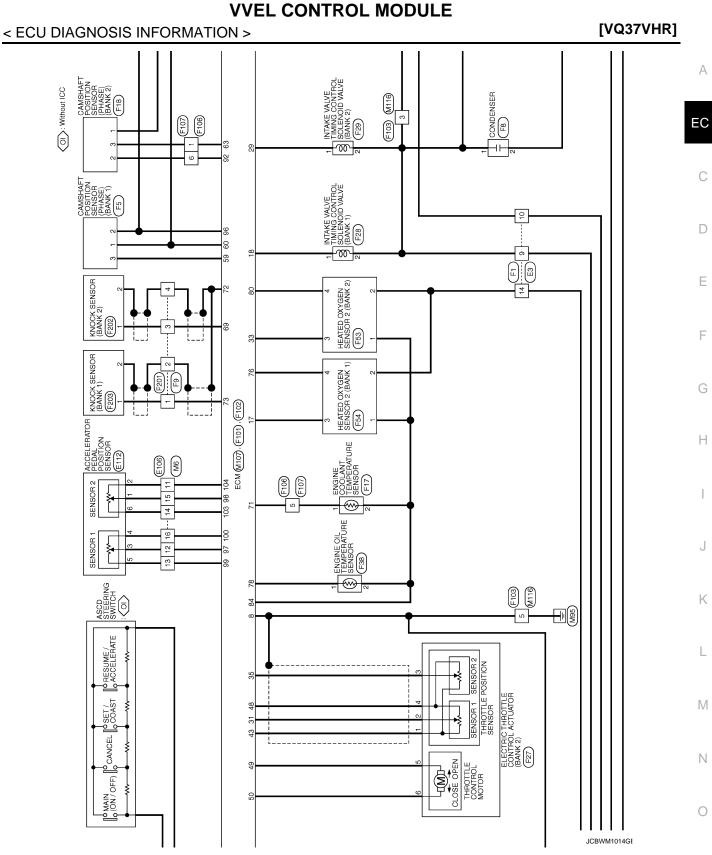


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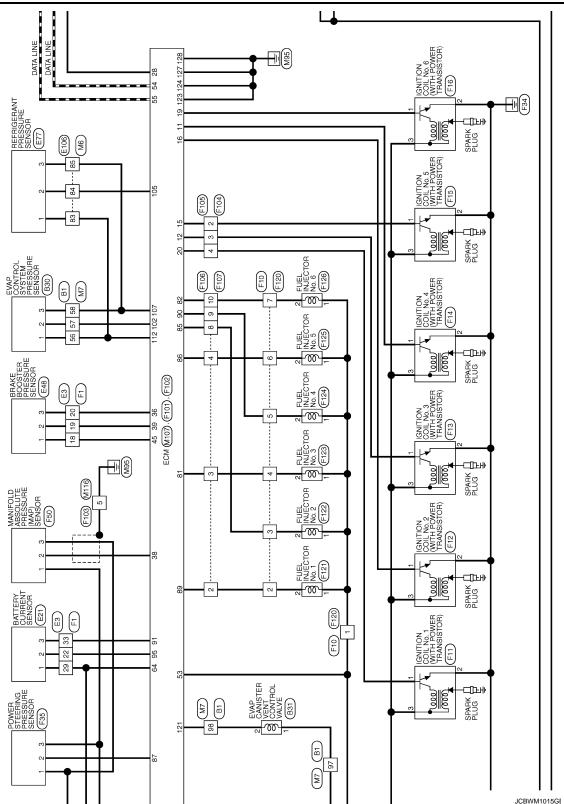


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[VQ37VHR]

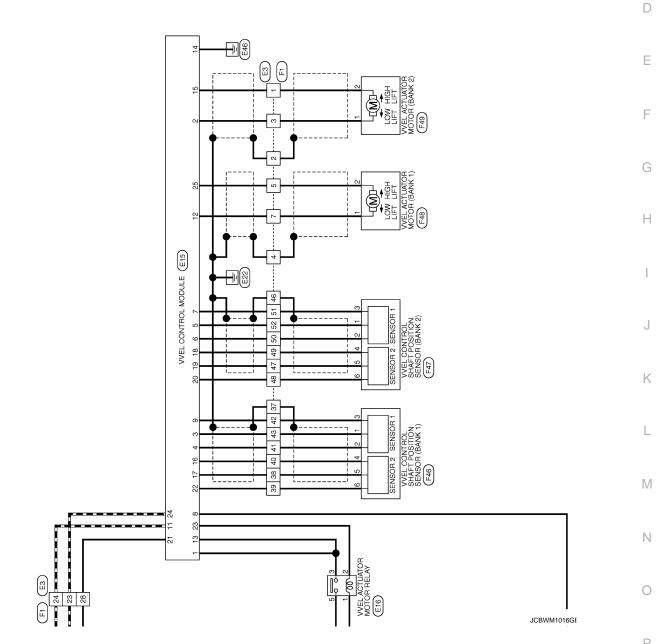
VVEL CONTROL MODULE

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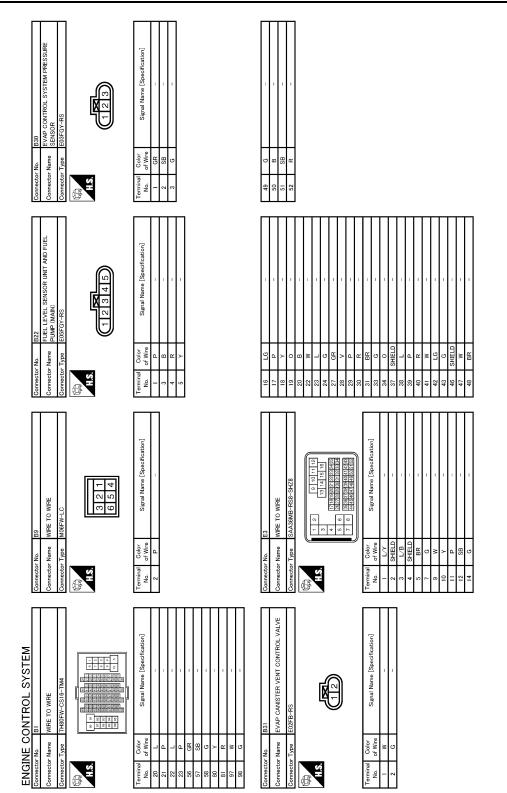
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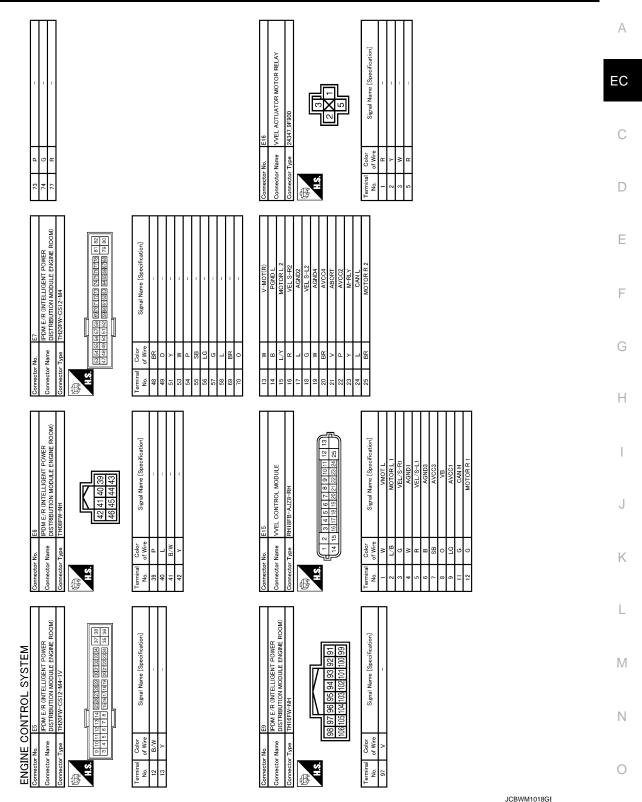
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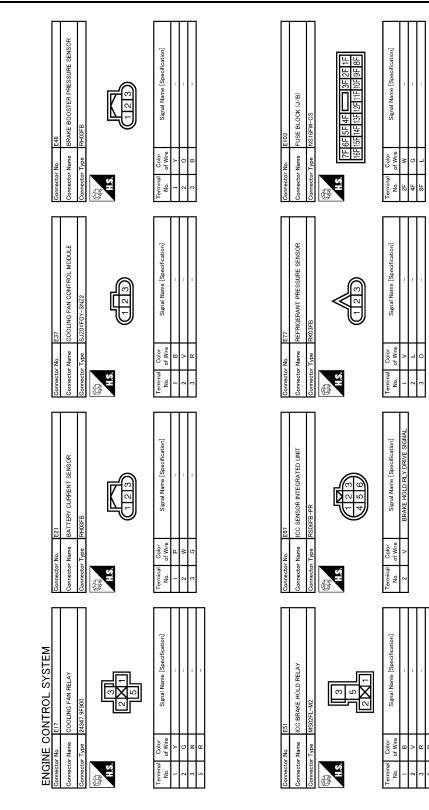
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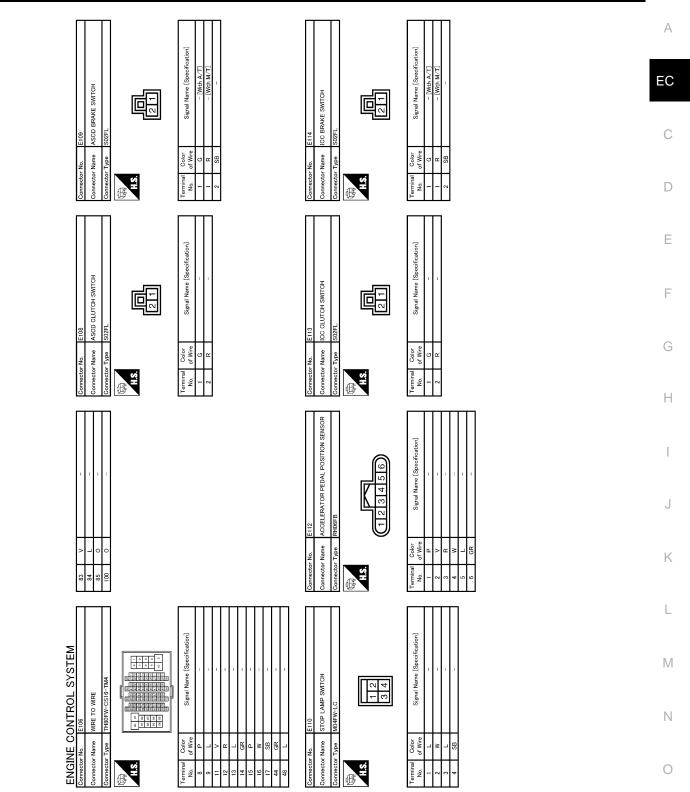
[VQ37VHR]



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[VQ37VHR]



JCBWM1020GE

CRANKSHAFT POSITION SENSOR (POS)

ctor Name

< ECU DIAGNOSIS INFORMATION >

COOLING FAN CONTROL MODULE (COOLING FAN MOTOR-2)

nector Name

COOLING FAN CONTROL MODULE (COOLING FAN MOTOR-1)

ector Name

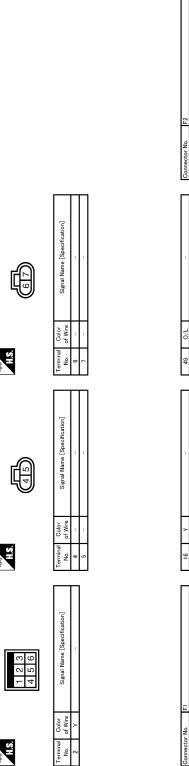
ENGINE CONTROL SYSTEM

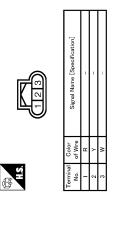
WIRE TO WIRE

nector Name

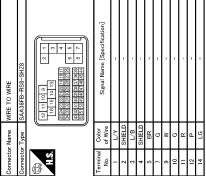
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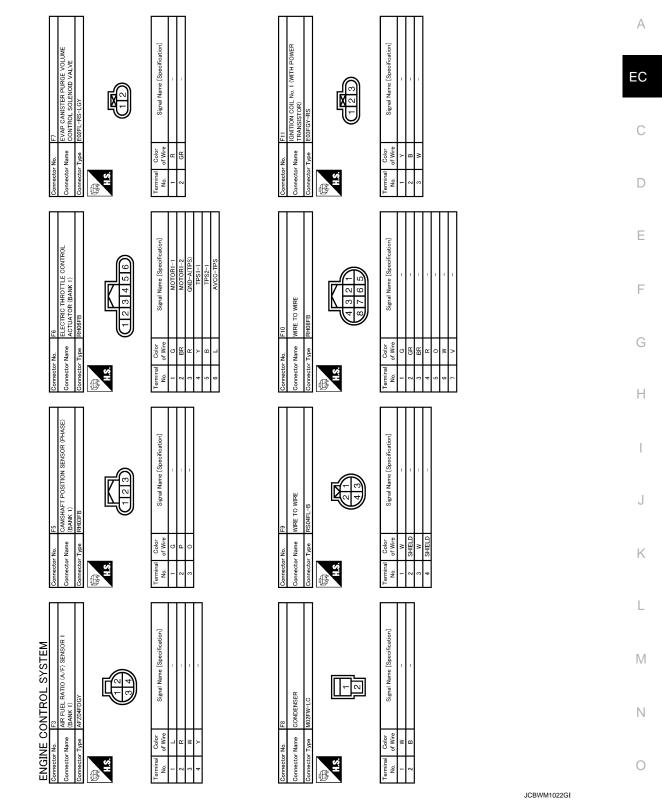
1	i	-	-	1	1	-	-	-	-	-	1	1	-	-	-	-	1		1		1			-
≻	M	ГG	Ь	0	9	Y	ΓC	GR	BR	٦	Я	٩	SB	0	8	M	Y	9	в	GR	Я	SHIELD	W/L	ГG
16	17	18	19	20	22	23	24	27	28	29	30	31	33	34	37	38	39	40	41	42	43	46	47	48



JCBWM1021GE

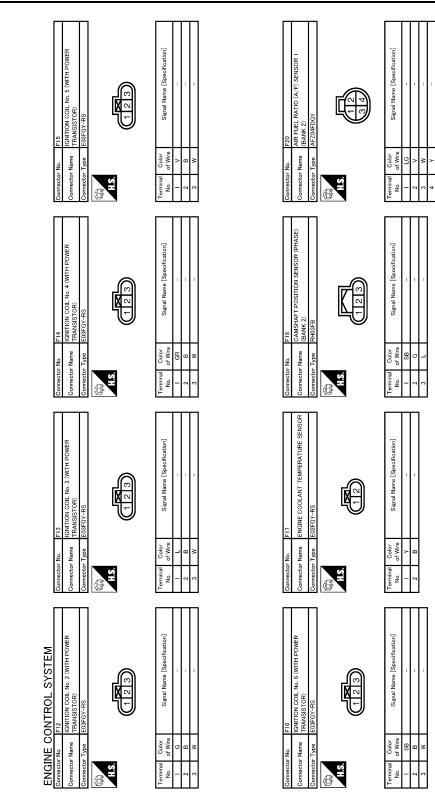
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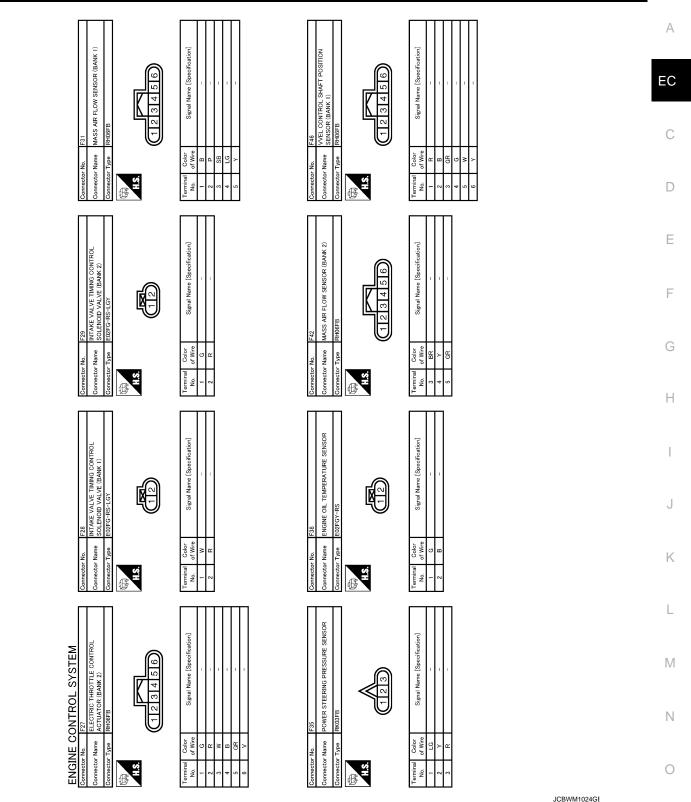
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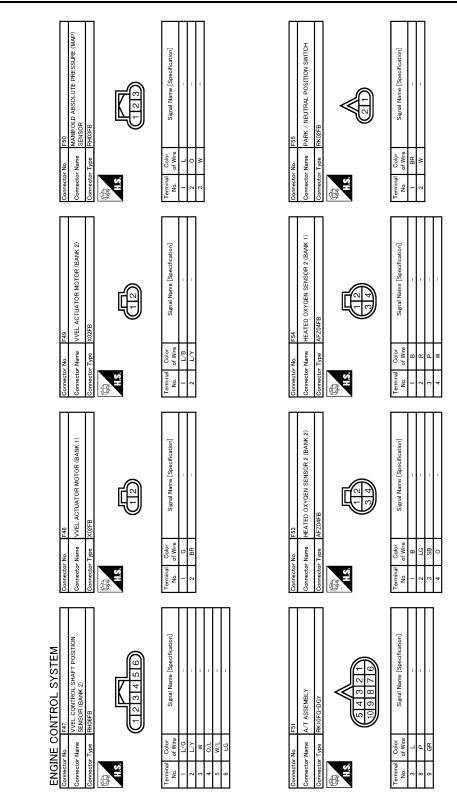
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J24Gt

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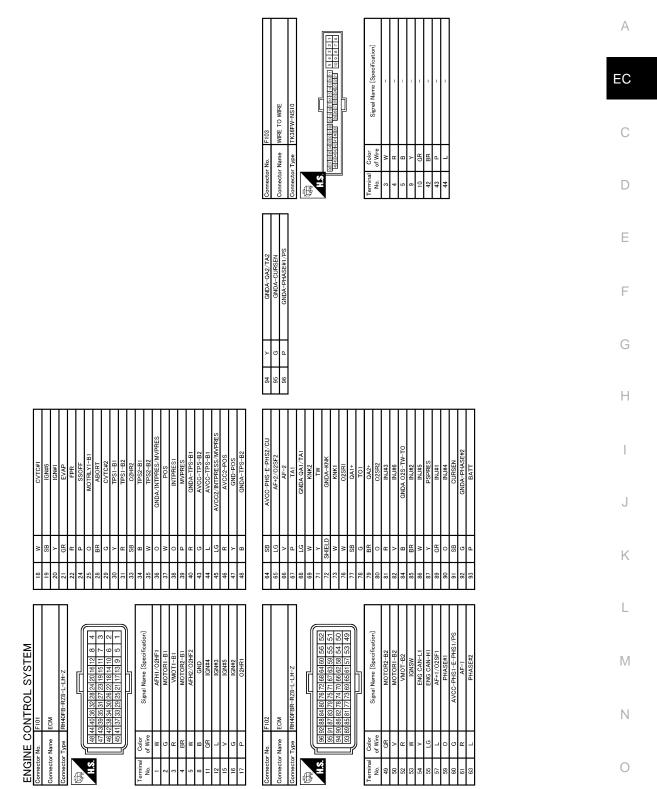
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JCBWM1025GE

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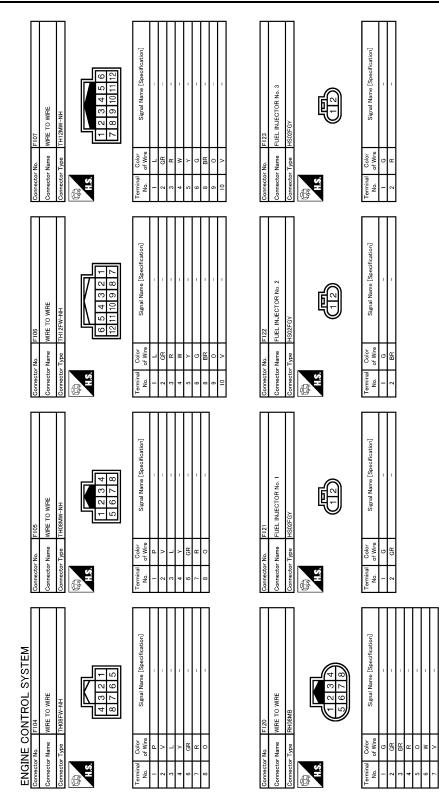
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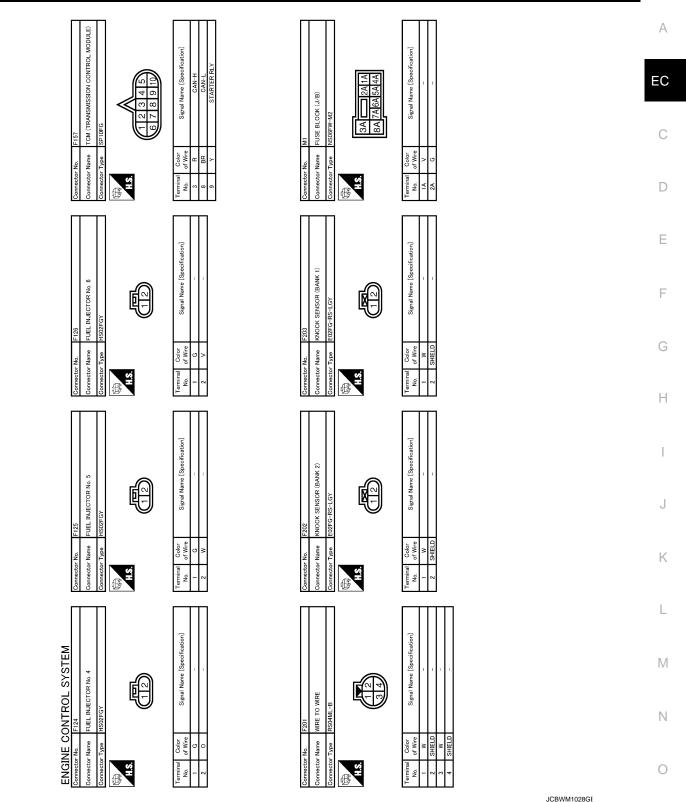
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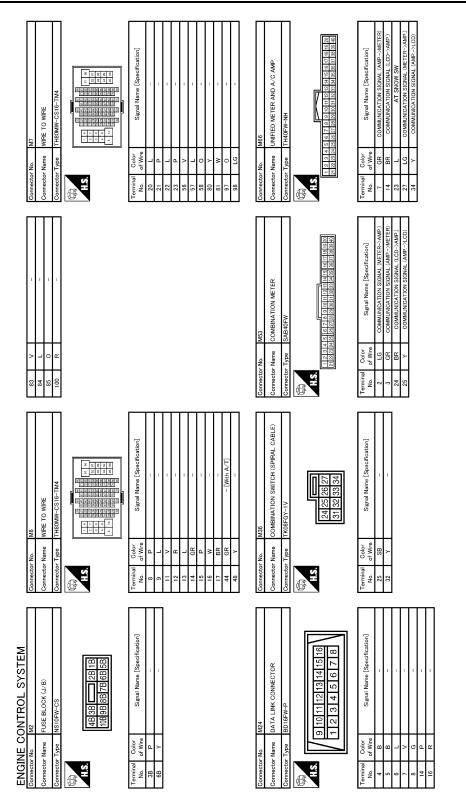
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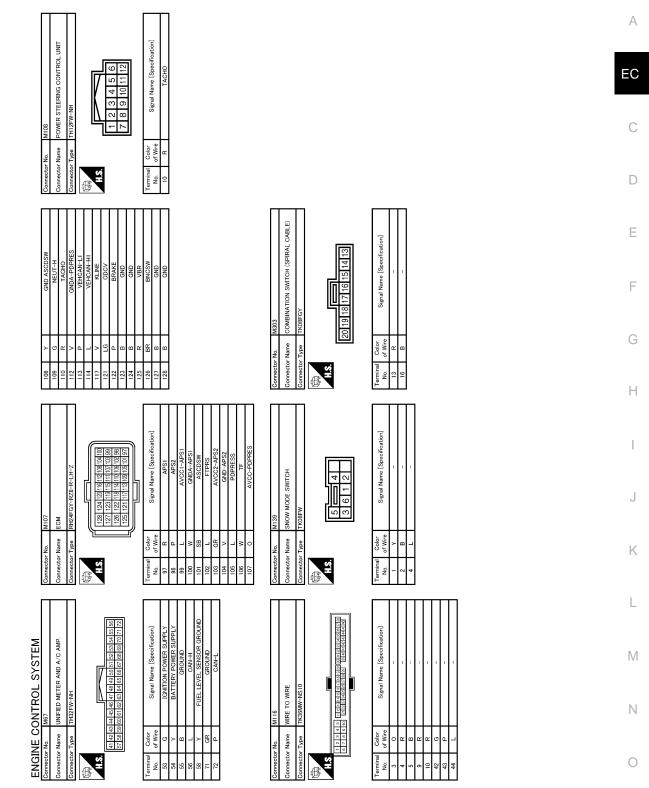
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< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]



JCBWM1030GE

< SYMPTOM DIAGNOSIS >

[VQ37VHR]

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SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

							S	/MPT	ОМ						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-499
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<u>EC-614</u>
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-496
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>EC-83</u>
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-518</u>
	Incorrect idle speed adjustment						1	1	1	1		1			<u>EC-13</u>
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	<u>EC-402,</u> <u>EC-409</u>
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			<u>EC-13</u>
	Ignition circuit	1	1	2	2	2		2	2			2			<u>EC-507</u>
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			<u>EC-145</u>
Mass air	r flow sensor circuit	1			2										<u>EC-168,</u> <u>EC-176</u>
Engine o	coolant temperature sensor circuit						3			3					<u>EC-191,</u> <u>EC-198</u>
Air fuel r	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			<u>EC-205,</u> <u>EC-209,</u> <u>EC-212,</u> <u>EC-215,</u> <u>EC-480</u>
Throttle	position sensor circuit					Ţ	2			2					EC-194, EC-260, EC-398, EC-400, EC-411
Accelera	ator pedal position sensor circuit			3	2	1									<u>EC-467,</u> <u>EC-471,</u> <u>EC-475</u>
Knock s	ensor circuit			2								3			<u>EC-270</u>

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< SYMPTOM DIAGNOSIS >

[VQ37VHR]

						S	YMPT	ОМ							Δ
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION			DLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	A EC C D
	HAR	ENG	HESI	SPA	LAC	НGF	ROU	IDLIN	SLOV	OVE	EXC	EXCI	BATI		E
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		
Engine oil temperature sensor			4		1						3			<u>EC-254,</u> <u>EC-257</u>	F
Crankshaft position sensor (POS) circuit	2	2												EC-273	
Camshaft position sensor (PHASE) circuit	3	2												<u>EC-277</u>	G
Vehicle speed signal circuit		2	3		3						3			<u>EC-346</u>	
Power steering pressure sensor circuit		2					3	3						<u>EC-355</u>	Н
ECM	2	2	3	3	3	3	3	3	3	3	3			<u>EC-363,</u> <u>EC-365</u>	
Intake valve timing control solenoid valve cir- cuit		3	2		1	3	2	2	3		3			<u>EC-165</u>	I
Manifold abslute pressure (MAP) sensor											3			<u>EC-182</u>	
Brake booster pressure sensor											3			EC-358	J
VVEL control module	3		4	4	3									<u>EC-</u> <u>457,EC-</u> <u>459</u>	K
VVEL actuator motor	3		4	4	3									<u>EC-384</u>	
VVEL actuator motor relay	3		4	4	3									<u>EC-388</u>	
VVEL actuator shaft position sensor	3		4	4	3									<u>EC-380</u>	L
PNP signal circuit			3		3		3	3			3			<u>EC-371</u>	
Refrigerant pressure sensor circuit		2				3			3		4			<u>EC-520</u>	M
Electrical load signal circuit							3							<u>EC-494</u>	
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	<u>HA-3</u>	
ABS actuator and electric unit (control unit)			4											BRC-4	Ν

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

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< SYMPTOM DIAGNOSIS >

[VQ37VHR]

							S	(MPT)	MC						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDRE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page
Warranty s	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	-													<u>FL-12</u>
	Fuel piping	5		5	5	5		5	5			5			FL-4
	Vapor lock		5												_
	Valve deposit														_
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5		5	5			5			_
Air	Air duct														<u>EM-28</u>
	Air cleaner														<u>EM-28</u>
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			<u>EM-28</u>
	Electric throttle control actuator	5			5		5			5					EM-29
	Air leakage from intake manifold/ Collector/Gasket														<u>EM-33</u>
Cranking	Battery														<u>PG-99</u>
	Generator circuit	1	1	1		1		1	1					1	<u>CHG-22,</u> <u>CHG-23</u>
	Starter circuit	3										1			STR-5
	Signal plate	6													<u>EM-131</u>
	PNP signal sircuit	4													<u>TM-9, TM-</u> <u>176</u>
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-117
	Cylinder head gasket				0				0		4		3		
	Cylinder block														
	Piston												4		
	Piston ring	6	6	6	6	6		6	6			6			<u>EM-131</u>
	Connecting rod				0				0						
	Bearing														
	Crankshaft														

< SYMPTOM DIAGNOSIS >

[VQ37VHR]

							S١	(MPT)	MC							А
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDTE/TOM IDTE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	EC
Warranty s	symptom code		АВ	AC	م AD	AE	 AF	AG	= AH	ഗ AJ	AK	Ш AL	Ш AM	Ш	-	
Valve	Timing chain	7.0.1													<u>EM-65</u>	F
mecha-	Camshaft														EM-104	
nism	Intake valve timing control	5	5	5	5	5		5	5			5			EM-65	G
	Intake valve	-											_		EM 447	0
	Exhaust valve	-											3		<u>EM-117</u>	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			<u>EX-4, EX-6</u>	Η
	Three way catalyst															
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>LU-10, LU-</u> <u>12, LU-13,</u> <u>LU-14</u>	I
	Oil level (Low)/Filthy oil														<u>LU-6</u>	J
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-11,</u> <u>CO-11</u>	
	Thermostat									5					<u>CO-21</u>	K
	Water pump	5	5	5	5	5		5	5		4	5			<u>CO-20</u>	
	Water gallery								0			Ŭ			<u>CO-24</u>	L
	Cooling fan														<u>CO-17</u>	
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-7</u>	M
IVIS (INFI NATS)	NITI Vehicle Immobilizer System —	1	1												<u>SEC-5</u>	

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< SYMPTOM DIAGNOSIS >

NORMAL OPERATING CONDITION

Description

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,400 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. However, if the engine speed is above 4,000 rpm, fuel will be cut off in a few seconds. Fuel cut will be operated until the engine speed reaches 1,000 rpm, then fuel cut will be cancelled. **NOTE:**

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-34.</u> <u>"System Description"</u>.

TORQUE CUT CONTROL (AT HIGH ENGINE OIL TEMPERATURE)

ECM receives engine oil temperature signal from engine oil temperature sensor.

To avoid VVEL performance, ECM performs the engine torque cut control at high engine oil temperature. If engine oil temperature is too high, engine oil viscosity will change. As a result, engine oil pressure is decreased. This control is to control the VVEL operating angle by operating the VVEL actuator sub assembly. If this control is operated, engine performance will decrease, then maximum engine speed is reduced a little, for example.

NOTE:

If the engine oil temperature sensor is deteriorated, its characteristic will change.

In this case, the operating temperature for engine torque cut control might be decrease.

Perform Component Inspection of the engine oil temperature sensor to check for the deterioration. Refer to EC-256, "Component Inspection".

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[VQ37VHR]

PRECAUTION PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

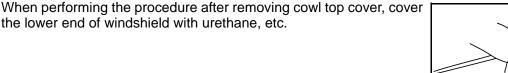
- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SRS AIR BAG".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Precaution for Procedure without Cowl Top Cover



Precautions For Xenon Headlamp Service

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WARNING:

Comply with the following warnings to prevent any serious accident.

 Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.

 $\langle \mathcal{A} \rangle$

- Never work with wet hands.
- Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)
- Never touch the bulb glass immediately after turning it OFF. It is extremely hot.

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< PRECAUTION >

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)
- Never perform HID circuit inspection with a tester.
- Never touch the xenon bulb glass with hands. Never put oil and grease on it.
- Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.
- Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).

On Board Diagnostic (OBD) System of Engine and A/T

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[VQ37VHR]

The ECM has an on board diagnostic system. It will illuminate the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

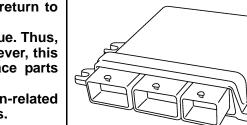
CAUTION:

- Always turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to illuminate.
- Always connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to illuminate due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to <u>PG-89</u>, "<u>Description</u>".
- Always route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to illuminate due to the short circuit.
- Always connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to illuminate due to the malfunction of the EVAP system or fuel injection system, etc.
- Always erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

General Precautions

- Always use a 12 volt battery as power source.
- Never attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.
- because switch is then dis-

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- Never disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

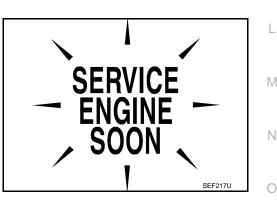
The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.

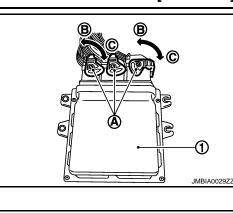
- If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

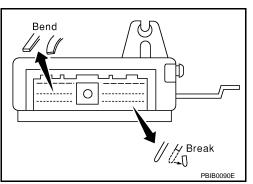
< PRECAUTION >

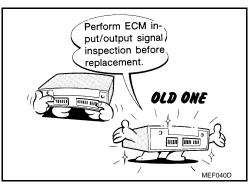
- When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.
- 1 : ECM
- C : Loosen

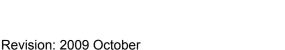
- When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- · Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-525, "Reference Value".
- Handle mass air flow sensor carefully to avoid damage.
- Never clean mass air flow sensor with any type of detergent.
- Never disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Never shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).
- After performing each TROUBLE DIAGNOSIS, perform DTC **Confirmation Procedure or Component Function Check.** The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.











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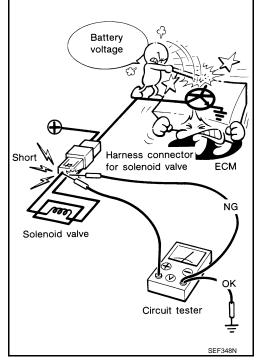
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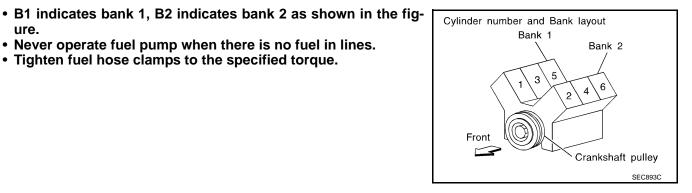
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ure.

· When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



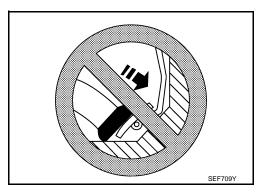




Never operate fuel pump when there is no fuel in lines.

• Tighten fuel hose clamps to the specified torque.

- · Immediately after starting, never rev up engine unnecessarily.
- Never rev up engine just prior to shutdown.



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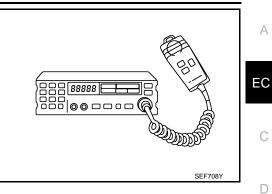
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- When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.
- Keep the antenna as far as possible from the electronic control units.
- Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.
- Never let them run parallel for a long distance.
- Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
- Be sure to ground the radio to vehicle body.



Revision: 2009 October

PREPARATION

< PREPARATION > PREPARATION PREPARATION

Special Service Tools

INFOID:000000004251085

[VQ37VHR]

NOTE:

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
(J-44321) Fuel pressure gauge kit	LEC642	Checks fuel pressure

Commercial Service Tools

INFOID:000000004251086

Tool name (Kent-Moore No.)		Description
Leak detector i.e.: (J-41416)	S-NT703	Locates the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)		Applies positive pressure through EVAP service port
Fuel filler cap adapter	S-NT704	Checks fuel tank vacuum relief valve opening
i.e.: (MLR-8382)	S-NT815	pressure
Socket wrench	19 mm (0.75 in) 19 mm (0.75 in) 19 mm Nore than 19 mm (1.26 in) 19 mm 19 mm 10	Removes and installs engine coolant temperature sensor

PREPARATION

< PREPARATION >

[VQ37VHR]

Tool name (Kent-Moore No.)		Description	A
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	a b Mating surface shave	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with anti- seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirco- nia Oxygen Sensor	EC
	Flutes AEM488	b: 12 mm diameter with pitch 1.25 mm for Tita- nia Oxygen Sensor	С
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent		Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.	D
meeting MIL specifica- tion MIL-A-907)			E
	S-NT779		F

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< PERIODIC MAINTENANCE >

PERIODIC MAINTENANCE FUEL PRESSURE

Inspection

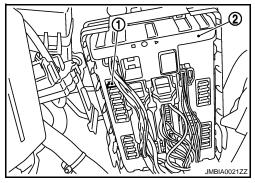
FUEL PRESSURE RELEASE

(I) With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.

Without CONSULT-III

- 1. Remove fuel pump fuse (1) located in IPDM E/R (2).
- 2. Start engine.
- 3. After engine stalls, crank it two or three times to release all fuel pressure.
- 4. Turn ignition switch OFF.
- 5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

CAUTION:

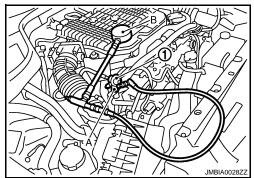
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. NOTE:

- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because CV36 models do not have fuel return system.
- Use Fuel Pressure Gauge Kit (J-44321) to check fuel pressure.
- 1. Release fuel pressure to zero.
- 2. Install the inline fuel quick disconnected fitting (A) between fuel damper (1) and injector tube.
- 3. Connect the fuel pressure test gauge (quick connector adapter hose) (B) to the inline fuel quick disconnected fitting.
- 4. Turn ignition switch ON and check for fuel leakage.
- 5. Start engine and check for fuel leakage.
- 6. Read the indication of fuel pressure gauge.

At idling : Approximately 350 kPa (3.57 kg/cm², 51 psi)

7. If result is unsatisfactory, check fuel hoses and fuel tubes for clogging.

If OK, Replace "fuel filter and fuel pump assembly". If NG, Repair or replace.



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EVAP LEAK CHECK

< PERIODIC MAINTENANCE > EVAP LEAK CHECK

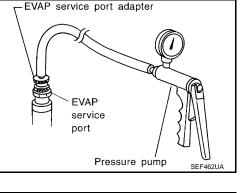
Inspection

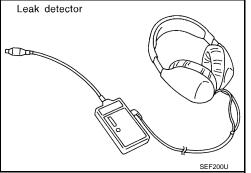
CAUTION:

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system. NOTE:
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

B WITH CONSULT-III

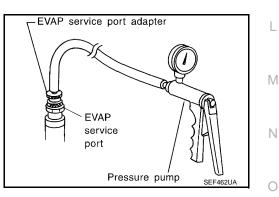
- 1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- Remove EVAP service port adapter and hose with pressure pump.
- 7. Locate the leak using a leak detector. Refer to <u>EC-83, "System</u> <u>Diagram"</u>.





WITHOUT CONSULT-III

- 1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
- 2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
- To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm², 0.2 to 0.4 psi).
- Remove EVAP service port adapter and hose with pressure pump.





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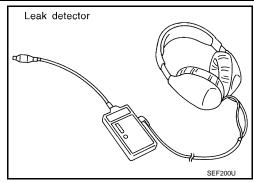
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EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

5. Locate the leak using a leak detector. Refer to <u>EC-83</u>, "System <u>Diagram"</u>.



[VQ37VHR]

EVAP CANISTER

< REMOVAL AND INSTALLATION > **REMOVAL AND INSTALLATION EVAP CANISTER**

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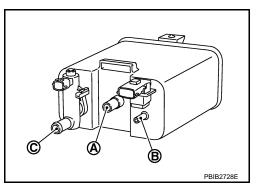
ASSEMBLY Assemble in the reverse order of disassembly. CAUTION:

Always replace O-ring with a new one.

Inspection

Check EVAP canister as follows:

- 1. Block port (B).
- 2. Blow air into port (A) and check that it flows freely out of port (C).
- 3. Release blocked port (B).
- 4. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
- 5. Block port (A) and (B).
- 6. Apply pressure to port (C) and check that there is no leakage.



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SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Transmission	Condition	Specification	
A/T	No load* (in P or N position)	650 ± 50 rpm	(
M/T	No load* (in Neutral position)	650 ± 50 rpm	
*: Under the following conditions	· · · · ·		C

• A/C switch: OFF

• Electric load: OFF (Lights, heater fan & rear window defogger)

Steering wheel: Kept in straight-ahead position

Ignition Timing

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Condition	Specification
No load* (in P or N position)	$10\pm5^\circ$ BTDC
No load* (in Neutral position)	10 ± 5° BTDC
	No load* (in P or N position)

*: Under the following conditions

A/C switch: OFF

· Electric load: OFF (Lights, heater fan & rear window defogger)

• Steering wheel: Kept in straight-ahead position

Calculated Load Value

Condition	Specification (Using CONSULT-III or GST)	
At idle	5 – 35 %	-
At 2,500 rpm	5 – 35 %	_
		- k

Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)	
Output voltage at idle	0.7 – 1.2 V*	_
Mass air flow (Using CONSULT-III or GST)	2.0 − 6.0 g·m/sec at idle* 7.0 − 20.0 g·m/sec at 2,500 rpm*	M

*: Engine is warmed up to normal operating temperature and running under no load.

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