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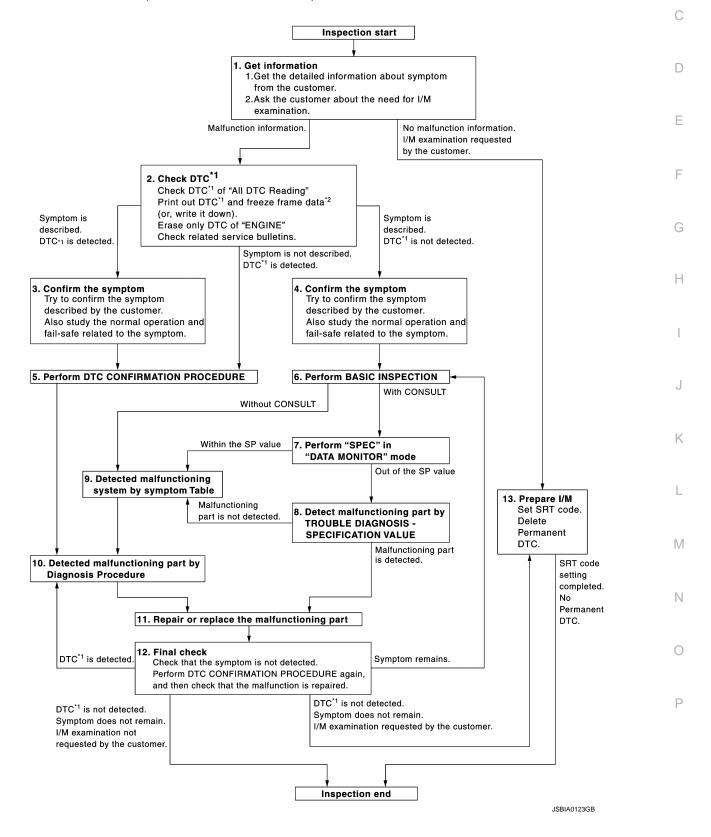
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

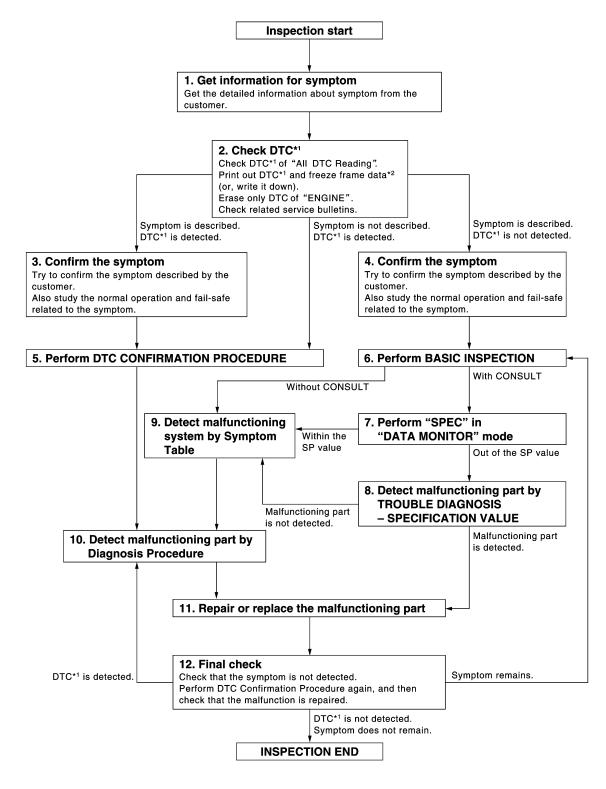
Α

OVERALL SEQUENCE (EXCEPT FOR MEXICO)



- *1: Include 1st trip DTC.
- *2: Include 1st trip freeze frame data.

OVERALL SEQUENCE (FOR MEXICO)



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^{*1:} Include 1st trip DTC.

^{*2:} Include 1st trip freeze frame data.

DIAGNOSIS AND REPAIR WORKFLOW [VQ37VHR] < BASIC INSPECTION > DETAILED FLOW (EXCEPT FOR MEXICO) Α 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 EC-27, "Diagnostic EC Work Sheet".) 2. Ask if the customer requests I/M examination. Malfunction information, obtained>>GO TO 2. No Malfunction information, but a request for I/M examination>>GO TO 13. 2.CHECK DTC Check DTC of "All DTC Reading". 2. Perform the following procedure if DTC is displayed. Record DTC and freeze frame data. (Print them out with CONSULT or GST.) Е Erase only DTC of "ENGINE". (P) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-164, "CONSULT Function". (R) Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-161, "On Board Diagnosis Function". Turn ignition switch OFF. Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-610, "Symptom Table".) 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 EC-614, "Description" and EC-579, "Fail safe". Diagnosis Work Sheet is useful to verify the incident. Verify relation between the symptom and the condition when the symptom is detected. K >> 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 EC-614, "Description" and EC-579, "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 6.

$oldsymbol{5}$.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 EC-581, "DTC Inspection Priority Chart" 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.

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< BASIC INSPECTION > [VQ37VHR]

Is DTC detected?

YES >> GO TO 10.

NO >> Check according to GI-43, "Intermittent Incident".

6. PERFORM BASIC INSPECTION

Perform EC-29, "BASIC INSPECTION: Special Repair Requirement".

Do you have CONSULT?

YES >> GO TO 7. NO >> GO TO 9.

7.PERFORM SPEC IN DATA MONITOR MODE

(P)With CONSULT

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 "SPEC" in "DATA MONITOR" mode. Refer to EC-173, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9. NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-174, "Diagnosis Procedure".

Is a malfunctioning part detected?

YES >> GO TO 11. NO >> GO TO 9.

9.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-610</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.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

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 GI-46, "Circuit Inspection".

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT. Refer to <u>EC-558</u>, "Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- 2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- Check DTC. If DTC is displayed, erase it.
 - (F) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-164, "CONSULT Function".
 - Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in <u>EC-161, "On Board Diagnosis Function"</u>.

>> GO TO 12.

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.

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.

[VQ37VHR] < BASIC INSPECTION > Is DTC detected and does symptom remain? Α YES-1 >> DTC is detected: GO TO 10. YES-2 >> Symptom remains: GO TO 6. NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (🖲 With CONSULT: Refer to "How to Read EC DTC and 1st Trip DTC" in EC-164, "CONSULT Function", R Without CONSULT: Refer to "How to Read Self-diagnostic Results" in EC-161, "On Board Diagnosis Function"). NO-2 >> I/M examination, requested from the customer: GO TO 13. 13. PREPARE FOR I/M EXAMINATION Set SRT codes. Refer to EC-41, "Description". Erase permanent DTCs. Refer to EC-51, "Description". D >> INSPECTION END. Е DETAILED FLOW (FOR MEXICO) 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 EC-27, "Diagnostic Work Sheet".) >> GO TO 2. 2.CHECK DTC 1. Check DTC of "All DTC Reading". 2. Perform the following procedure if DTC is displayed. Record DTC and freeze frame data. (Print them out with CONSULT or GST.) Erase only DTC of "ENGINE". (F) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-164, "CONSULT Function". Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-161, "On Board Diagnosis Function". Turn ignition switch OFF. Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-610, "Symptom Table".) 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 M 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 EC-614, "Description" and EC-579, "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. f 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 EC-614, "Description" and EC-579, "Fail safe". Diagnosis Work Sheet is useful to verify the incident.

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

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>> GO TO 6.

${f 5.}$ 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-581, "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 GI-43, "Intermittent Incident".

6.PERFORM BASIC INSPECTION

Perform EC-29, "BASIC INSPECTION: Special Repair Requirement".

Do vou have CONSULT?

YES >> GO TO 7. NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

(P)With CONSULT

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 "SPEC" in "DATA MONITOR" mode. Refer to EC-173, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9. NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-174, "Diagnosis Procedure".

Is a malfunctioning part detected?

YES >> GO TO 11. NO >> GO TO 9.

$oldsymbol{9}.$ DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-610. "Symptom Table"</u> based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

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 GI-46, "Circuit Inspection".

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT. Refer to EC-558, "Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.

[VQ37VHR] < BASIC INSPECTION >

Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replace-

- Check DTC. If DTC is displayed, erase it.
 - (P) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-164, "CONSULT Function".
 - (R) Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-161, "On Board Diagnosis Function".

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>> GO TO 12.

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.

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.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.

YES-2 >> Symptom remains: GO TO 6. NO

>> Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM ((A) With CONSULT: Refer to "How to Read DTC and 1st Trip DTC" in EC-164, "CONSULT Function", ® Without CONSULT: Refer to "How to Read Self-diagnostic Results" in EC-161, "On Board Diagnosis Function").

Diagnostic Work Sheet

INFOID:0000000007462543

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:

- 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.

KEY POINTS

WHAT Vehicle & engine model WHEN Date, Frequencies WHERE Road conditions **HOW** Operating conditions, Weather conditions.

Symptoms

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< BASIC INSPECTION >

[VQ37VHR]

WORKSHEET SAMPLE

Customer nar	ne MR/MS	Model & Year	VIN		
Engine #	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.			
	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others []			
Symptoms	□ Idling	☐ No fast idle ☐ Unstable ☐ H☐ Others [High idle □ Low idle]		
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock☐ Intake backfire ☐ Exhaust backfi☐ Others [☐ Lack of power re]		
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While dece ☐ Just after stopping ☐ While loadi	lerating		
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night [☐ In the daytime		
Frequency		☐ All the time ☐ Under certain cond	ditions		
Weather conditions		☐ Not affected			
	Weather	☐ Fine ☐ Raining ☐ Snowing	Others [
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐	Cold ☐ Humid °F		
		☐ Cold ☐ During warm-up ☐	After warm-up		
Engine conditions		Engine speed0 2,000	4,000 6,000 8,000 rpm		
Road conditions		☐ In town ☐ In suburbs ☐ Hig	hway		
Driving conditions		☐ While accelerating ☐ While cruis ☐ While decelerating ☐ While turning	9		
		Vehicle speed	30 40 50 60 MPH		
Malfunction indicator lamp		☐ Turned on ☐ Not turned on			

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[VQ37VHR] < BASIC INSPECTION >

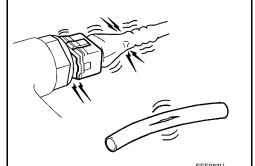
INSPECTION AND ADJUSTMENT BASIC INSPECTION

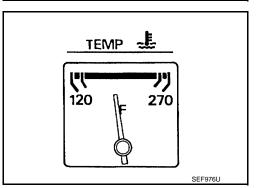
BASIC INSPECTION: Special Repair Requirement

INFOID:0000000007462544

1.INSPECTION START

- Check service records for any recent repairs that may indicate a related malfunction, or a current need for 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.

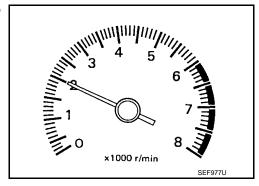




- Run engine at about 2,000 rpm for about 2 minutes under no load
- Make sure that no DTC is displayed with CONSULT or GST.

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.

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< BASIC INSPECTION > [VQ37VHR]

2. 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.

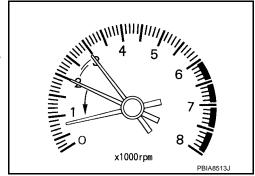
Check idle speed.

For procedure, refer to EC-34, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-625, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 4.



4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform <u>EC-35</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-36, "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.
- 2. Check idle speed.

For procedure, refer to EC-34, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-625, "Idle Speed".

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 EC-328, "Component Inspection".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-324, "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.)
- 2. 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 4.

10. CHECK IGNITION TIMING

Run engine at idle.

[VQ37VHR] < BASIC INSPECTION >

Check ignition timing with a timing light.

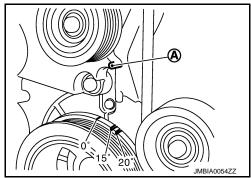
A :Timing indicator

For procedure, refer to EC-34, "IGNITION TIMING: Special Repair Requirement".

For specification, refer to <u>EC-625</u>, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 19. NO >> GO TO 11.



11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- 2. Perform EC-35, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 12.

12.perform throttle valve closed position learning

Perform EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-36, "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

- Start engine and warm it up to normal operating temperature.
- 2. Check idle speed.

For procedure, refer to EC-34, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-625, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

- Run engine at idle.
- Check ignition timing with a timing light.

A :Timing indicator

For procedure, refer to EC-34, "IGNITION TIMING: Special Repair Requirement".

For specification, refer to EC-625, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 16.

16.check timing chain installation

Check timing chain installation. Refer to EM-203, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 17.

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

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17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-328, "Component Inspection".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-324, "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>SEC-8</u>, "ECM RE-COMMUNICATING FUNCTION: Special Repair Requirement".

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to <u>EC-32</u>, "ADDITIONAL SERVICE WHEN <u>REPLACING CONTROL UNIT (ECM)</u>: Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM)

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Description

INFOID:0000000007462545

When replacing ECM, the following procedure must be performed. (For details, refer to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".)

PROGRAMMING OPERATION

NOTE:

After replacing with a blank ECM, programming is required to write ECM information. Be sure to follow the procedure to perform the programming.

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

1. CHECK ECM PART NUMBER

Check ECM part number to see whether it is blank ECM or not.

NOTE:

- Part number of blank ECM is 23703 xxxx.
- Check the part number when ordering ECM or with the one included in the label on the container box.

Is the ECM a blank ECM?

YES >> GO TO 2.

NO >> GO TO 4.

$2.\mathsf{s}$ ave ecm part number

Read out the part number from the old ECM and save the number, following the programming instructions. Refer to "CONSULT Operation Manual".

NOTE:

- The ECM part number is saved in CONSULT.
- Even when ECM part number is not saved in CONSULT, go to 3.

>> GO TO 3.

3. PERFORM ECM PROGRAMMING

After replacing ECM, perform the ECM programming. Refer to "CONSULT Operation Manual".

[VQ37VHR] < BASIC INSPECTION > NOTE: During programming, maintain the following conditions: Α - Ignition switch: ON - Electric load: OFF - Brake pedal: Not depressed EC - Battery voltage: 12 - 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in "Data monitor" of CONSULT.) >> GO TO 5. 4.REPLACE ECM Replace ECM. D >> GO TO 5. Е 5.PERFORM INITIALIZATION OF IVIS (NATS) SYSTEM AND REGISTRATION OF ALL IVIS (NATS) IGNI-TION KEY IDS Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION: Special Repair Requirement". F >> GO TO 6. 6. PERFORM VIN REGISTRATION Refer to EC-34, "VIN REGISTRATION: Special Repair Requirement". Н >> GO TO 7. 7.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING Refer to EC-35, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement". >> GO TO 8. 8.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement", >> GO TO 9. 9. PERFORM IDLE AIR VOLUME LEARNING Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement". M >> END ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MODULE) Ν ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MODULE): Description INFOID:0000000007462547 When replacing VVEL control module, the following procedure must be performed. ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL Р MODULE): Special Repair Requirement INFOID:0000000007462548 1. PERFORM IDLE AIR VOLUME LEARNING Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

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>> END

IDLE SPEED

IDLE SPEED: Description

INFOID:0000000007462549

This describes how to check the idle speed. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IDLE SPEED: Special Repair Requirement

INFOID:0000000007462550

1. CHECK IDLE SPEED

With CONSULT

Check idle speed in "DATA MONITOR" mode with CONSULT.

With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING: Description

INFOID:0000000007462551

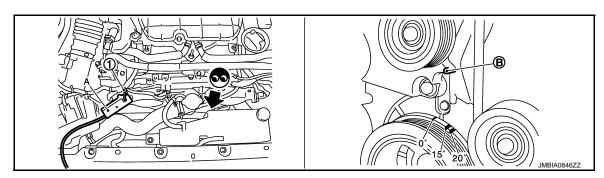
This describes how to check the ignition timing. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IGNITION TIMING: Special Repair Requirement

INFOID:0000000007462552

1. CHECK IGNITION TIMING

Attach timing light to loop wire as shown.



- 1. Loop wire
- A. Timing light

- B. Timing indicator
- 2. Check ignition timing.

>> INSPECTION END

VIN REGISTRATION

VIN REGISTRATION: Description

INFOID:0000000007462553

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:0000000007462554

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-24, "Information About Identification or Model Code".

< BASIC INSPECTION > [VQ37V	HR]
>> GO TO 2. 2. PERFORM VIN REGISTRATION	А
 With CONSULT 1. Turn ignition switch ON and engine stopped. 2. Select "VIN REGISTRATION" in "WORK SUPPORT" mode. 3. Follow the instruction of CONSULT display. 	EC
>> END ACCELERATOR PEDAL RELEASED POSITION LEARNING	С
ACCELERATOR PEDAL RELEASED POSITION LEARNING: Description INFOID:00000000	007462555
Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed time the harness connector of the accelerator pedal position sensor or ECM is disconnected.	
ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement	F
1.START	G
 Make sure that accelerator pedal is fully released. Turn ignition switch ON and wait at least 2 seconds. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON and wait at least 2 seconds. Turn ignition switch OFF and wait at least 10 seconds. 	Н
>> END THROTTLE VALVE CLOSED POSITION LEARNING	I
THROTTLE VALVE CLOSED POSITION LEARNING: Description	07462557 J
Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle by monitoring the throttle position sensor output signal. It must be performed each time harness contor of electric throttle control actuator or ECM is disconnected or electric throttle control actuator inside cleaned.	nnec-
THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requiremen	
1.START	M
 WITH CONSULT Turn ignition switch ON. Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode. Follow the instructions on the CONSULT display. Turn ignition switch OFF and wait at least 10 seconds. 	N
Check that throttle valve moves during the above 10 seconds by confirming the operating sound. WITHOUT CONSULT Start the engine.	0
NOTE: Engine coolant temperature is 25°C (77°F) or less before engine starts. 2. Warm up the engine. NOTE:	Р
Raise engine coolant temperature until it reaches 65°C (149°F) or more. 3. Turn ignition switch OFF and wait at least 10 seconds. Check that throttle valve moves during the above 10 seconds by confirming the operating sound.	

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>> END

< BASIC INSPECTION > [VQ37VHR]

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING: Description

INFOID:0000000007462559

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.
- 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:0000000007462560

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

(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: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9 V.
- Without CONSULT: Drive vehicle for 10 minutes.
- M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT?

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

2.PERFORM IDLE AIR VOLUME LEARNING

(P)With CONSULT

- 1. Perform Accelerator Pedal Released Position Learning. Refer to EC-35, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".
- 2. Perform Throttle Valve Closed Position Learning. <u>EC-35</u>, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 4. NO >> GO TO 5.

${f 3.}$ PERFORM IDLE AIR VOLUME LEARNING

♥Without CONSULT

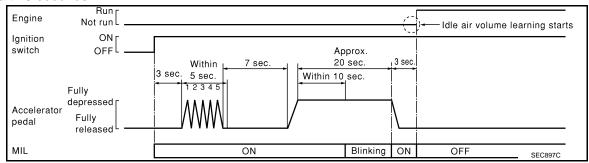
NOTE:

- 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.
- Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-35</u>, "ACCELERATOR PEDAL <u>RELEASED POSITION LEARNING</u>: Special Repair Requirement".
- Perform Throttle Valve Closed Position Learning. <u>EC-35</u>, "THROTTLE VALVE CLOSED POSITION <u>LEARNING</u>: <u>Special Repair Requirement</u>".

INSPECTION AND ADJUSTMENT

< BASIC INSPECTION > [VQ37VHR]

- 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.
- 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.

4. CHECK IDLE SPEED AND IGNITION TIMING

- 1. Start engine and warm it up to normal operating temperature.
- 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 EC-625, "Idle Speed" and EC-625, "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-173</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

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.

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INFOID:0000000007462561

< BASIC INSPECTION > [VQ37VHR]

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

1.START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.perform vvel control shaft position sensor adjustment

(P) With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "VVEL POS SEN ADJ PREP" in "WORK SUPPORT" mode with CONSULT.
- 3. Touch "Start" and wait a few seconds.
- 4. Make sure the "CMPLT" is displayed on CONSULT screen.
- Select "VVEL POSITION SEN- B1" or "VVEL POSITION SEN- B2" in "DATA MONITOR" mode with CON-SULT.
- 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 SENB1" or "VVEL POSITION SEN-B2" and adjust the output voltage to be within the standard value.

Voltage : 500 ± 48 mV

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

: 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 : $500 \pm 48 \text{ mV}$

NOTE:

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

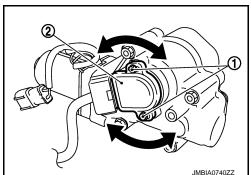
- 10. Turn ignition switch OFF and wait at least 10 seconds.
- 11. Start engine and warm it up to normal operating temperature.
- 12. Turn ignition switch OFF and wait at least 10 seconds.
- 13. Perform idle air volume learning. Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> INSPECTION END

3.perform vvel control shaft position sensor adjustment

Without CONSULT

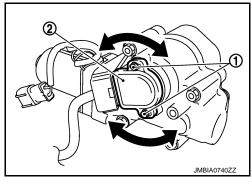
- 1. Disconnect VVEL control shaft position sensor harness connector.
- Remove VVEL actuator motor relay.
- Turn ignition switch ON, wait at least 5 seconds and then turn OFF.
- 4. Reconnect all harness connectors disconnected.
- 5. Install VVEL actuator motor relay.
- 6. Turn ignition switch ON and wait at least 5 seconds.



INSPECTION AND ADJUSTMENT

[VQ37VHR] < BASIC INSPECTION >

- Loosen the VVEL control shaft position sensor mounting bolt (1).
- 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.



VVEL control module				
Bank	Connector	+	_	Voltage
Dalik		Terminal	Terminal	
1	E15	3	4	500 ± 48 mV
2	E 13	5	6	300 ± 46 IIIV

Tighten the VVEL control shaft position sensor mounting bolt.

: 7.0 N•m (0.71 kg-m, 62 in-lb) (0)

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

VVEL control module				
Bank	Connector	+	-	Voltage
Dalik		Terminal	Terminal	-
1	E15	3	4	500 ± 48 mV
2	LIS	5	6	300 ± 40 IIIV

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 EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Description

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:0000000007462564

INFOID:0000000007462563

1.START

(P)With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
- Clear mixture ratio self-learning value by touching "CLEAR".

With GST

Start engine and warm it up to normal operating temperature.

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INSPECTION AND ADJUSTMENT

[VQ37VHR] < BASIC INSPECTION >

- Turn ignition switch OFF.
- Disconnect mass air flow sensor (bank 1) harness connector.
- Restart engine and let it idle for at least 5 seconds.
- Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
 Select Service \$03 with GST. Make sure DTC P0102 is detected.
- 7. Select Service \$04 with GST to erase the DTC P0102.

>> END

HOW TO SET SRT CODE

< BASIC INSPECTION > [VQ37VHR]

HOW TO SET SRT CODE

Description INFOID:0000000007462565

OUTLINE

In order to set all SRTs, the self-diagnoses as in the "SRT ITEM" table must have been performed at least once. Each diagnosis may require actual driving for a long period of time under various conditions.

SRT ITEM

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

SRT item*1 (CONSULT indication)	Performance Priority* ²	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	1	Three way catalyst function	P0420, P0430
EVAP SYSTEM*3	1	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0456
HO2S	1	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
EGR/VVT SYSTEM	2	Intake value timing control function	P0011, P0021

^{*1:} Though displayed on the CONSULT screen, "HO2S HTR" is not SRT item.

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, referring to the following flowchart.

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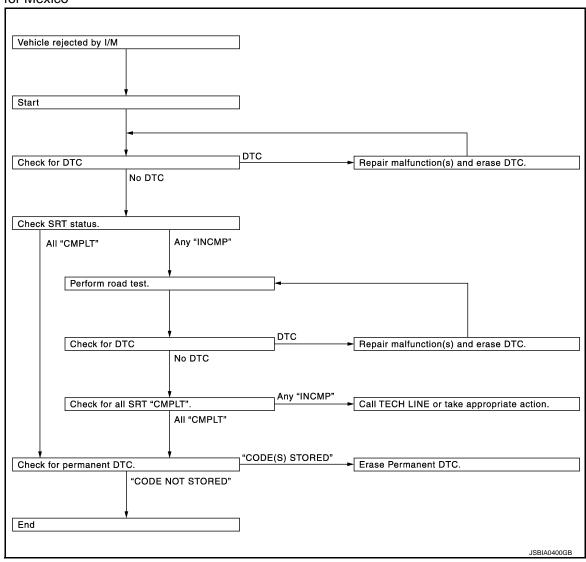
Revision: 2013 February

EC-41

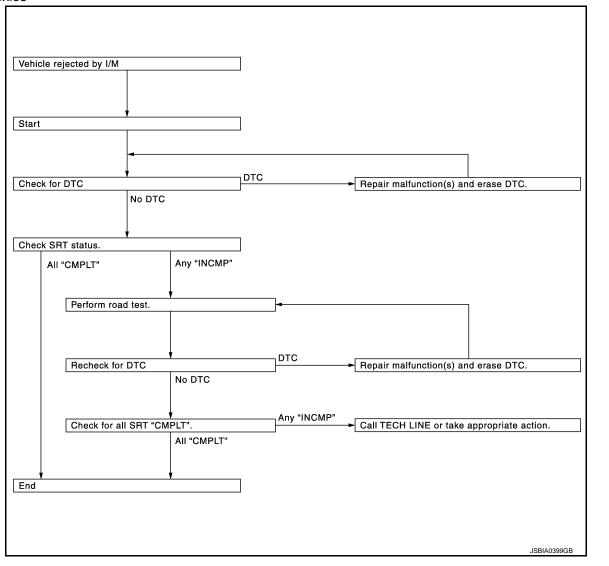
^{*2:} If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

^{*3:} Except for Mexico

Except for Mexico



For Mexico



SRT Set Driving Pattern

EXCEPT FOR MEXICO CAUTION:

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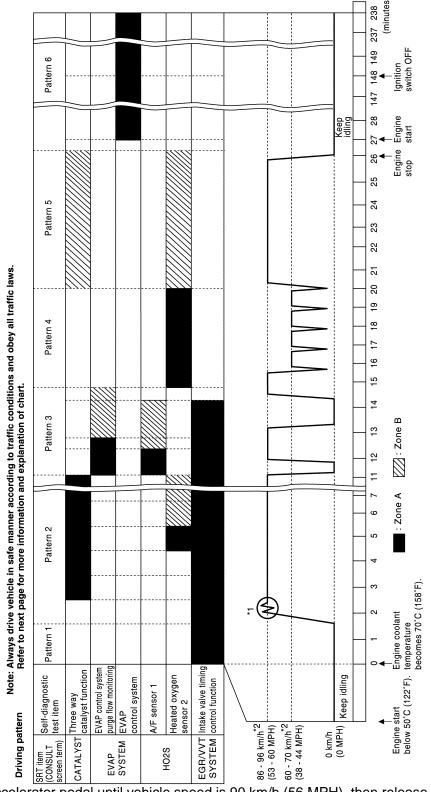
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Always drive the vehicle in safe manner according to traffic conditions and obey all traffic laws.



^{*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.

[•] The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

^{• &}quot;Zone A" is the fastest time where required for the diagnosis under normal conditions*. If the diagnosis is not completed within "Zone A", the diagnosis can still be performed within "Zone B".

HOW TO SET SRT CODE

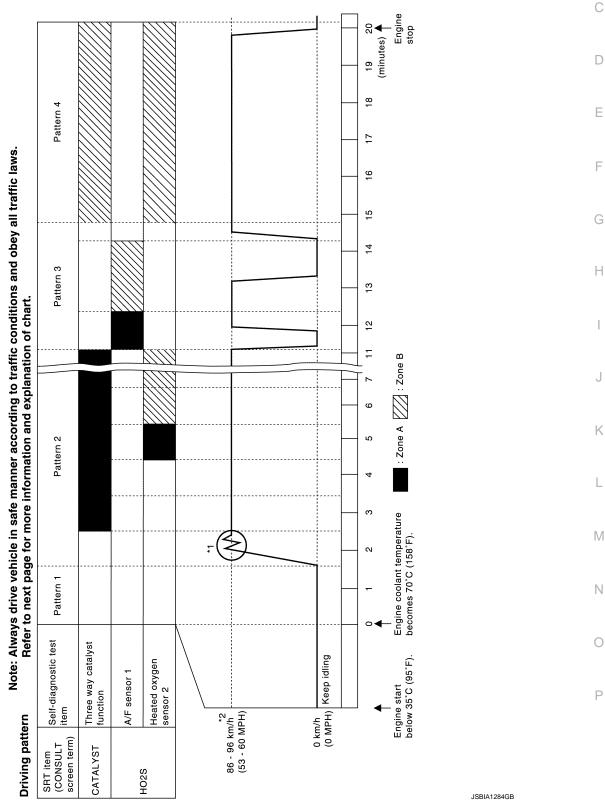
[VQ37VHR] < BASIC INSPECTION >

- *: Normal conditions
- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)

NOTE:

Diagnosis is performed as quickly as possible under normal conditions. However, under other conditions, diagnosis may also be performed. [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)]

FOR MEXICO



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< BASIC INSPECTION > [VQ37VHR]

*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.
- 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.

- *: 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.

Work Procedure

EXCEPT FOR MEXICO

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-583, "DTC Index".

NO >> GO TO 2.

2. CHECK SRT STATUS

(P)With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

Perform "SRT status" mode with EC-161, "On Board Diagnosis Function".

With GST

Select Service \$01 with GST.

Is SRT code(s) set?

YES >> GO TO 12.

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 4.

3.DTC CONFIRMATION PROCEDURE

- Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT.
- 2. For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to EC-41, "Description".
- 3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-583, "DTC Index".

NO >> GO TO 11.

4. PERFORM ROAD TEST

- Check the "Performance Priority" in the "SRT ITEM" table. Refer to EC-41, "Description".
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to <u>EC-43</u>, "<u>SRT Set Driving</u> Pattern".

In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5. PATTERN 1

1. Check the vehicle condition;

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HOW TO SET SRT CODE

[VQ37VHR] < BASIC INSPECTION >

- Engine coolant temperature is -10 to 35°C (14 to 95°F).
- Fuel tank temperature is more than 0°C (32°F).
- Start the engine.
- Keep engine idling until the engine coolant temperature is greater than 70°C (158°F) 3.

NOTE:

ECM terminal voltage is follows;

- Engine coolant temperature
- −10 to 35°C (14 to 95°F): 3.0 − 4.3 V
- 70°(158°F): Less than 4.1 V
- Fuel tank temperature: Less than 1.4 V

Refer to EC-558, "Reference Value".

>> GO TO 6.

6. PATTERN 2

- Drive the vehicle. And 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

NOTE:

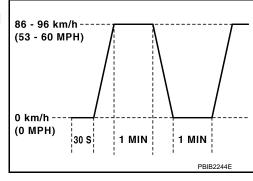
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

/.PATTERN 3

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

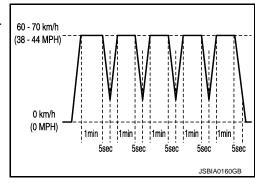
>> GO TO 8.



8.PATTERN 4

- Operate vehicle, following the driving pattern shown in the figure.
- Drive the vehicle in a proper gear at 60 km/h (38 MPH) and maintain the speed.
- Release the accelerator pedal fully at least 5 seconds.
- Repeat the above two steps at least 5 times.

>> GO TO 9.



9. PATTERN 5

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 10.

10.PATTERN 6

• Cool down the engine so that the engine coolant temperature lowers between 15 – 35°C (59 – 95°F).

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< BASIC INSPECTION > [VQ37VHR]

CAUTION:

Never turn the ignition switch ON while cooling down the engine.

Engine coolant temperature at engine start is between 15 – 35°C (59 – 95°F) and has lowered 45°C (113°F) or more since the latest engine stop.

>> GO TO 11.

11. CHECK SRT STATUS

(P)With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

®Without CONSULT

Perform "SRT status" mode with EC-161, "On Board Diagnosis Function".

With GST

Select Service \$01 with GST.

Is SRT(s) set?

YES >> GO TO 12.

NO >> Call TECH LINE or take appropriate action.

12. CHECK PERMANENT DTC

NOTE:

Permanent DTC cannot be checked with a tool other than CONSULT or GST.

(P)With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

@With GST

Select Service \$0A with GST.

Is permanent DTC(s) detected?

YES >> Go to EC-41, "Description".

NO >> END

FOR MEXICO

1. CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-583, "DTC Index".

NO >> GO TO 2.

2.CHECK SRT STATUS

(P)With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

Perform "SRT status" mode with EC-161, "On Board Diagnosis Function".

With GST

Select Service \$01 with GST.

Is SRT code(s) set?

YES >> END

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 4.

3.DTC CONFIRMATION PROCEDURE

- Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT.
- 2. For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to EC-41, "Description".
- 3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-583</u>, "DTC Index".

NO >> GO TO 9.

4. PERFORM ROAD TEST

- Check the "Performance Priority" in the "SRT ITEM" table. Refer to EC-41, "Description".
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to EC-43, "SRT Set Driving Pattern".

In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5. PATTERN 1

- Check the vehicle condition;
- Engine coolant temperature is -10 to 35°C (14 to 95°F).
- Fuel tank temperature is more than 0°C (32°F).
- Start the engine.
- Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)

NOTE:

ECM terminal voltage is follows;

- Engine coolant temperature
- −10 to 35°C (14 to 95°F): 3.0 − 4.3 V
- 70°(158°F): Less than 4.1 V
- Fuel tank temperature: Less than 1.4 V

Refer to EC-558, "Reference Value".

>> GO TO 6.

6. PATTERN 2

- Drive the vehicle. And 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.
- 2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

NOTE:

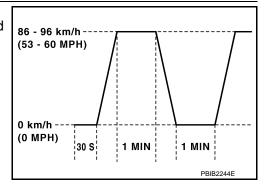
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

/.PATTERN 3

- · Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

>> GO TO 8.



8. PATTERN 4

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 9.

9.CHECK SRT STATUS

With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

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HOW TO SET SRT CODE

< BASIC INSPECTION > [VQ37VHR]

Perform "SRT status" mode with <u>EC-161, "On Board Diagnosis Function"</u>.

With GST

Select Service \$01 with GST.

Is SRT(s) set?

YES >> END

NO >> Call TECH LINE or take appropriate action.

< BASIC INSPECTION > [VQ37VHR]

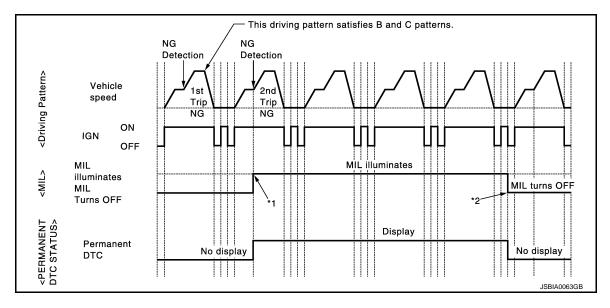
HOW TO ERASE PERMANENT DTC

Description INFOID:000000007462568

OUTLINE

When a DTC is stored in ECM

When a DTC is stored in ECM and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a raw.



^{*1:} When the same malfunction is detected in two consecutive trips, MIL will illuminate.

MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

The erasing method depends on a permanent DTC stored in ECM. Refer to the following table.

NOTE:

If the applicable permanent DTC includes multiple groups, perform the procedure of Group B first. If the permanent DTC is not erased, perform the procedure of Group A.

×: Applicable —: Not applicable

Croup*	Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern	
Group	renorm bic continuation procedure for applicable bics.	В	D
A	×	_	_
В	_	×	×

^{*:} For group, refer to EC-583, "DTC Index".

PERMANENT DTC ITEM

For permanent DTC items, MIL turns ON. Refer to EC-583, "DTC Index".

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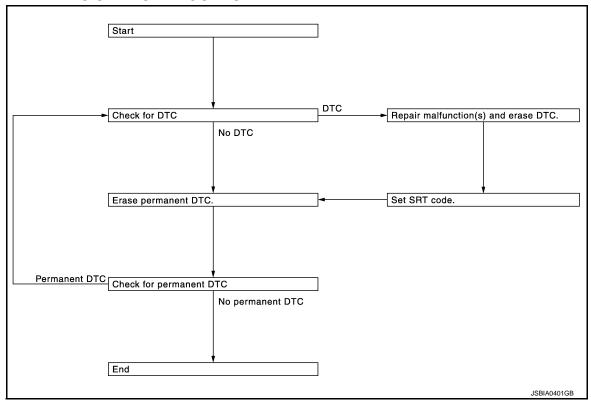
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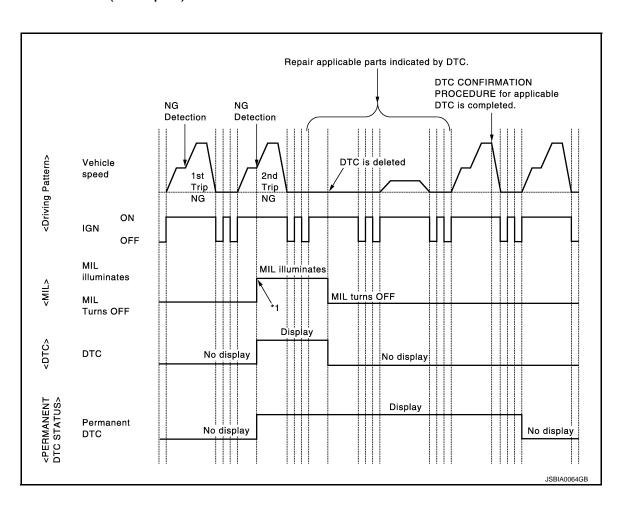
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PERMANENT DTC SERVICE PROCEDURE



Work Procedure (Group A)

INFOID:0000000007462569



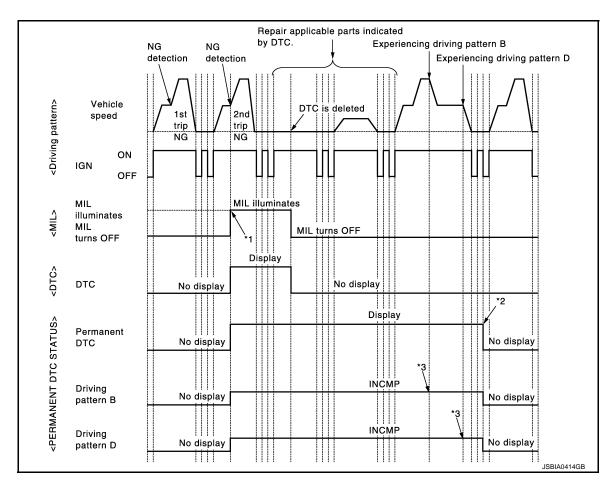
HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION > [VQ37VHR]

*1: When the same malfunction is de-Α tected in two consecutive trips, MIL will illuminate. 1.CHECK DTC EC Check DTC. Is any DTC detected? YES >> Repair malfunction(s) and erase DTC. Refer to EC-161, "On Board Diagnosis Function", EC-164, "CONSULT Function". NO >> GO TO 2. D 2.CHECK PERMANENT DTC (P)With CONSULT Е 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. Turn ignition switch ON. F Select "PERMANENT DTC STATUS" mode with CONSULT. @With GST 1. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 3. Turn ignition switch OFF and wait at least 10 seconds. 4. Turn ignition switch ON. Select Service \$0A with GST. Н Is any permanent DTC detected? YES >> GO TO 3. NO >> END 3.perform dtc confirmation procedure Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in ECM. Refer to EC-583, "DTC Index". >> GO TO 4. K 4. CHECK PERMANENT DTC (P)With CONSULT Ĭ. L 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. 4. Turn ignition switch ON. Select "PERMANENT DTC STATUS" mode with CONSULT. 1. Turn ignition switch OFF and wait at least 10 seconds. N Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Select Service \$0A with GST. Is any permanent DTC detected? YES >> GO TO 1. NO Р >> END

Work Procedure (Group B)

INFOID:0000000007462570



- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *2: After experiencing driving pattern B and D, permanent DTC is erased.
- Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing driving pattern B or D.

NOTE:

Drive the vehicle according to only driving patterns indicating "INCMP" in driving patterns B and D on the "PERMANENT DTC STATUS" screen.

1. CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-161. "On Board Diagnosis Function"</u>, <u>EC-164. "CONSULT Function"</u>.

NO >> GO TO 2.

2.CHECK PERMANENT DTC

(P)With CONSULT

- 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. Turn ignition switch ON.
- Select "PERMANENT DTC STATUS" mode with CONSULT.

With GST

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

HOW TO ERASE PERMANENT DTC

[VQ37VHR] < BASIC INSPECTION > Turn ignition switch ON. Select Service \$0A with GST. Α Is any permanent DTC detected? YES >> GO TO 3. NO >> END EC 3.drive driving pattern b **CAUTION:** Always drive at a safe speed. Never erase self-diagnosis results. If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset. D (P)With CONSULT Start engine and warm it up to normal operating temperature. Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according to driving pattern B. Refer to EC-164, "CONSULT Function", EC-158, "DIAGNOSIS DESCRIPTION: Driving Pattern". F 1. Start engine and warm it up to normal operating temperature. Drive the vehicle according to driving pattern B. Refer to EC-158, "DIAGNOSIS DESCRIPTION: Driving Pattern". >> GO TO 4. 4. CHECK PERMANENT DTC (II) With CONSULT 1. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Select "PERMANENT DTC STATUS" mode with CONSULT. 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. Turn ignition switch ON. Select Service \$0A with GST. Is any permanent DTC detected? YFS >> GO TO 5. NO >> END ${f 5}$. DRIVE DRIVING PATTERN D M **CAUTION:** Always drive at a safe speed. Ν Never erase self-diagnosis results. If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset. Drive the vehicle according to driving pattern D. Refer to <u>EC-158</u>, "<u>DIAGNOSIS DESCRIPTION</u>: <u>Driving</u> Pattern". >> GO TO 6. Р 6. CHECK PERMANENT DTC With CONSULT 1. Turn ignition switch OFF and wait at least 10 seconds. 2. Turn ignition switch ON.

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Turn ignition switch OFF and wait at least 10 seconds.

3.

Turn ignition switch ON.

HOW TO ERASE PERMANENT DTC

[VQ37VHR] < BASIC INSPECTION >

Select "PERMANENT DTC STATUS" mode with CONSULT.

- With GST1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON.
- 5. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1.

NO >> END

SYSTEM DESCRIPTION

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000007462571

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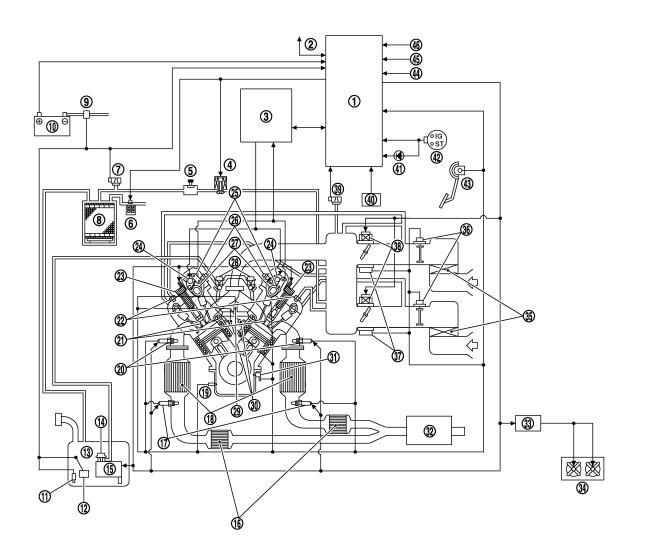
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1. ECM

 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

1. Fuel tank temperature sensor

14. Fuel pressure regulator

17. Heated oxygen sensor 2

20. A/F sensor 1

23. Ignition coil (with power transistor)

. 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

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< SYSTEM DESCRIPTION >

- 25. VVEL control shaft position sensor
- 26. Intake valve timing control solenoid valve
- 27. Camshaft position sensor (PHASE)

- 28. Fuel damper
- 29. Engine coolant temperature sensor 31. Crankshaft position sensor (POS)
 - 32. Muffler

33. Cooling fan control module

Knock sensor

Cooling fan

35. Air cleaner

36. Mass air flow sensor (with intake air temperature sensor)

- 37. Electric throttle control actuator
- Throttle position sensor 38.
- 39. Manifold absolute pressure (MAP) sensor

- 40. Brake booster pressure sensor
- 41. MIL

42. Ignition switch

30.

- 43. Accelerator pedal position sensor
- 44. Power steering pressure sensor
- 45. Refrigerant pressure sensor

46. PNP signal

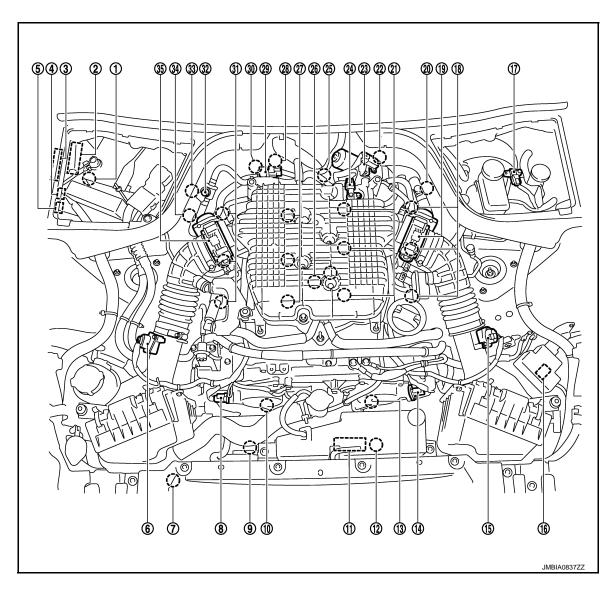
System Description

INFOID:0000000007462572

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

Component Parts Location

INFOID:0000000007462573



- Battery current sensor
- Cooling fan relay
- IPDM E/R
- VVEL actuator motor relay
- 3. VVEL control module
- Mass air flow sensor (with intake air temperature sensor) (bank 1)

and spark plug (bank 1)34. Crankshaft position sensor (POS)

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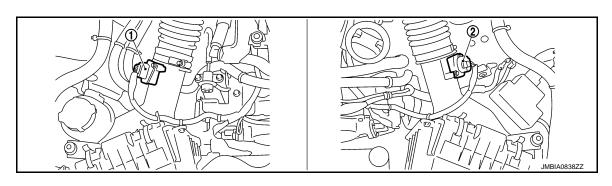
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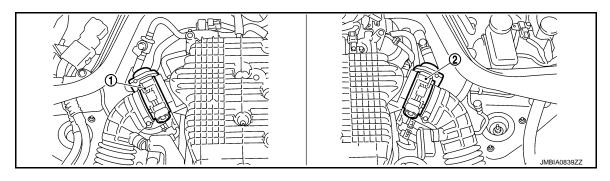
Camshaft position sensor (PHASE) Refrigerant pressure sensor 8. 9. Cooling fan motor-2 (bank 1) 10. Intake valve timing control solenoid 11. Cooling fan control module 12. Cooling fan motor-1 valve (bank 1) 14. Camshaft position sensor (PHASE) 13. Intake valve timing control solenoid 15. Mass air flow sensor (bank 2) valve (bank 2) (bank 2) 16. ICC brake hold relay (ICC models) 17. Brake booster pressure sensor 18. Ignition coil (with power transistor) and spark plug (bank 2) Electric throttle control actuator A/F sensor 1 (bank 2) 21. Fuel injector (bank 2) (bank 2) 22. VVEL control shaft position sensor VVEL actuator motor (bank 2) 24. Manifold absolute pressure (MAP) 23. (bank 2) sensor 25. Engine coolant temperature sensor 26. Knock sensor 27. Fuel injector (bank 1) 28. VVEL actuator motor (bank 1) 29. EVAP canister purge volume control 30. VVEL control shaft position sensor solenoid valve (bank 1) 31. Ignition coil (with power transistor) 32. EVAP service port 33. A/F sensor 1 (bank 1)

(bank 1)



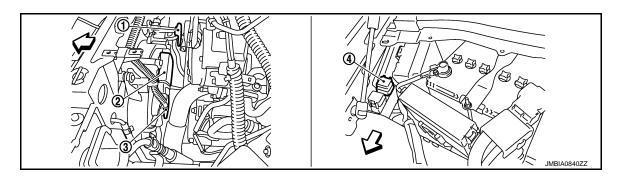
35. Electric throttle control actuator

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



Electric throttle control actuator (bank 1)

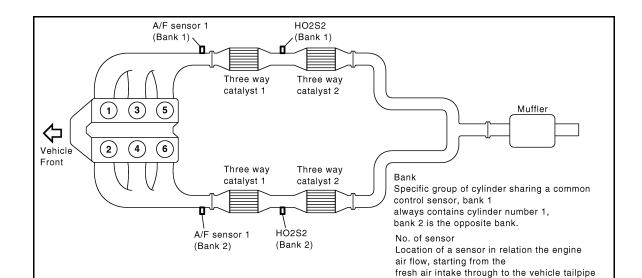
Electric throttle control actuator (bank 2)

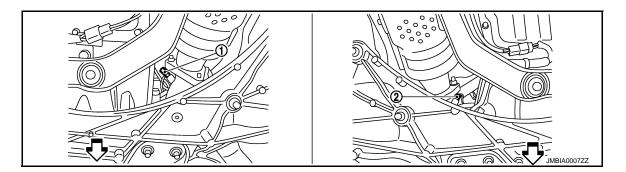


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- ∵ : Vehicle front
- Cooling fan motor-2
 Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

in order numbering 1, 2, 3, and so on PBIB1907E

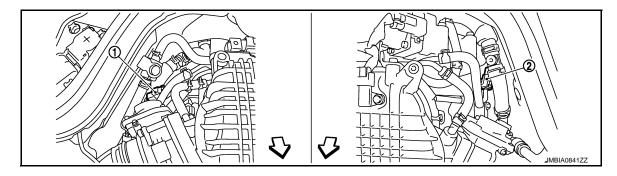




∵ : Vehicle front

1. A/F sensor 1 (bank 1)

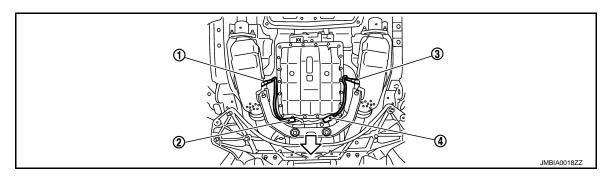
2. A/F sensor 1 (bank 2)



: Vehicle front

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

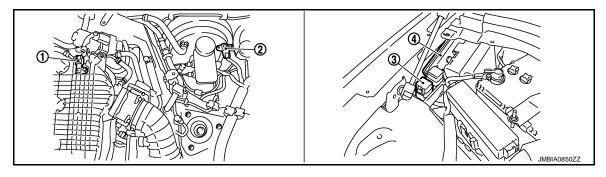
 A/F sensor 1 (bank 2) harness connector



∵ : Vehicle front

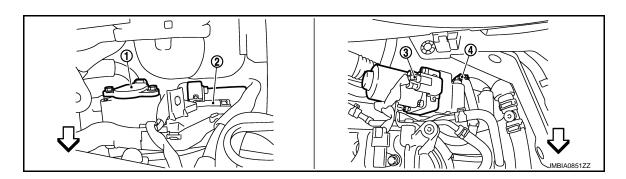
- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

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



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

4. VVEL control module



∵ : Vehicle front

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

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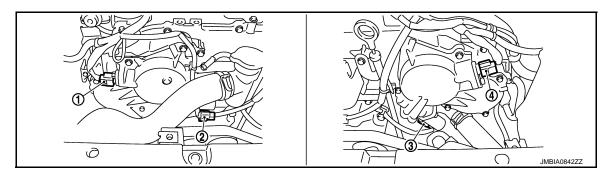
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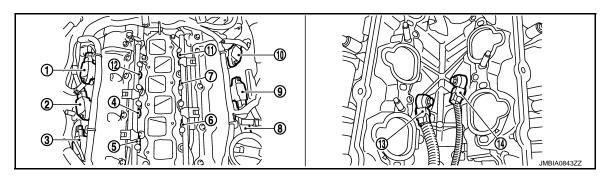
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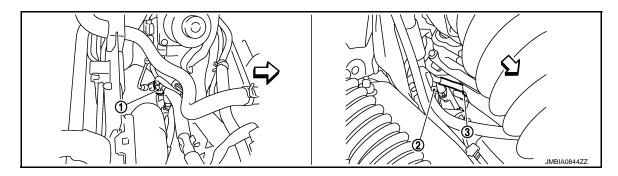
- Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
 - Intake valve timing control solenoid valve (bank 2) harness connector



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

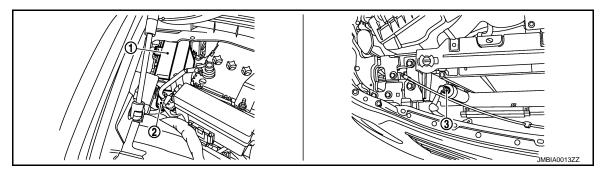
- Ignition coil No.3 (with power transis- 3. tor)
- Fuel injector No.1
- Ignition coil No.2 (with power transis- 9.
- 14. Knock sensor (bank 2)

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



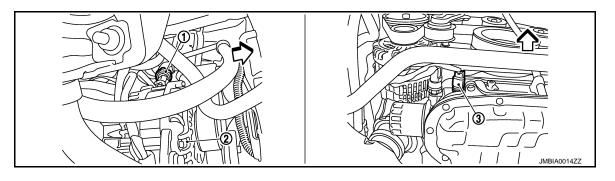
: Vehicle front

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



1. IPDM E/R

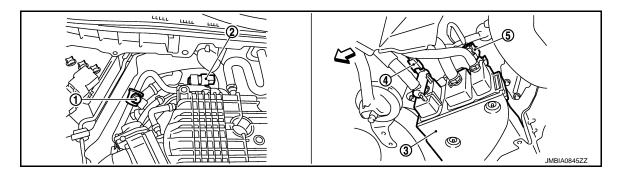
- 2. Battery current sensor
- 3. Refrigerant pressure sensor



∵ : Vehicle front

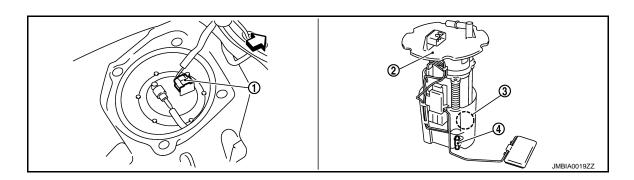
- 1. Power steering pressure sensor
- Alternator

3. Engine oil temperature sensor



∵ : Vehicle front

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



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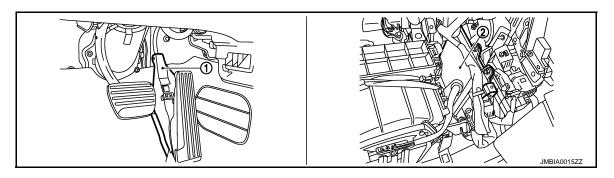
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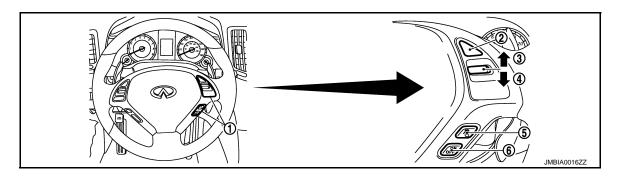
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: Vehicle front

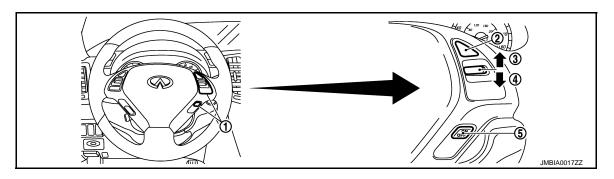
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector.
- 4. Fuel tank temperature sensor



1. Accelerator pedal position sensor 2. ECM

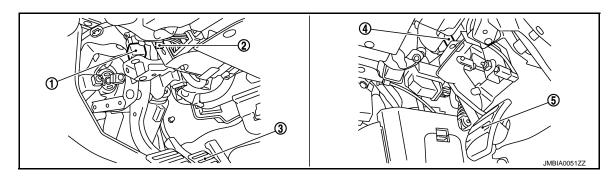


- 1. ICC steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. DISTANCE switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch

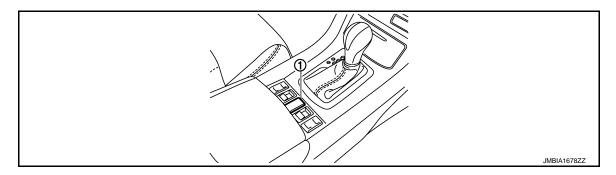


- 1. ASCD steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. MAIN switch

RESUME/ACCELERATE switch



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



Snow mode switch

Component Description

INFOID:0000000007462574

Component	Reference
A/F sensor 1	EC-249, "Description"
A/F sensor 1 heater	EC-197, "Description"
Accelerator pedal position sensor	EC-502, "Description"
ASCD brake switch	EC-475, "Description"
ASCD steering switch	EC-468. "Description"
Battery current sensor	EC-455, "Description"
Brake booster pressure sensor	EC-397, "Description"
Camshaft position sensor (PHASE)	EC-325, "Description"
Cooling fan control module	EC-525, "Description"
Cooling fan motor	EC-525, "Description"
Crankshaft position sensor (POS)	EC-321, "Description"
Electric throttle control actuator	EC-448, "Description"
Engine coolant temperature sensor	EC-231, "Description"
Engine oil temperature sensor	EC-306, "Description"
EVAP canister purge volume control solenoid valve	EC-339, "Description"
EVAP canister vent control valve	EC-347, "Description"
EVAP control system pressure sensor	EC-355, "Description"
Fuel injector	EC-531, "Description"
Fuel level sensor	EC-375, "Description"
Fuel pump	EC-534, "Description"
Fuel tank temperature sensor	EC-299, "Description"
Heated oxygen sensor 2	EC-264, "Description"
Heated oxygen sensor 2 heater	EC-200, "Description"
ICC brake switch	EC-482, "Description"
ICC steering switch	EC-471, "Description"
Ignition signal	EC-540, "Description"
Intake air temperature sensor	EC-228, "Description"
Intake valve timing control solenoid valve	EC-210, "Description"

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ENGINE CONTROL SYSTEM

< SYSTEM DESCRIPTION >

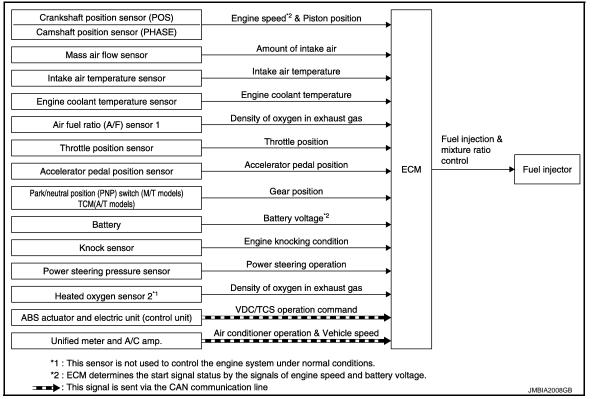
[VQ37VHR]

Component	Reference
Knock sensor	EC-318, "Description"
Manifold absolute pressure (MAP) sensor	EC-224, "Description"
Mass air flow sensor	EC-213, "Description"
PCV valve	EC-551, "Description"
Power steering pressure sensor	EC-394, "Description"
Refrigerant pressure sensor	EC-553, "Description"
Stop lamp switch	EC-499, "Description"
Throttle control motor	EC-445, "Description"
Throttle control motor relay	EC-453, "Description"
Throttle position sensor	EC-309, "Description"
VVEL actuator motor	EC-423, "Description"
VVEL actuator motor relay	EC-427, "Description"
VVEL control module	EC-492, "Description"
VVEL control shaft position sensor	EC-419, "Description"

[VQ37VHR]

MULTIPORT FUEL INJECTION SYSTEM

System Diagram INFOID:0000000007462575



System Description

INPUT/OUTPUT SIGNAL CHART

ECM function Sensor Input Signal to ECM Actuator Crankshaft position sensor (POS) Engine speed*3 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 Accelerator pedal position sensor Accelerator pedal position Fuel injection Park/neutral position (PNP) switch (M/T models) & mixture ratio Fuel injector Gear position TCM (A/T models) control 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 VDC/TCS operation command ABS actuator and electric unit (control unit)*2 Air conditioner operation*2 Unified meter and A/C amp. Vehicle speed*2

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

< SYSTEM DESCRIPTION >

- *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.

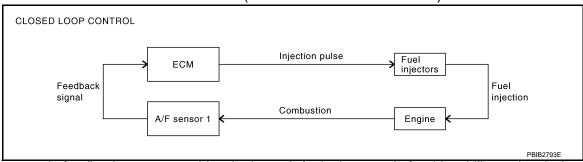
<Fuel increase>

- 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. 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 EC-249, "Description". 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 control 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

[VQ37VHR]

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.

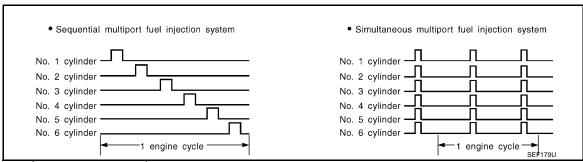
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"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



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.

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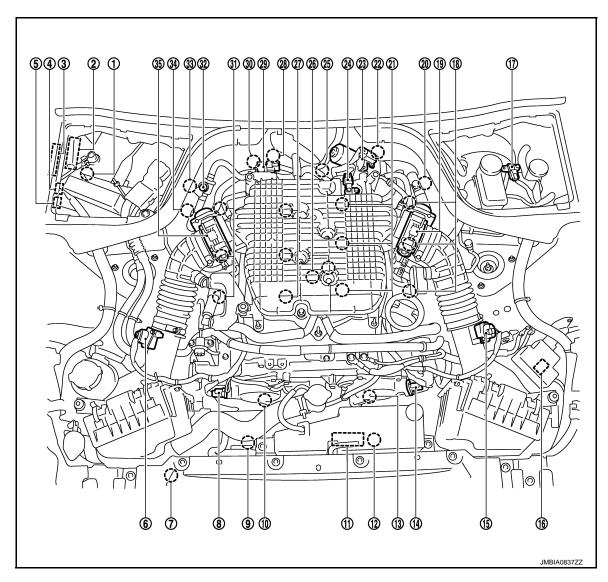
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Component Parts Location

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- Battery current sensor
- 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)

- IPDM E/R
- VVEL actuator motor relay
- 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
- solenoid valve

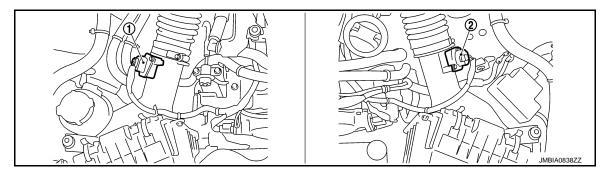
- VVEL control module
- Mass air flow sensor (with intake air temperature sensor) (bank 1)
- Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- 18. Ignition coil (with power transistor) and spark plug (bank 2)
- 21. Fuel injector (bank 2)
- 24. Manifold absolute pressure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

MULTIPORT FUEL INJECTION SYSTEM

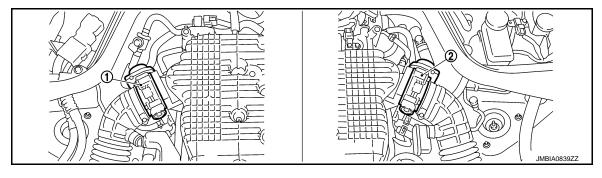
< SYSTEM DESCRIPTION > [VQ37VHR]

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

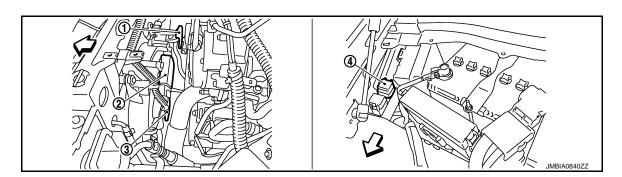
- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)



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



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



: Vehicle front

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

4. Cooling fan relay

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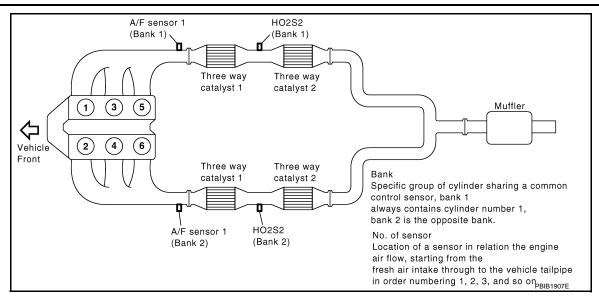
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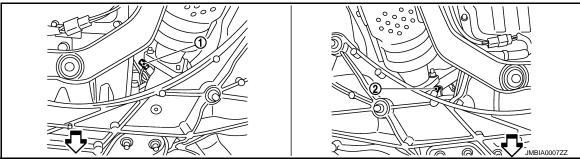
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2012 G Sedan

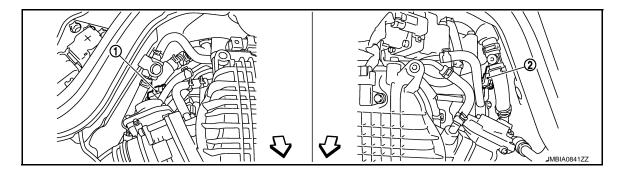




: Vehicle front

A/F sensor 1 (bank 1)

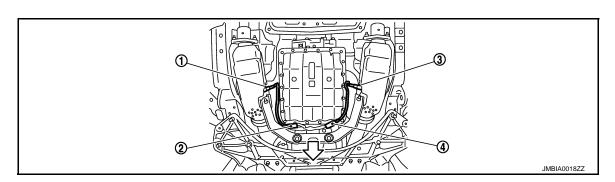
A/F sensor 1 (bank 2)



∵ : Vehicle front

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

nector

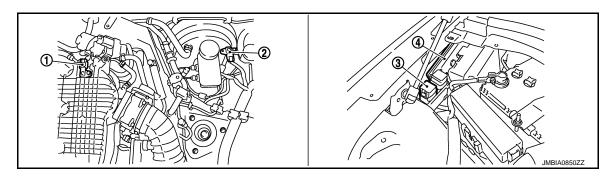


[VQ37VHR]

∵ : Vehicle front

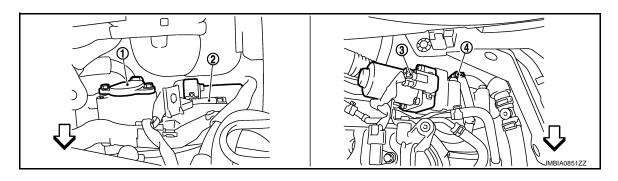
- Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector
- Heated oxygen sensor 2 (bank 1)

Heated oxygen sensor 2 (bank 1) harness connector



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

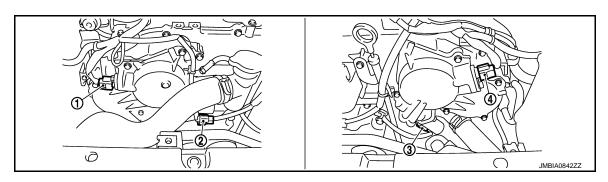
VVEL control module



: Vehicle front

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

VVEL control shaft position sensor (bank 2)



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

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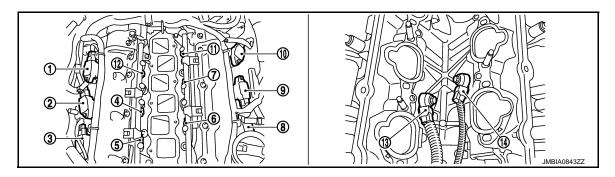
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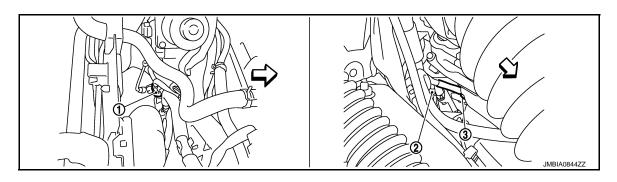
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- Ignition coil No.5 (with power transis- 2.
- 4. Fuel injector No.3
- Fuel injector No.4
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6
- 13. Knock sensor (bank 1)

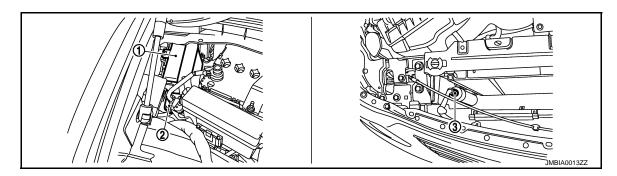
- Ignition coil No.3 (with power transis- 3. tor)
- Fuel injector No.1
- Ignition coil No.2 (with power transis- 9.
- 14. Knock sensor (bank 2)

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



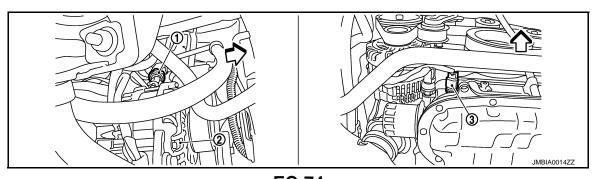
: Vehicle front

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



IPDM E/R

- Battery current sensor
- Refrigerant pressure sensor

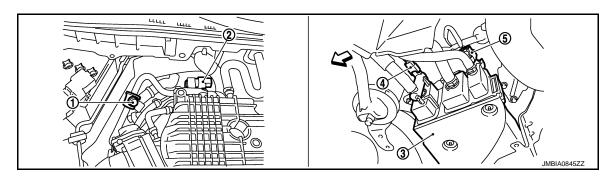


 \triangleleft : Vehicle front

1. Power steering pressure sensor

2. Alternator

3. Engine oil temperature sensor



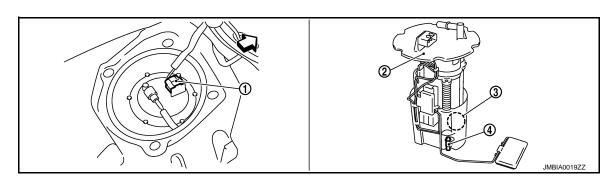
: Vehicle front

1. EVAP service port

EVAP canister purge volume control 3. EVAP canister solenoid valve

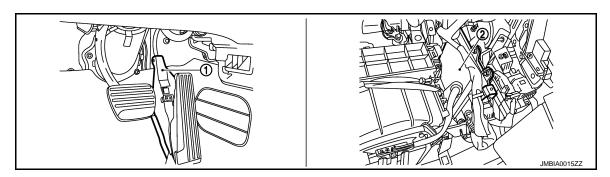
4. EVAP canister vent control valve

5. EVAP control system pressure sensor



: Vehicle front

- 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

Revision: 2013 February EC-75 2012 G Sedan

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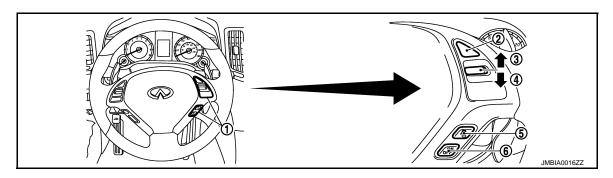
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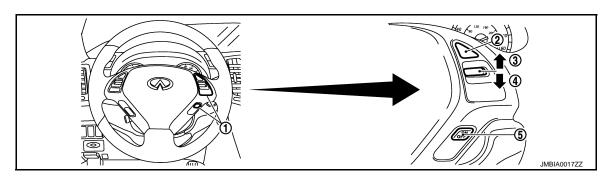
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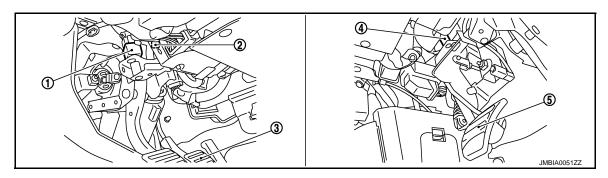
- ICC steering switch
 - SET/COAST switch
- 2. CANCEL switch
- 5. DISTANCE switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch



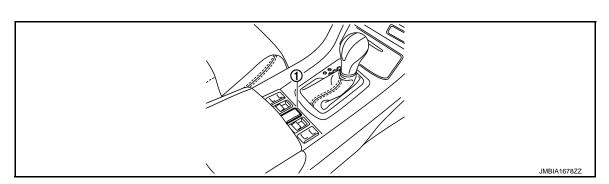
- 1. ASCD steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. MAIN switch

8. RESUME/ACCELERATE switch

Brake pedal



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



1. Snow mode switch

MULTIPORT FUEL INJECTION SYSTEM

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component Description

INFOID:0000000007462578

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Component	Reference	
A/F sensor 1	EC-249, "Description"	
Accelerator pedal position sensor	EC-502, "Description"	
Camshaft position sensor (PHASE)	EC-325, "Description"	
Crankshaft position sensor (POS)	EC-321, "Description"	
Engine coolant temperature sensor	EC-302, "Description"	
Fuel injector	EC-531, "Description"	
Heated oxygen sensor 2	EC-264, "Description"	
Intake air temperature sensor	EC-228, "Description"	
Knock sensor	EC-318, "Description"	
Mass air flow sensor	EC-203, "Description"	
Power steering pressure sensor	EC-394, "Description"	
Throttle position sensor	EC-309, "Description"	

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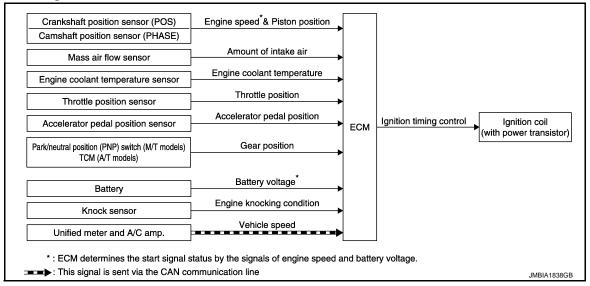
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ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000007462579



System Description

INFOID:0000000007462580

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		
Mass air flow sensor	Amount of intake air	-	Ignition coil (with power transistor)
Engine coolant temperature sensor	Engine coolant temperature	-	
Throttle position sensor	Throttle position	Ignition timing control	
Accelerator pedal position sensor	Accelerator pedal position		
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.

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

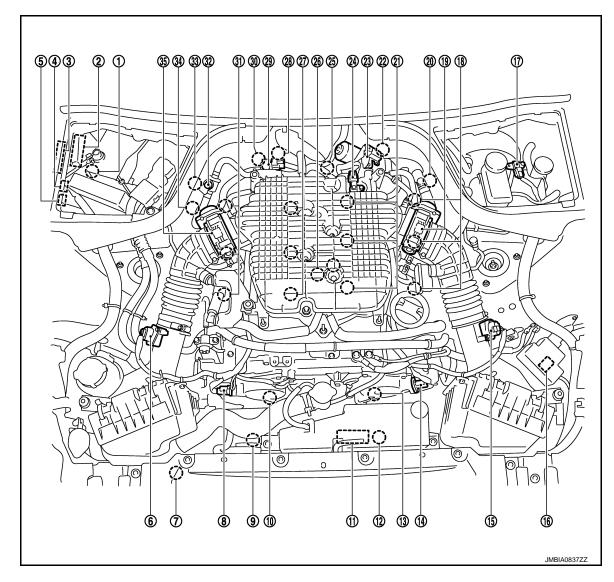
^{*2:} ECM determines the start signal status by the signals of engine speed and battery voltage.

[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:0000000007462581



- Battery current sensor 1.
- 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)

- IPDM E/R 2.
- VVEL actuator motor relay
- Camshaft position sensor (PHASE) (bank 1)
- Cooling fan control module
- Camshaft position sensor (PHASE) (bank 2)
- 17. Brake booster pressure sensor
- 20. A/F sensor 1 (bank 2)

26. Knock sensor

- 23. VVEL actuator motor (bank 2)
- 29. EVAP canister purge volume control solenoid valve

- VVEL control module 3.
- Mass air flow sensor (with intake air 6. temperature sensor) (bank 1)
- Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow 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
- (bank 1)

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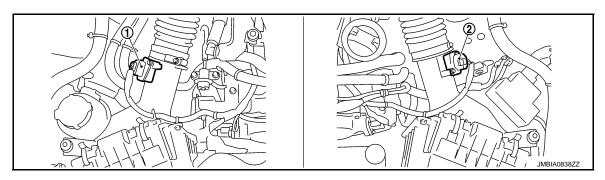
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27. Fuel injector (bank 1)

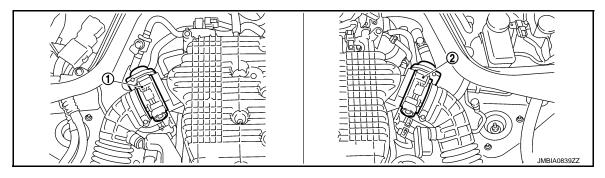
30. VVEL control shaft position sensor

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

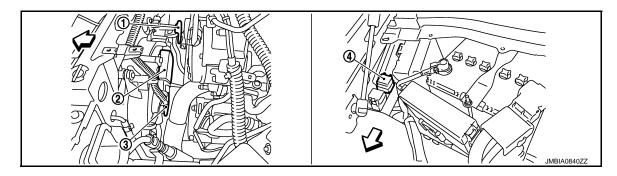
- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)



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

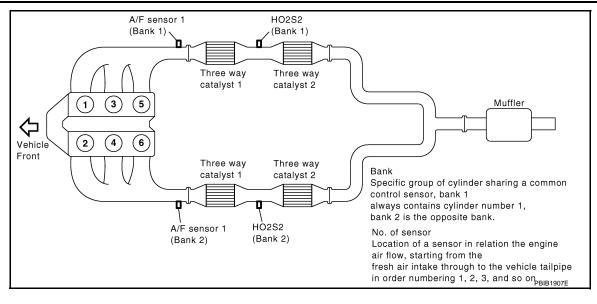


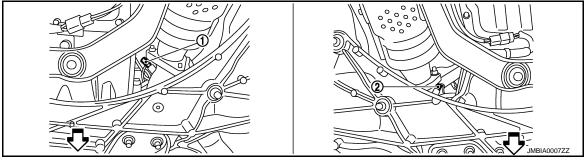
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



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

4. Cooling fan relay

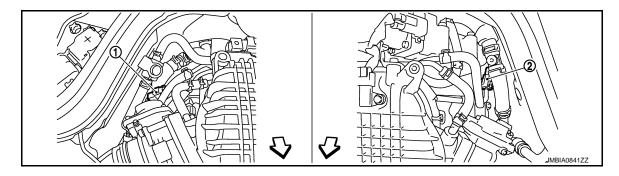




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1. A/F sensor 1 (bank 1)

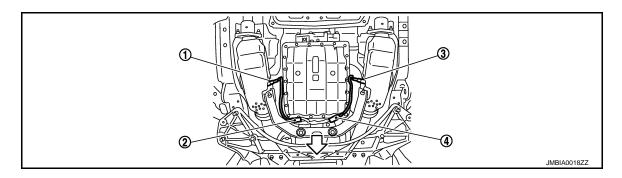
2. A/F sensor 1 (bank 2)



∵ : Vehicle front

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

A/F sensor 1 (bank 2) harness connector



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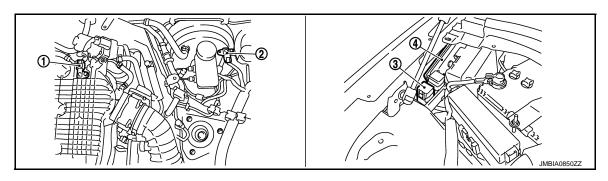
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∵ : Vehicle front

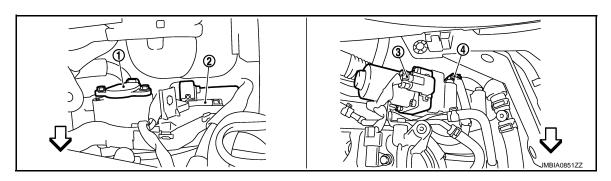
- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

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



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

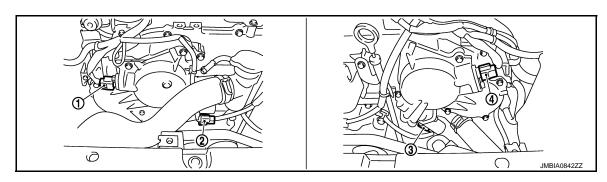
4. VVEL control module



∵ : Vehicle front

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

 VVEL control shaft position sensor (bank 2)



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

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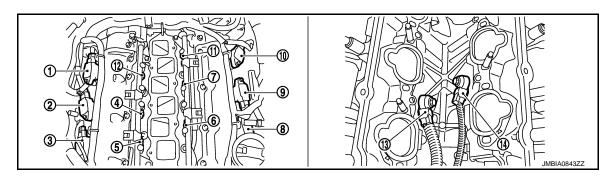
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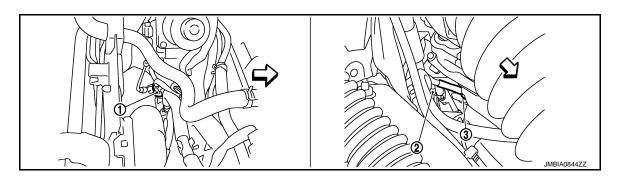
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- Ignition coil No.5 (with power transis- 2. tor)
- 4. Fuel injector No.3
- 7. Fuel injector No.4
- Ignition coil No.6 (with power transistor)
- 13. Knock sensor (bank 1)

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

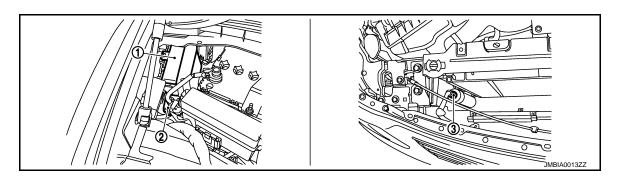
- Ignition coil No.1 (with power transistor)
- 6. Fuel injector No.2
- Ignition coil No.4 (with power transistor)
- 12. Fuel injector No.5



: Vehicle front

. Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)

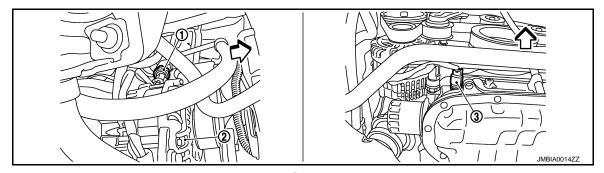
3. Crankshaft position sensor (POS)



1. IPDM E/R

2. Battery current sensor

3. Refrigerant pressure sensor

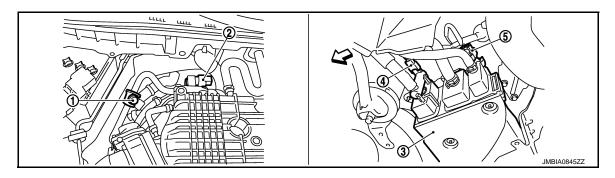


Revision: 2013 February

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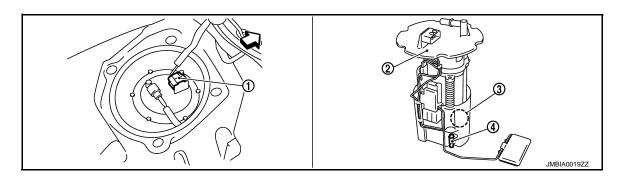
- 1. Power steering pressure sensor
- 2. Alternator

Engine oil temperature sensor



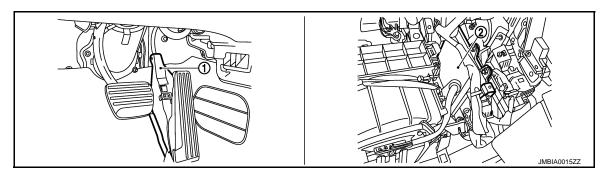
∵ : Vehicle front

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

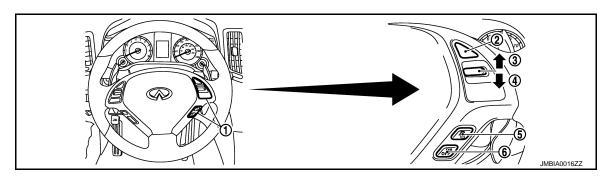


: Vehicle front

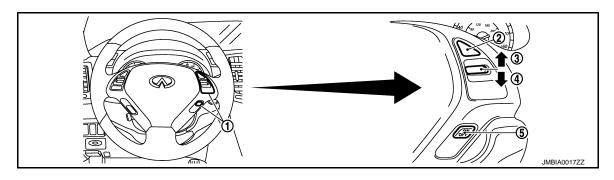
- harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- Fuel tank temperature sensor



Accelerator pedal position sensor ECM



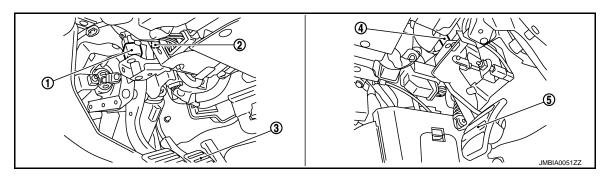
- ICC steering switch 1.
- 4. SET/COAST switch
- 2. **CANCEL** switch
- 5. **DISTANCE** switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch



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

RESUME/ACCELERATE switch

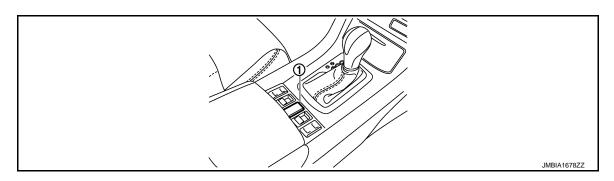
Brake pedal



Stop lamp switch

ASCD clutch switch

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



Snow mode switch

EC-85 Revision: 2013 February 2012 G Sedan

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ELECTRIC IGNITION SYSTEM

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component Description

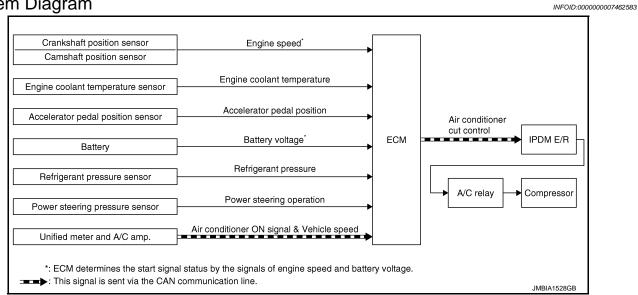
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Component	Reference
Accelerator pedal position sensor	EC-502, "Description"
Camshaft position sensor (PHASE)	EC-325, "Description"
Crankshaft position sensor (POS)	EC-321, "Description"
Engine coolant temperature sensor	EC-234, "Description"
Ignition signal	EC-540, "Description"
Knock sensor	EC-318, "Description"
Mass air flow sensor	EC-203, "Description"
Throttle position sensor	EC-309, "Description"

[VQ37VHR]

AIR CONDITIONING CUT CONTROL

System Diagram



System Description

INFOID:0000000007462584

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 mater and A/C amp	Air conditioner ON signal*1					
Unified meter and A/C amp.	Vehicle speed*1					

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

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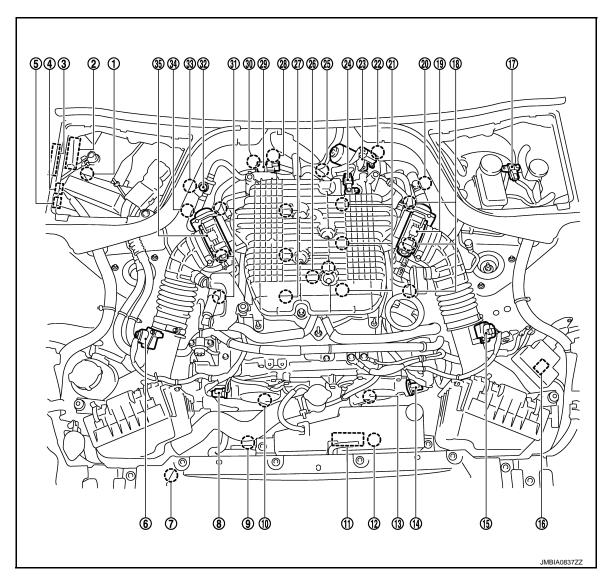
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^{*2:} ECM determines the start signal status by the signals of engine speed and battery voltage.

Component Parts Location

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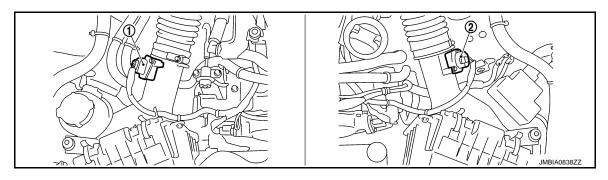
- Battery current sensor
- Cooling fan relay
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- 13. Intake valve timing control solenoid valve (bank 2)
- 16. ICC brake hold relay (ICC models)
- 19. Electric throttle control actuator (bank 2)
- 22. VVEL control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

- IPDM E/R
- VVEL actuator motor relay
- 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
- solenoid valve

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

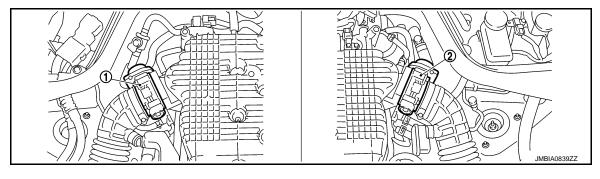
- 31. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. EVAP service port
- 33. A/F sensor 1 (bank 1)

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

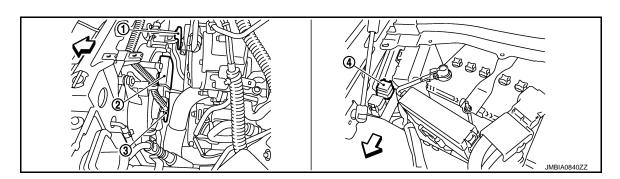


 Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)

Mass air flow sensor (bank 2)



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



: Vehicle front

1. Cooling fan motor-2

1. Cooling fan relay

2. Cooling fan control module

3. Cooling fan motor-1

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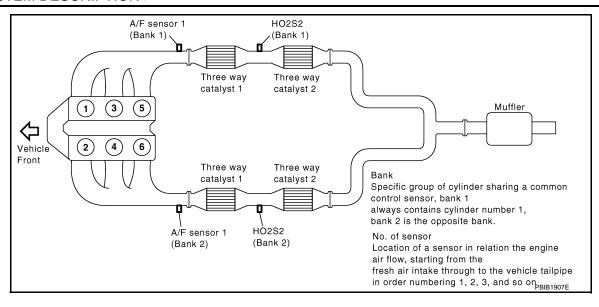
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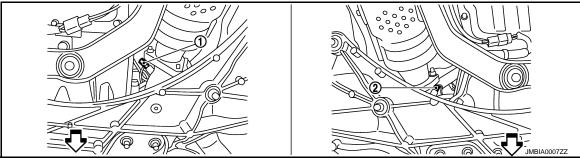
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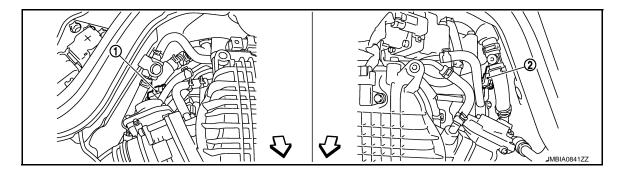




: Vehicle front

A/F sensor 1 (bank 1)

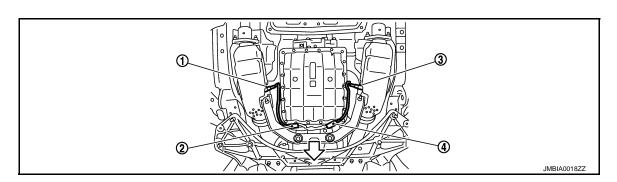
2. A/F sensor 1 (bank 2)



∵ : Vehicle front

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

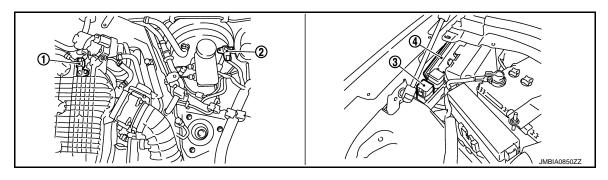
nector



∵ : Vehicle front

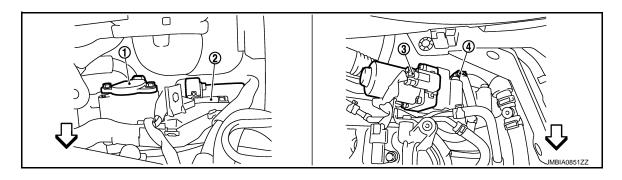
- 1. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector
- Heated oxygen sensor 2 (bank 1)

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



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

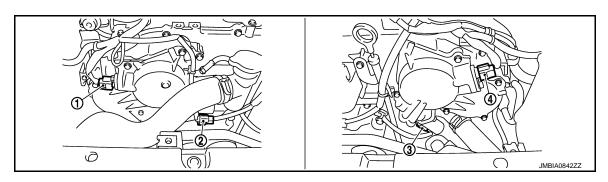
4. VVEL control module



: Vehicle front

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

 VVEL control shaft position sensor (bank 2)



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

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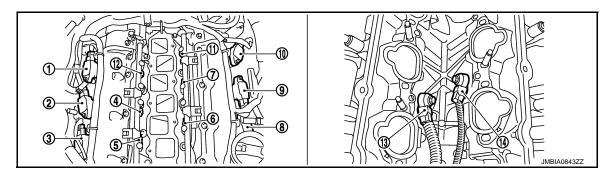
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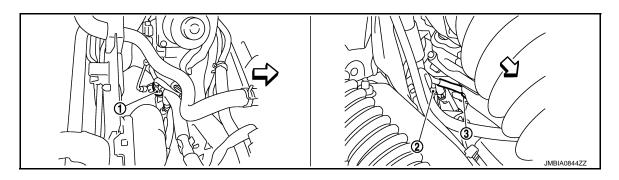
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- Ignition coil No.5 (with power transis- 2.
- 4. Fuel injector No.3
- Fuel injector No.4
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6
- 13. Knock sensor (bank 1)

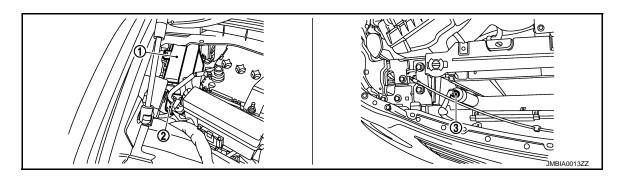
- Ignition coil No.3 (with power transis- 3. tor)
- Fuel injector No.1
- Ignition coil No.2 (with power transis- 9.
- 14. Knock sensor (bank 2)

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



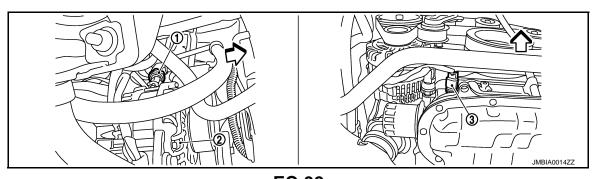
: Vehicle front

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



IPDM E/R

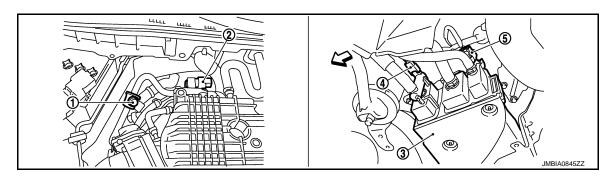
- Battery current sensor
- Refrigerant pressure sensor



 \triangleleft : Vehicle front

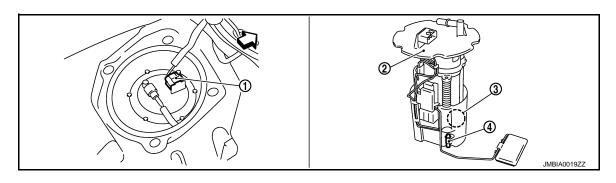
- 1. Power steering pressure sensor
- 2. Alternator

3. Engine oil temperature sensor



 \triangleleft : Vehicle front

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

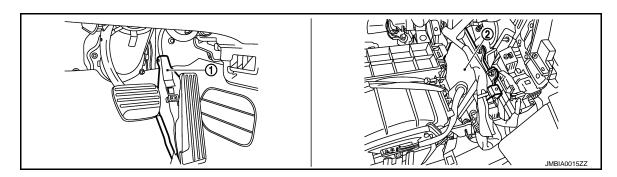


: Vehicle front

 Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector

ECM

4. Fuel tank temperature sensor



1. Accelerator pedal position sensor 2.

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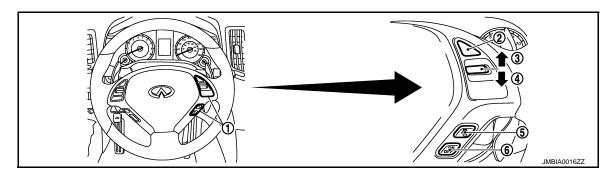
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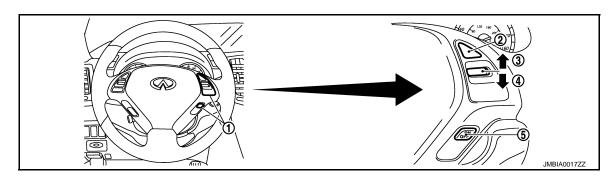
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ICC steering switch

SET/COAST switch

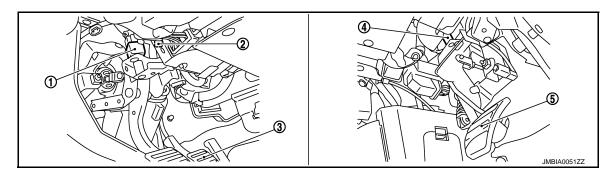
- 2. CANCEL switch
- 5. DISTANCE switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch



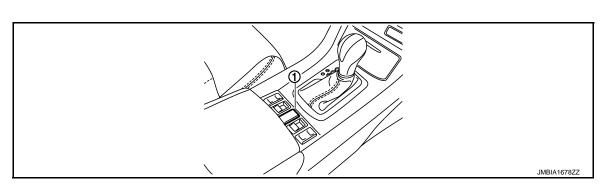
- 1. ASCD steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. MAIN switch

3. RESUME/ACCELERATE switch

Brake pedal



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



1. Snow mode switch

AIR CONDITIONING CUT CONTROL

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component Description

INFOID:0000000007462586

Component	Reference
Accelerator pedal position sensor	EC-502, "Description"
Camshaft position sensor (PHASE)	EC-325, "Description"
Crankshaft position sensor (POS)	EC-321, "Description"
Engine coolant temperature sensor	EC-231, "Description"
Power steering pressure sensor	EC-394, "Description"
Refrigerant pressure sensor	EC-553, "Description"

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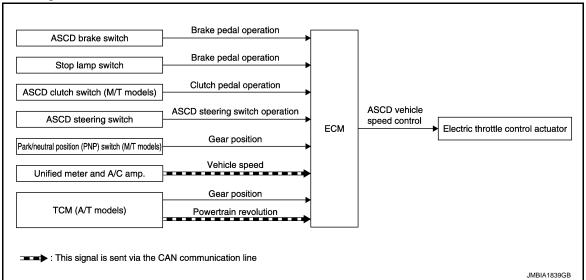
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[VQ37VHR]

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000007462587



System Description

INFOID:0000000007462588

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation		Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position (PNP) switch (M/T models)	Gear position	ASCD vehicle speed control	
Unified meter and A/C amp.	Vehicle speed*		
TCM (A/T models)	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 lamp 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 indicator in combination meter is displayed.)

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.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SYSTEM DESCRIPTION >

[VQ37VHR]

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)

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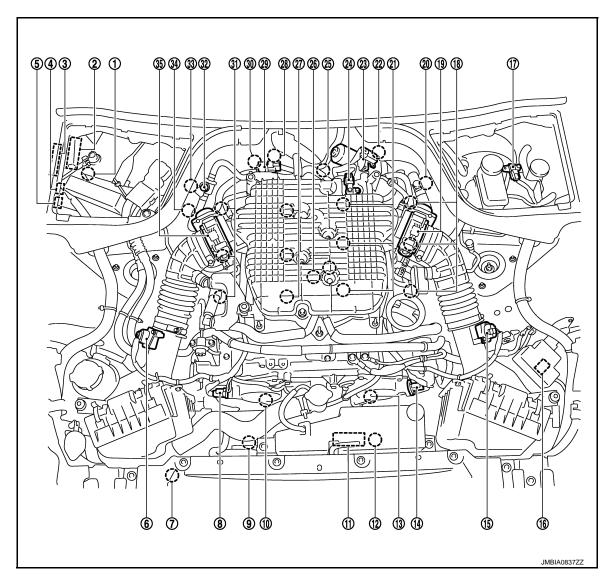
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Component Parts Location

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- Battery current sensor
- 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)

- IPDM E/R
- VVEL actuator motor relay
- 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
- solenoid valve

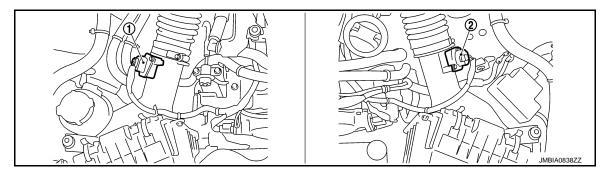
- VVEL control module
- Mass air flow sensor (with intake air temperature sensor) (bank 1)
- Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- 18. Ignition coil (with power transistor) and spark plug (bank 2)
- 21. Fuel injector (bank 2)
- 24. Manifold absolute pressure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

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

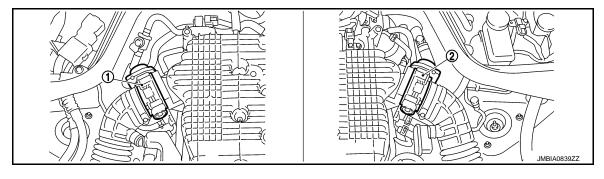
[VQ37VHR] < SYSTEM DESCRIPTION >

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

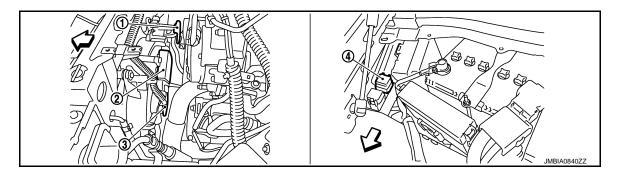
- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)



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



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



: Vehicle front

- Cooling fan motor-2
- Cooling fan control module

Cooling fan relay

Cooling fan motor-1

EC-99 Revision: 2013 February 2012 G Sedan

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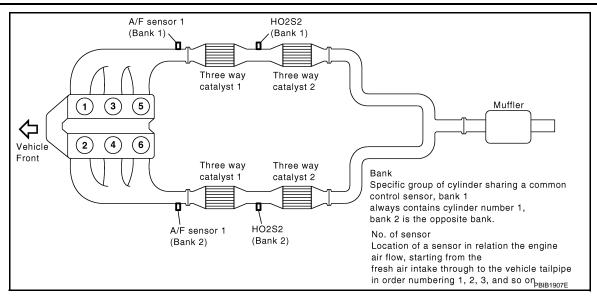
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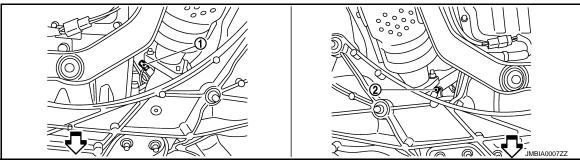
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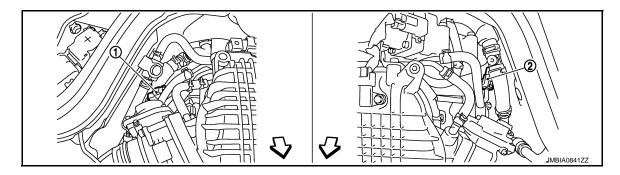




: Vehicle front

A/F sensor 1 (bank 1)

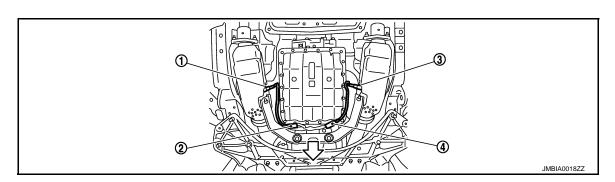
A/F sensor 1 (bank 2)



∵ : Vehicle front

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

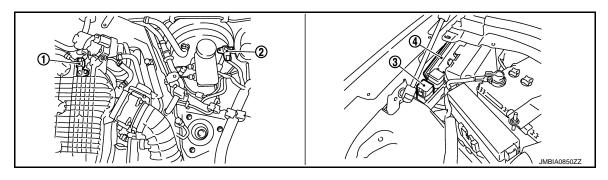
nector



∵ : Vehicle front

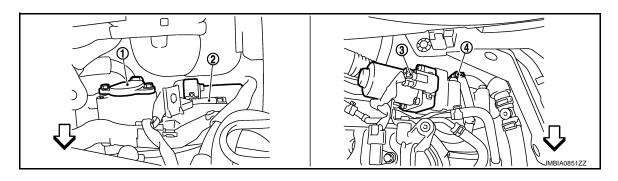
- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

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



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

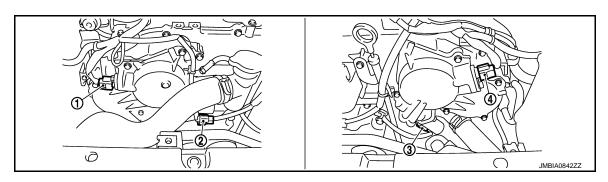
4. VVEL control module



: Vehicle front

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

 VVEL control shaft position sensor (bank 2)



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

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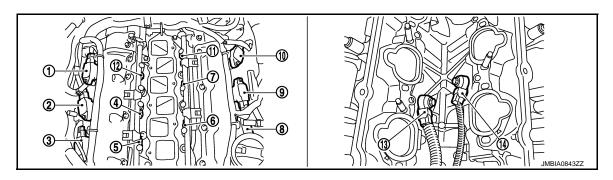
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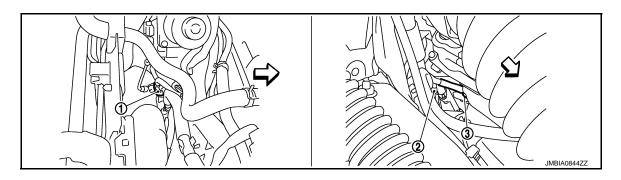
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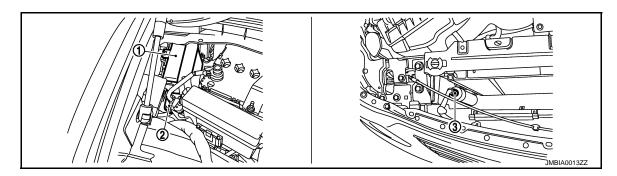
- Ignition coil No.5 (with power transis- 2.
- 4. Fuel injector No.3
- Fuel injector No.4
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6
- 13. Knock sensor (bank 1)

- Ignition coil No.3 (with power transis- 3. tor)
- Fuel injector No.1
- Ignition coil No.2 (with power transis- 9.
- 14. Knock sensor (bank 2)

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

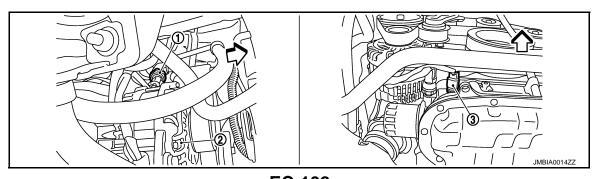


- : Vehicle front
- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- Crankshaft position sensor (POS)



IPDM E/R

- Battery current sensor
- Refrigerant pressure sensor

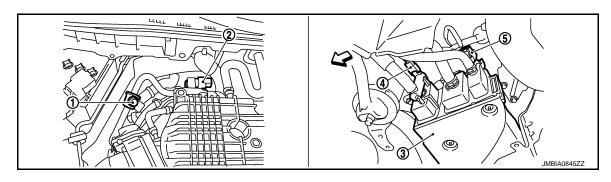


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1. Power steering pressure sensor

Alternator

3. Engine oil temperature sensor



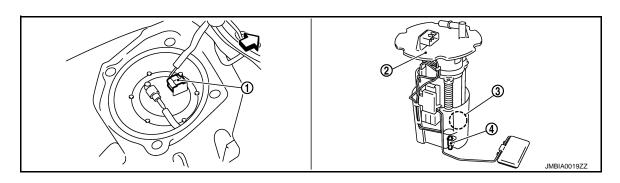
: Vehicle front

1. EVAP service port

EVAP canister purge volume control 3. EVAP canister solenoid valve

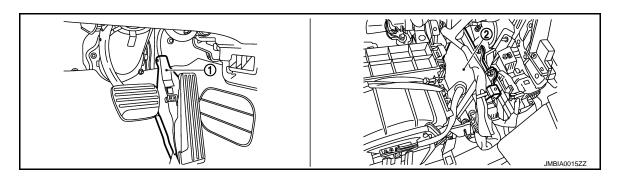
4. EVAP canister vent control valve

5. EVAP control system pressure sensor



: Vehicle front

- 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



Accelerator pedal position sensor
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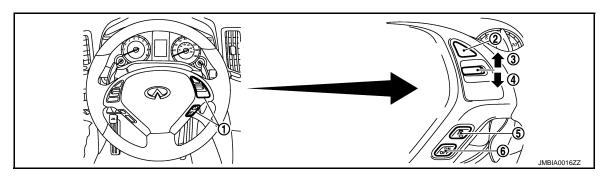
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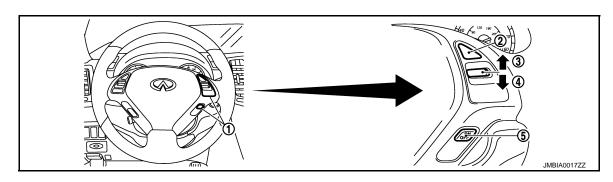
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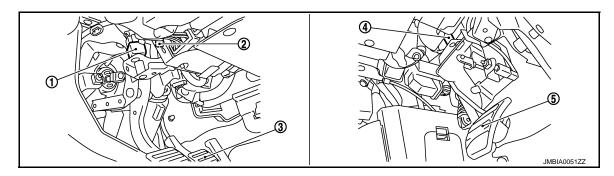
- ICC steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. DISTANCE switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch



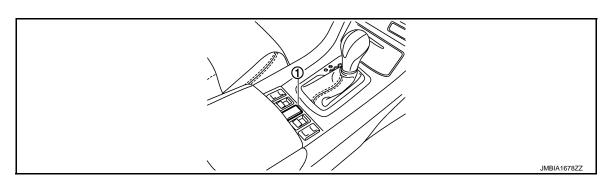
- 1. ASCD steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. MAIN switch

3. RESUME/ACCELERATE switch

Brake pedal



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



1. Snow mode switch

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component Description

INFOID:0000000007462590

Component	Reference
ASCD brake switch	EC-475, "Description"
ASCD indicator	EC-524, "Description"
ASCD steering switch	EC-468, "Description"
Electric throttle control actuator	EC-448, "Description"
Stop lamp switch	EC-499, "Description"

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CAN COMMUNICATION

< SYSTEM DESCRIPTION >

[VQ37VHR]

CAN COMMUNICATION

System Description

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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.

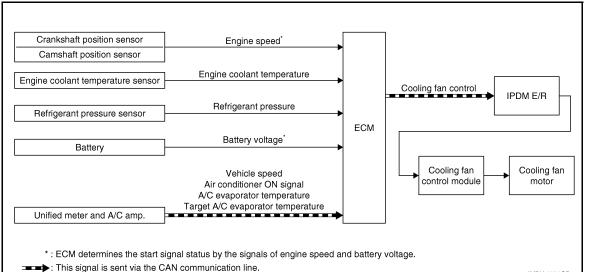
Refer to LAN-9, "CAN Communication Control Circuit", about CAN communication for detail.

[VQ37VHR]

INFOID:0000000007462592

COOLING FAN CONTROL

System Diagram



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	Cooling fan	IPDM E/R ↓ Cooling fan control module ↓ Cooling fan motor
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Battery	Battery voltage*1		
Unified meter and A/C amp.	Vehicle speed* ²		
	Air conditioner ON signal*2		
	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.

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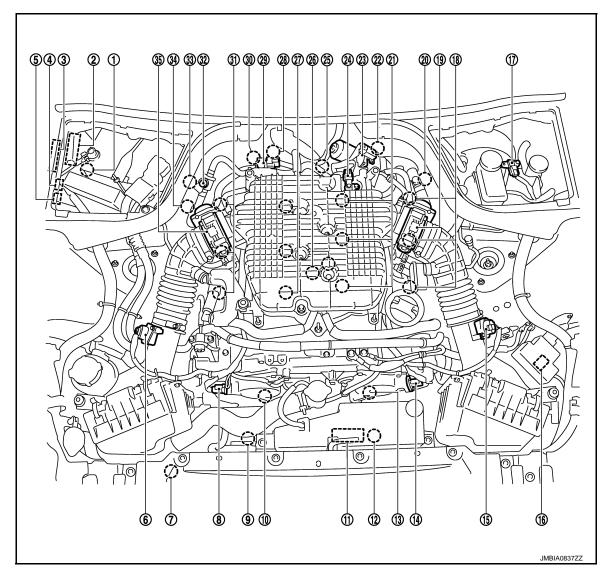
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^{*2:} This signal is sent to ECM via the CAN communication line.

Component Parts Location

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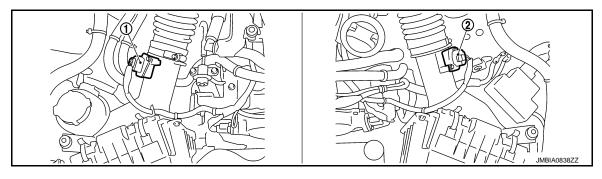
- Battery current sensor
- Cooling fan relay
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- 13. Intake valve timing control solenoid valve (bank 2)
- 16. ICC brake hold relay (ICC models)
- 19. Electric throttle control actuator (bank 2)
- 22. VVEL control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

- IPDM E/R
- VVEL actuator motor relay
- 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
- solenoid valve

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

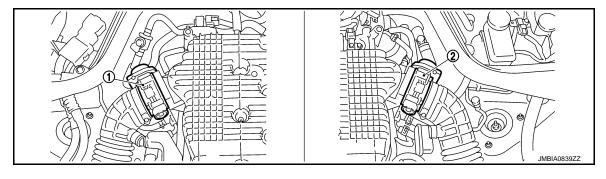
- 31. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. EVAP service port
- 33. A/F sensor 1 (bank 1)

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

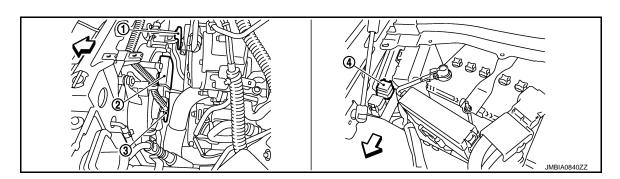


 Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)

. Mass air flow sensor (bank 2)



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



: Vehicle front

1. Cooling fan motor-2

Cooling fan relay

2. Cooling fan control module

3. Cooling fan motor-1

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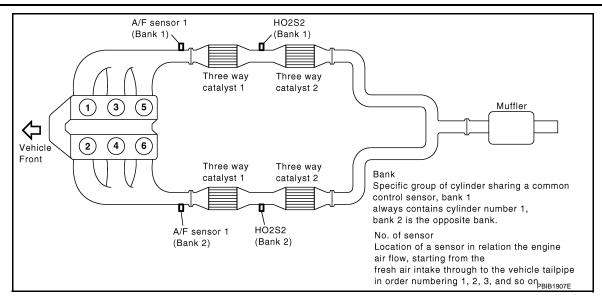
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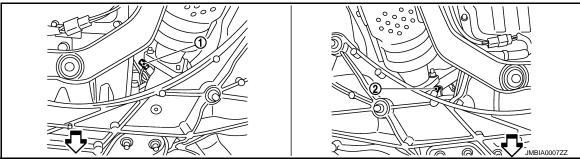
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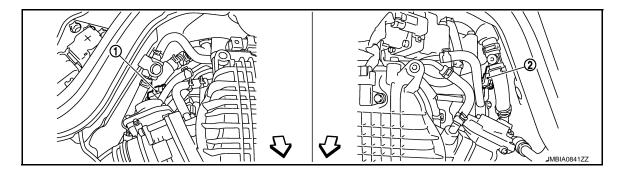
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A/F sensor 1 (bank 1)

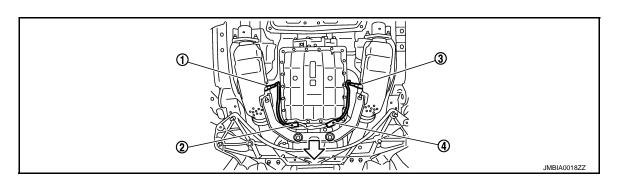
A/F sensor 1 (bank 2)



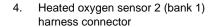
∵ : Vehicle front

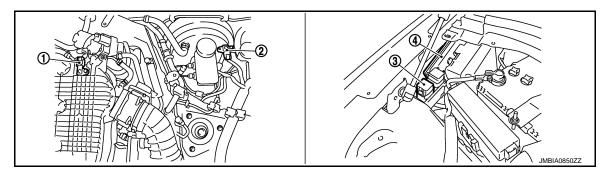
1. A/F sensor 1 (bank 1) harness con- 2. A/F sensor 1 (bank 2) harness connector

nector



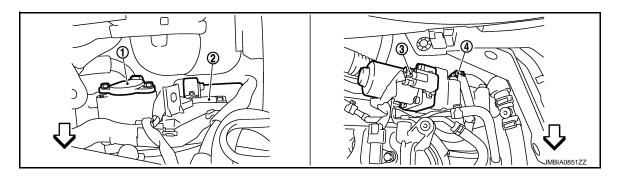
- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)





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

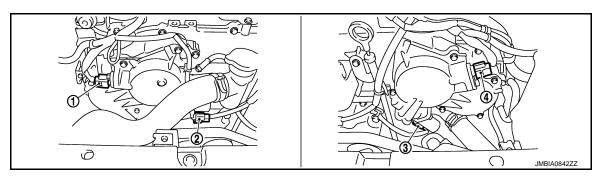
4. VVEL control module



: Vehicle front

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

 VVEL control shaft position sensor (bank 2)



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

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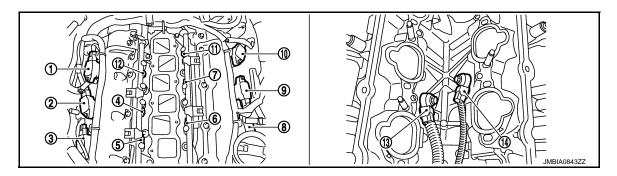
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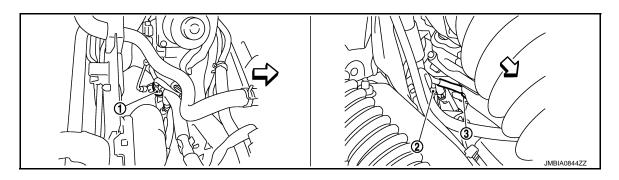
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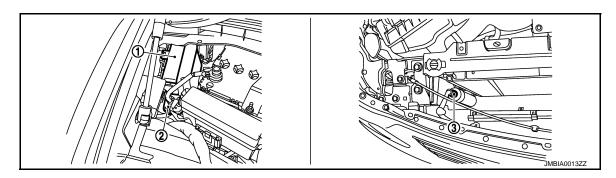
- Ignition coil No.5 (with power transis- 2.
- 4. Fuel injector No.3
- Fuel injector No.4
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6
- 13. Knock sensor (bank 1)

- Ignition coil No.3 (with power transis- 3. tor)
- Fuel injector No.1
- Ignition coil No.2 (with power transis- 9. tor)
- 14. Knock sensor (bank 2)

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

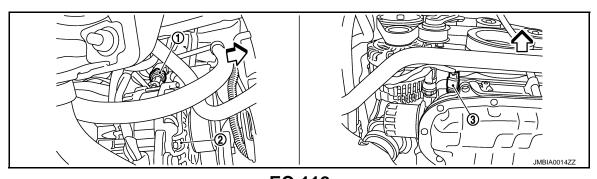


- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- Crankshaft position sensor (POS)



IPDM E/R

- Battery current sensor
- Refrigerant pressure sensor

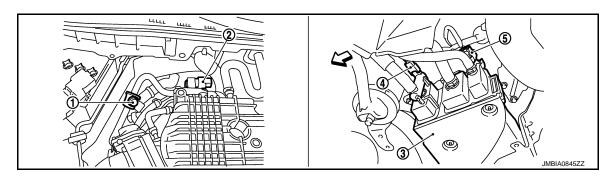


 \triangleleft : Vehicle front

1. Power steering pressure sensor

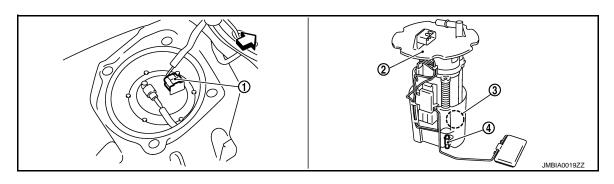
2. Alternator

3. Engine oil temperature sensor



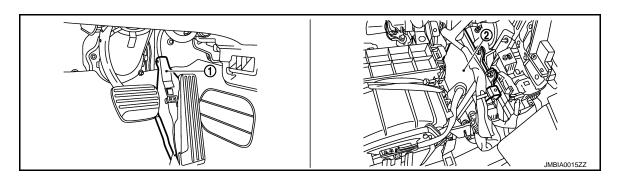
 \triangleleft : Vehicle front

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



: 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



Accelerator pedal position sensor

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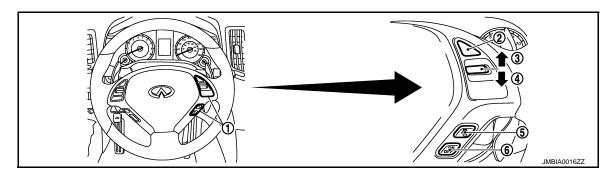
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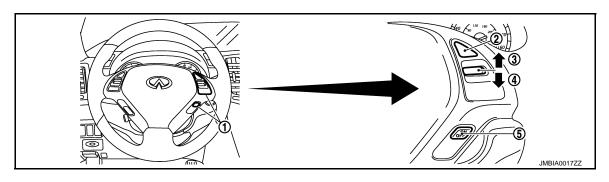
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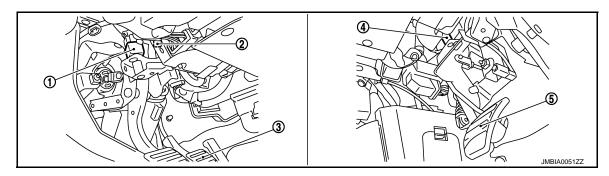


- ICC steering switch
- SET/COAST switch
- 2. CANCEL switch
- 5. **DISTANCE** switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch

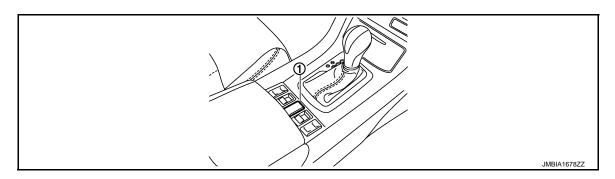


- ASCD steering switch
- SET/COAST switch
- CANCEL switch 2.
- MAIN switch

RESUME/ACCELERATE switch



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



Snow mode switch

COOLING FAN CONTROL

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component Description

INFOID:0000000007462595

Component	Reference
Camshaft position sensor (PHASE)	EC-325, "Description"
Cooling fan control module	EC-525, "Description"
Cooling fan motor	EC-525, "Description"
Crankshaft position sensor (POS)	EC-321, "Description"
Engine coolant temperature sensor	EC-234, "Description"
Refrigerant pressure sensor	EC-553, "Description"

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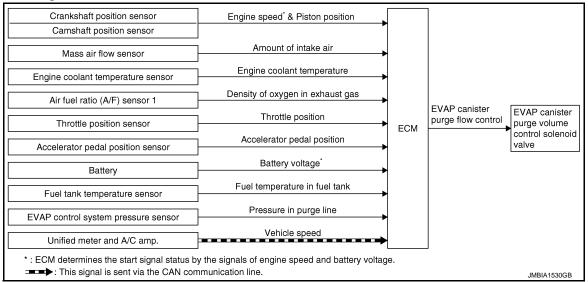
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[VQ37VHR]

EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000007462596



System Description

INFOID:0000000007462597

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 purge volume control solenoid valve	
Throttle position sensor	Throttle position	EVAP canister purge flow control		
Accelerator pedal position sensor	Accelerator pedal position			
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*3	Pressure 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.

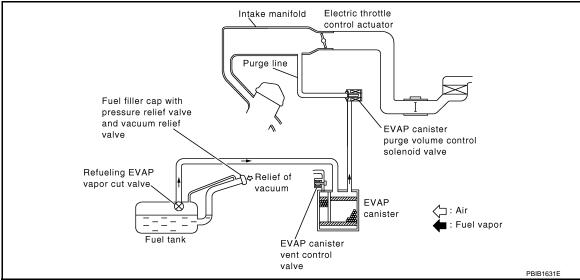
SYSTEM DESCRIPTION

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

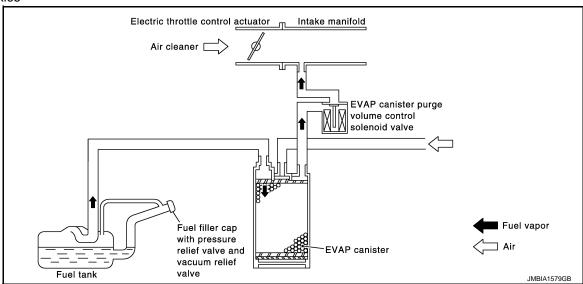
^{*3:} Except for Mexico

[VQ37VHR]

Except for Mexico



For Mexico



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.

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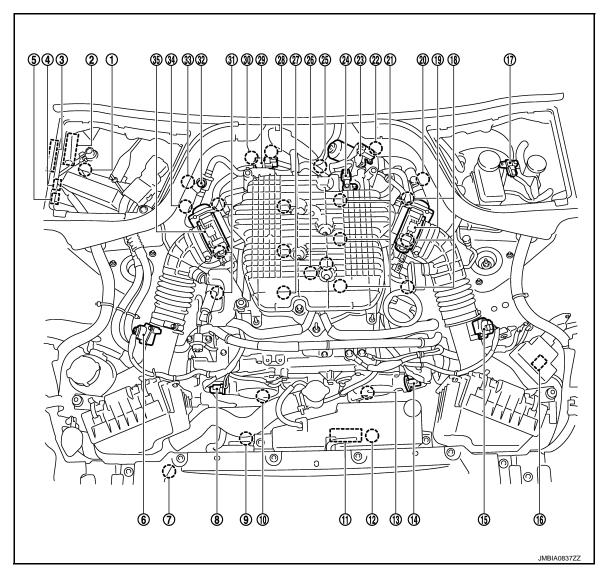
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Component Parts Location

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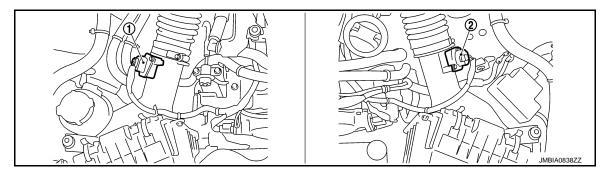
- Battery current sensor
- Cooling fan relay
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- 13. Intake valve timing control solenoid valve (bank 2)
- 16. ICC brake hold relay (ICC models)
- 19. Electric throttle control actuator (bank 2)
- 22. VVEL control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

- IPDM E/R
- VVEL actuator motor relay
- 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
- solenoid valve

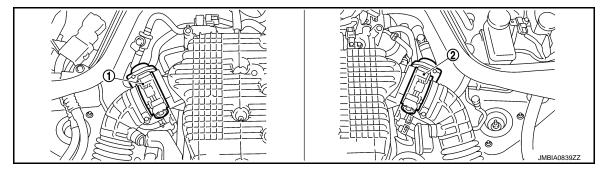
- VVEL control module
- Mass air flow sensor (with intake air temperature sensor) (bank 1)
- Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (bank 2)
- 18. Ignition coil (with power transistor) and spark plug (bank 2)
- 21. Fuel injector (bank 2)
- 24. Manifold absolute pressure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

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

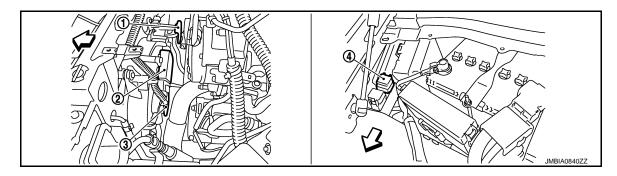
- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)



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



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



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

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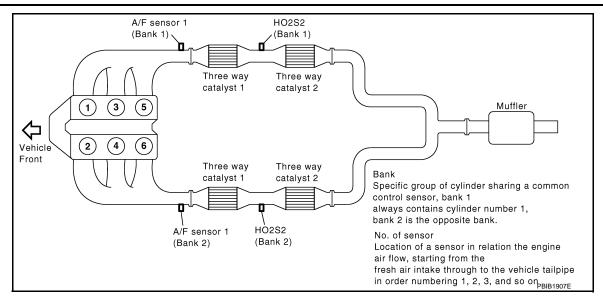
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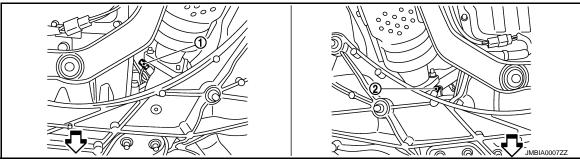
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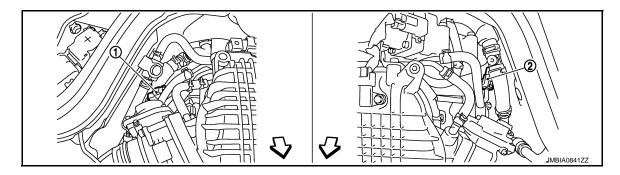
2012 G Sedan





A/F sensor 1 (bank 1)

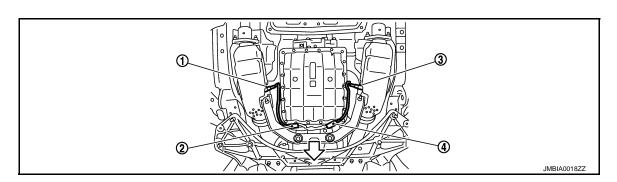
A/F sensor 1 (bank 2)



∵ : Vehicle front

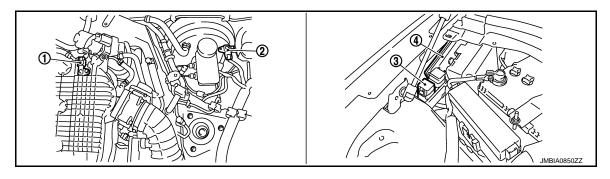
1. A/F sensor 1 (bank 1) harness con- 2. A/F sensor 1 (bank 2) harness connector

nector



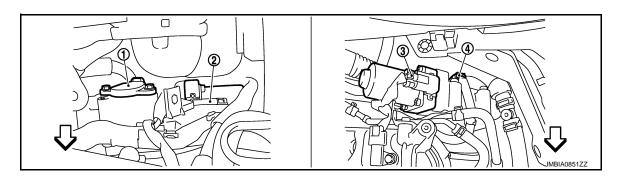
- 1. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

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



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

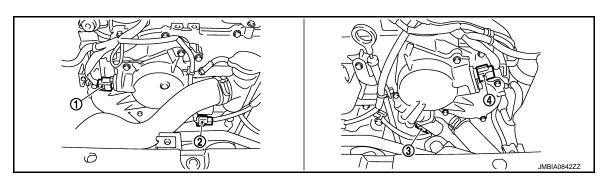
4. VVEL control module



: Vehicle front

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

 VVEL control shaft position sensor (bank 2)



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

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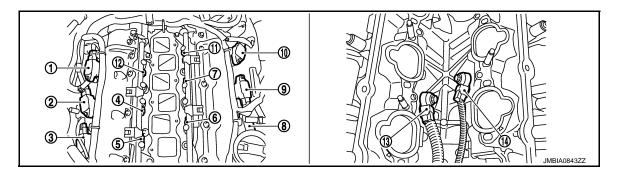
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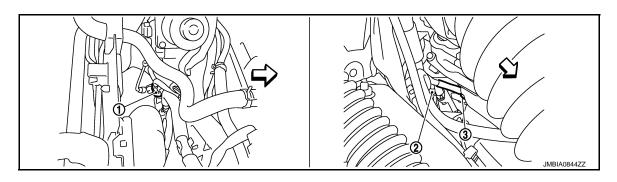
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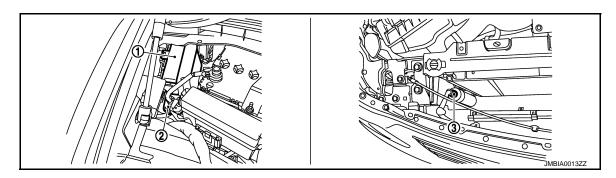
- Ignition coil No.5 (with power transis- 2.
- 4. Fuel injector No.3
- Fuel injector No.4
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6
- 13. Knock sensor (bank 1)

- Ignition coil No.3 (with power transis- 3. tor)
- Fuel injector No.1
- Ignition coil No.2 (with power transis- 9.
- 14. Knock sensor (bank 2)

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

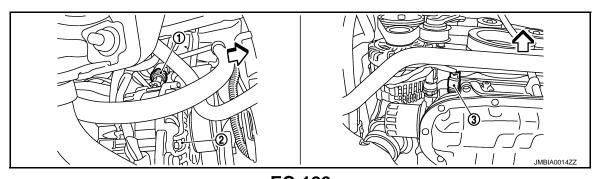


- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- Crankshaft position sensor (POS)



IPDM E/R

- Battery current sensor
- Refrigerant pressure sensor



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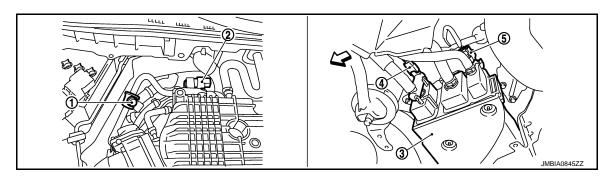
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 \triangleleft : Vehicle front

1. Power steering pressure sensor

2. Alternator

3. Engine oil temperature sensor



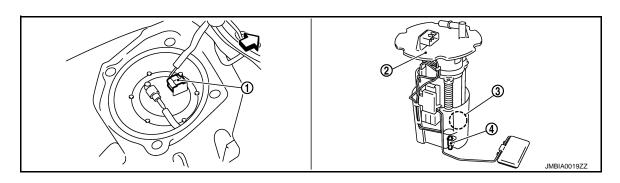
 \triangleleft : Vehicle front

1. EVAP service port

EVAP canister purge volume control 3. EVAP canister solenoid valve

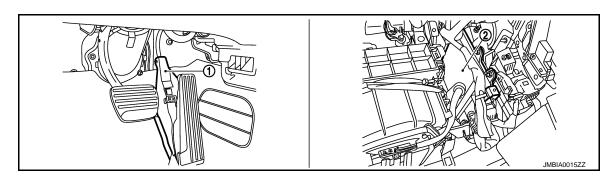
4. EVAP canister vent control valve

5. EVAP control system pressure sensor



: 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



Accelerator pedal position sensor

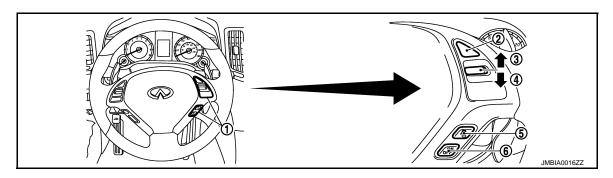
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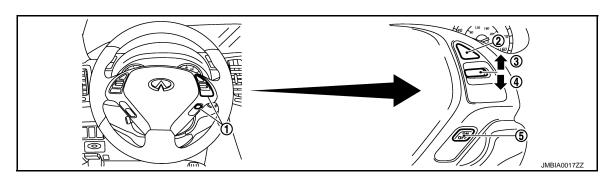
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- ICC steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. DISTANCE switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch

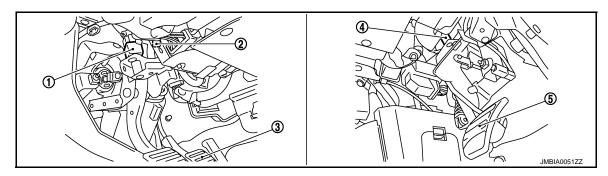


- 1. ASCD steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. MAIN switch

. RESUME/ACCELERATE switch

Brake pedal

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

1. Snow mode switch

EVAPORATIVE EMISSION SYSTEM

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component Description

INFOID:0000000007462599

Component	Reference	
A/F sensor 1	EC-249, "Description"	
Accelerator pedal position sensor	EC-502, "Description"	
Camshaft position sensor (PHASE)	EC-325, "Description"	
Crankshaft position sensor (POS)	EC-321, "Description"	
Engine coolant temperature sensor	EC-234, "Description"	
EVAP canister purge volume control solenoid valve	EC-344, "Description"	
EVAP control system pressure sensor	EC-355, "Description"	
Fuel tank temperature sensor	EC-295, "Description"	
Mass air flow sensor	EC-203, "Description"	
Throttle position sensor	EC-309, "Description"	

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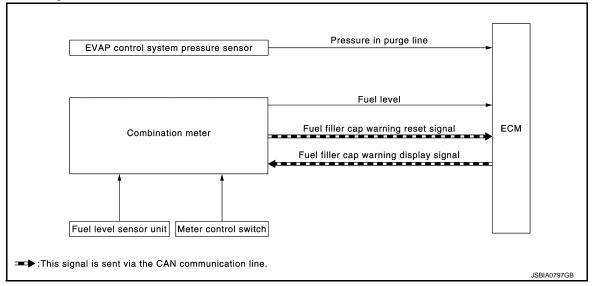
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[VQ37VHR]

FUEL FILLER CAP WARNING SYSTEM

System Diagram

INFOID:0000000007462600



System Description

INFOID:000000000746260

INPUT/OUTPUT SIGNAL CHART

Input		
Unit/Sensor	Input signal to ECM	ECM function
EVAP control system pressure sensor	Pressure in purge line	
Combination mater	Fuel level	Fuel filler cap warning control
Combination meter	Fuel filler cap warning reset signal*	

^{*:} This signal is sent to the ECM via the CAN communication line.

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Unit	Output signal Actuator	
ECM	Fuel filler cap warning display signal*	Combination meter

^{*:} This signal is sent to the combination meter via the CAN communication line.

SYSTEM DESCRIPTION

The fuel filler cap warning system alerts the driver to the prevention of the fuel filler being left uncapped and malfunction occurrences after refueling, by turning ON the fuel filler cap warning display on the combination meter

ECM judges a refueled state, based on a fuel level signal transmitted from the combination meter.

When a very small leak is detected through the EVAP leak diagnosis performed after judging the refueled state, ECM transmits a fuel filler cap warning display signal (request for display ON) to the combination meter via CAN communication.

When receiving the signal, the combination meter turns ON the fuel filler cap warning display.

CAUTION:

Check fuel filler cap installation condition when the fuel filler cap warning display turns ON.

Reset Operation

The fuel filler cap warning lamp tunes OFF, according to any condition listed below:

- Reset operation is performed by operating the meter control switch on the combination meter.
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.
- EVAP leak diagnosis result is normal.
- Fuel refilled.

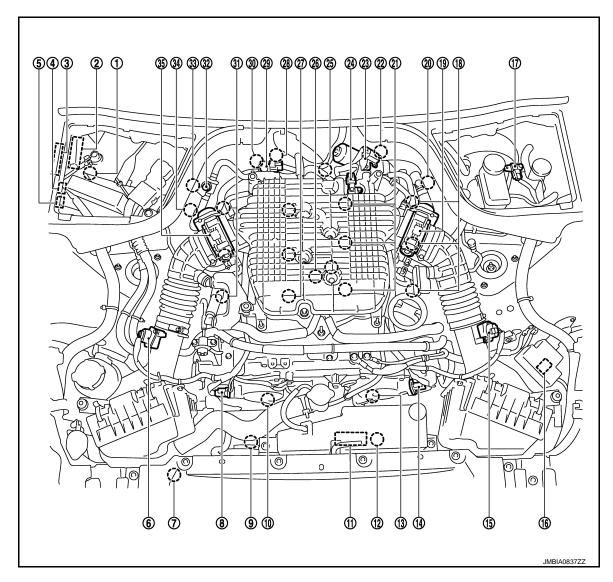
· DTC erased by using CONSULT.

NOTE:

MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

Component Parts Location

INFOID:0000000007462602



- Battery current sensor
- Cooling fan relay
- Refrigerant pressure sensor 7.
- 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)
- Electric throttle control actuator (bank 2)
- 22. VVEL control shaft position sensor (bank 2)
- 25. Engine coolant temperature sensor

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

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

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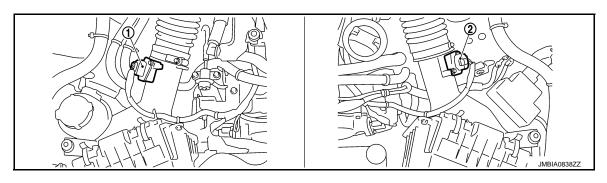
24. Manifold absolute pressure (MAP)

27. Fuel injector (bank 1)

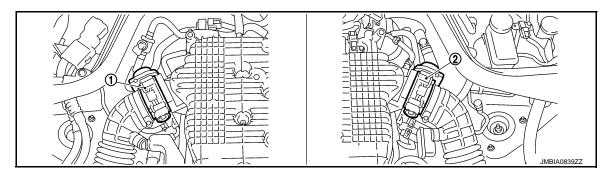
- 28. VVEL actuator motor (bank 1)
- 29. EVAP canister purge volume control 30. VVEL control shaft position sensor solenoid valve
 - (bank 1)

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

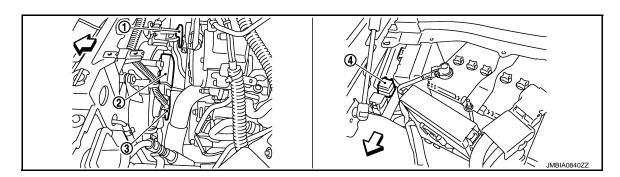
- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)



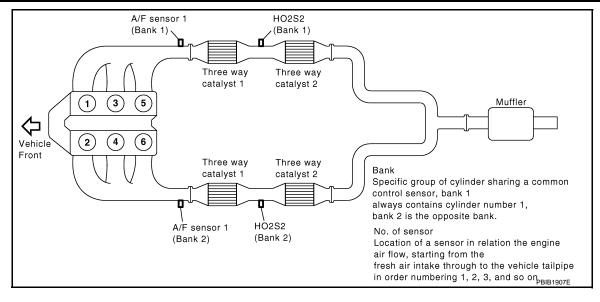
- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (bank 2)

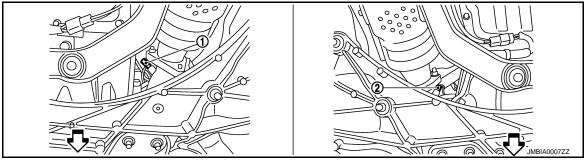


- Electric throttle control actuator (bank 1)
- Electric throttle control actuator (bank 2)



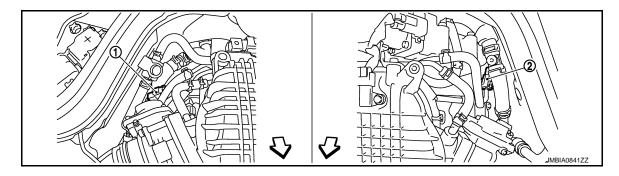
- : Vehicle front
- Cooling fan motor-2
- Cooling fan control module
- Cooling fan motor-1





A/F sensor 1 (bank 1)

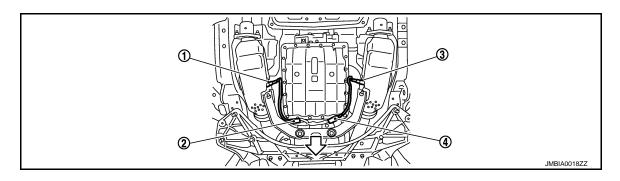
A/F sensor 1 (bank 2)



∵ : Vehicle front

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

A/F sensor 1 (bank 2) harness connector



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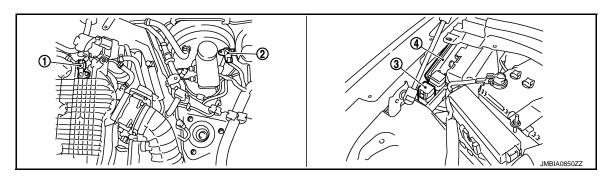
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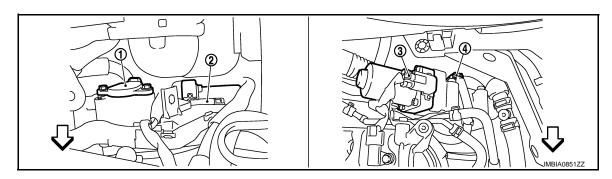
- 1. Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

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



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

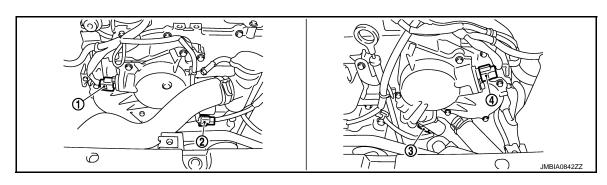
4. VVEL control module



∵ : Vehicle front

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

4. VVEL control shaft position sensor (bank 2)



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

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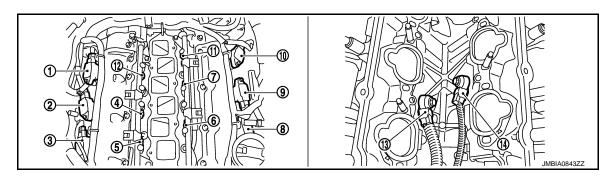
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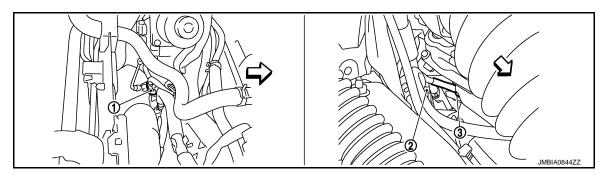
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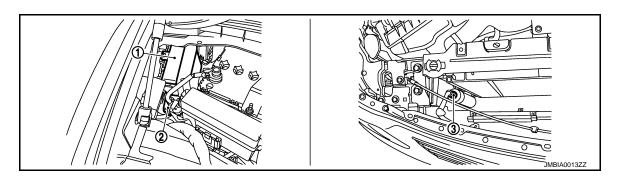
- Ignition coil No.5 (with power transis- 2. tor)
- 4. Fuel injector No.3
- Fuel injector No.4 7.
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6
- 13. Knock sensor (bank 1)

- Ignition coil No.3 (with power transis- 3. tor)
- Fuel injector No.1
- Ignition coil No.2 (with power transis- 9.
- 14. Knock sensor (bank 2)
- Ignition coil No.1 (with power transistor)
- Fuel injector No.2
- Ignition coil No.4 (with power transistor)
- 12. Fuel injector No.5



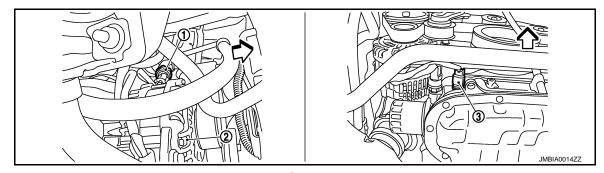
: Vehicle front

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



IPDM E/R

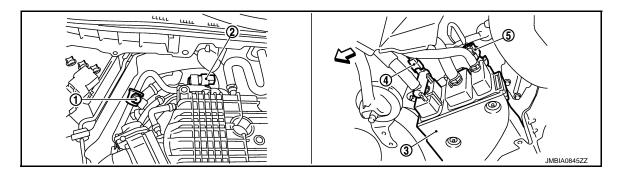
- Battery current sensor
- Refrigerant pressure sensor



Revision: 2013 February

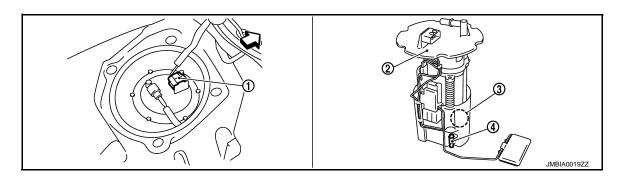
- 1. Power steering pressure sensor
- 2. Alternator

Engine oil temperature sensor



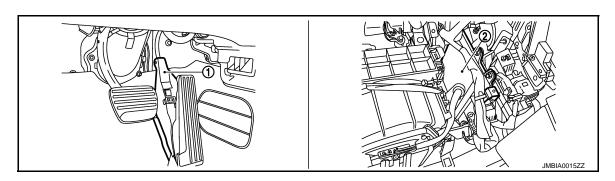
∵ : Vehicle front

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



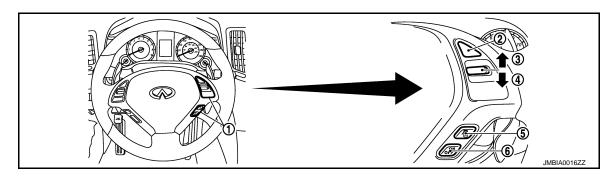
: Vehicle front

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

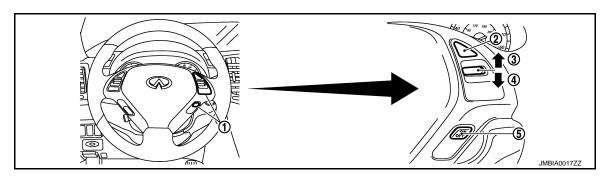


Accelerator pedal position sensor

ECM



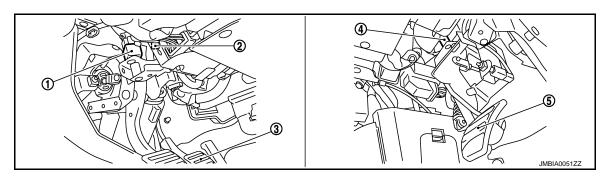
- 1. ICC steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. DISTANCE switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch



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

3. RESUME/ACCELERATE switch

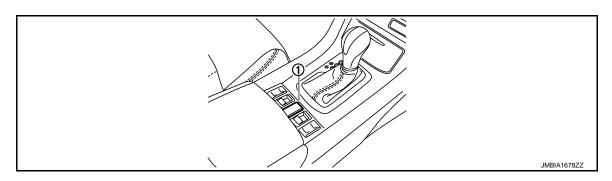
Brake pedal



1. Stop lamp switch

ASCD clutch switch

- 100 brake swi
- 2. ASCD brake switch (ASCD models) 3. ICC brake switch (ICC models)
- 5. Clutch pedal



Snow mode switch

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FUEL FILLER CAP WARNING SYSTEM

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component Description

INFOID:0000000007462603

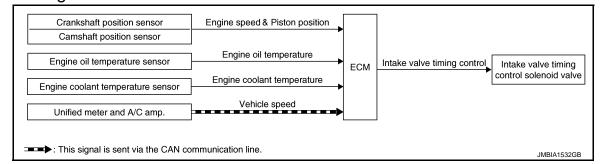
Component	Reference
EVAP control system pressure sensor	EC-355, "Description"
Fuel level sensor	EC-375, "Description"

[VQ37VHR]

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000007462604



System Description

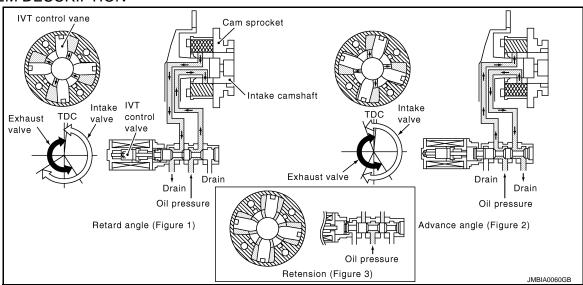
INFOID:0000000007462605

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position		
Camshaft position sensor (PHASE)	Engine speed and piston position	Intake valve timing control	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

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.

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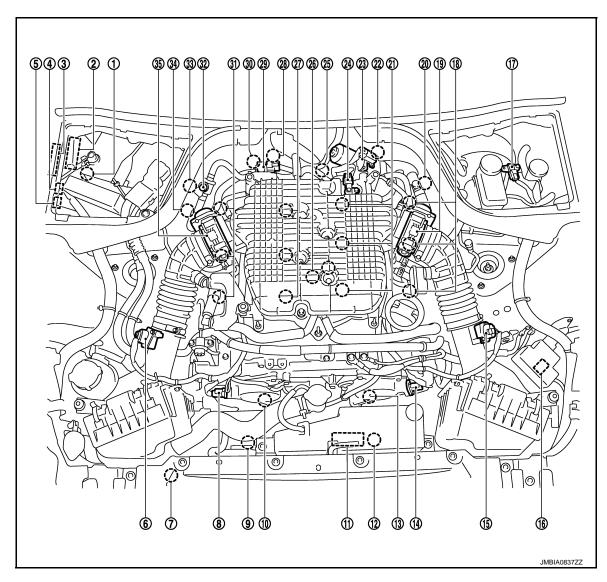
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Component Parts Location

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- Battery current sensor
- 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)

- IPDM E/R
- VVEL actuator motor relay
- 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
- solenoid valve

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

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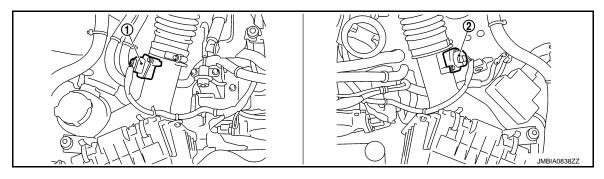
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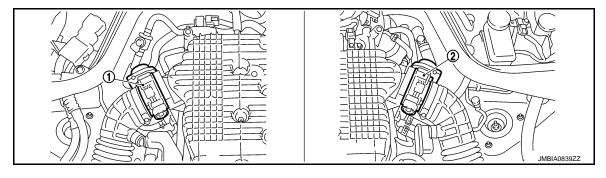
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- 31. Ignition coil (with power transistor) and spark plug (bank 1)
- 32. EVAP service port
- 33. A/F sensor 1 (bank 1)

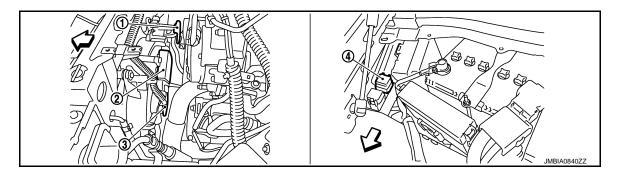
- 34. Crankshaft position sensor (POS)
- 35. Electric throttle control actuator (bank 1)



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



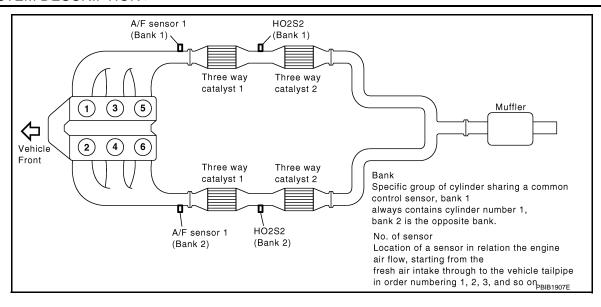
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)

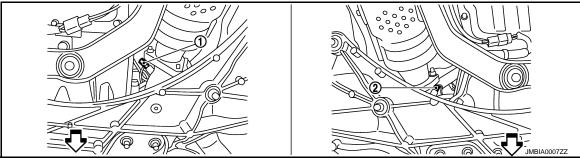


: Vehicle front

- Cooling fan motor-2 Cooling fan relay
- Cooling fan control module
- Cooling fan motor-1

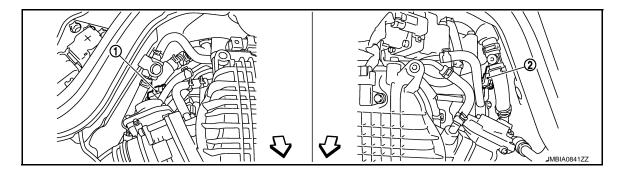
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A/F sensor 1 (bank 1)

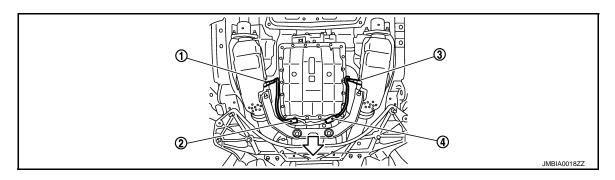
2. A/F sensor 1 (bank 2)



∵ : Vehicle front

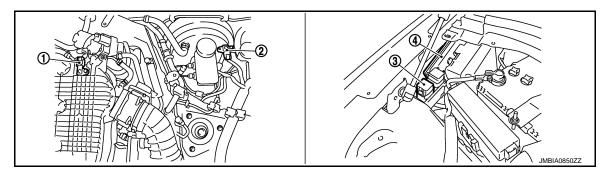
nector

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



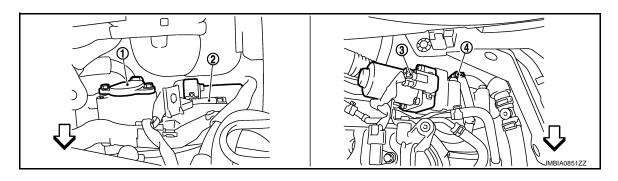
- Heated oxygen sensor 2 (bank 2)
- Heated oxygen sensor 2 (bank 2) harness connector
- Heated oxygen sensor 2 (bank 1)

Heated oxygen sensor 2 (bank 1) harness connector



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

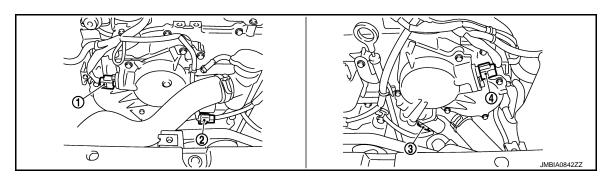
VVEL control module



: Vehicle front

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

- VVEL control shaft position sensor
- (bank 2)



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

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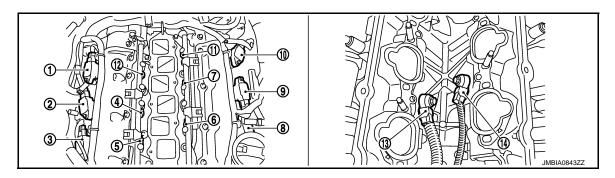
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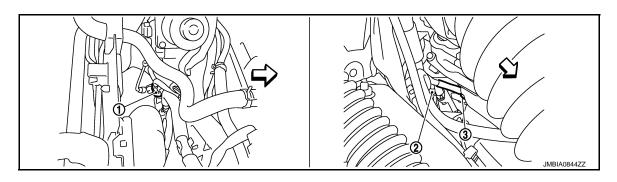
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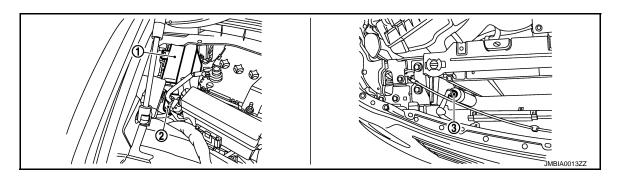
- Ignition coil No.5 (with power transis- 2.
- 4. Fuel injector No.3
- Fuel injector No.4
- 10. Ignition coil No.6 (with power transis- 11. Fuel injector No.6
- 13. Knock sensor (bank 1)

- Ignition coil No.3 (with power transis- 3. tor)
- Fuel injector No.1
- Ignition coil No.2 (with power transis- 9.
- 14. Knock sensor (bank 2)

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

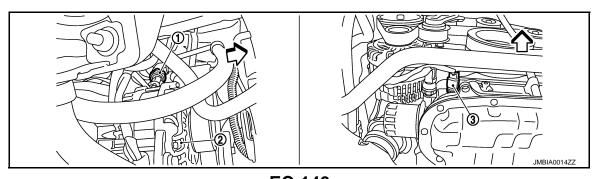


- Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)
- Crankshaft position sensor (POS)



IPDM E/R

- Battery current sensor
- Refrigerant pressure sensor

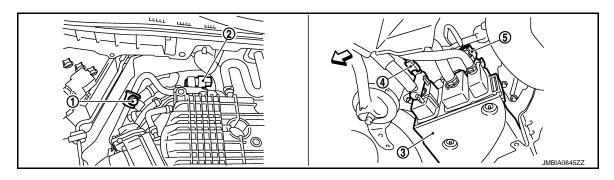


 \triangleleft : Vehicle front

1. Power steering pressure sensor

2. Alternator

3. Engine oil temperature sensor



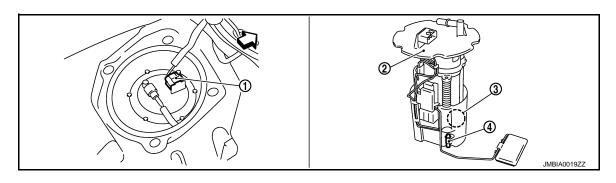
 \triangleleft : Vehicle front

1. EVAP service port

EVAP canister purge volume control 3. EVAP canister solenoid valve

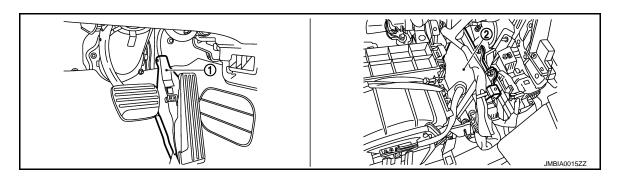
4. EVAP canister vent control valve

5. EVAP control system pressure sensor



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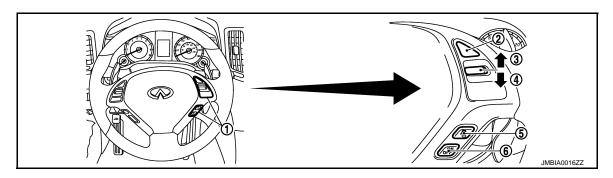
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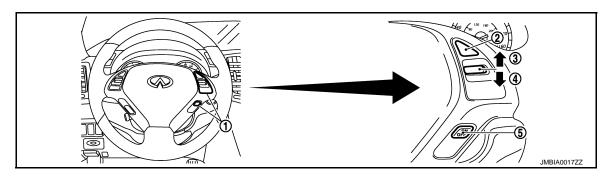
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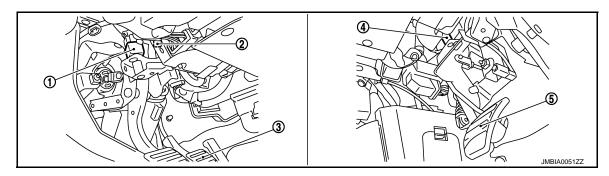
- ICC steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. DISTANCE switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch



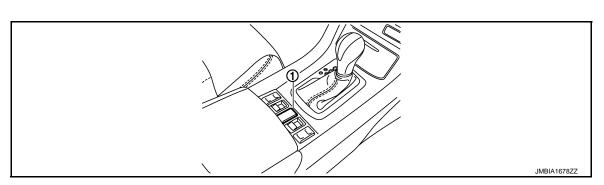
- 1. ASCD steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. MAIN switch

3. RESUME/ACCELERATE switch

Brake pedal



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



1. Snow mode switch

INTAKE VALVE TIMING CONTROL

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component Description

INFOID:0000000007462607

Component	Reference
Camshaft position sensor (PHASE)	EC-325, "Description"
Crankshaft position sensor (POS)	EC-321, "Description"
Engine coolant temperature sensor	EC-231, "Description"
Engine oil temperature sensor	EC-302, "Description"
Intake valve timing control solenoid valve	EC-210, "Description"

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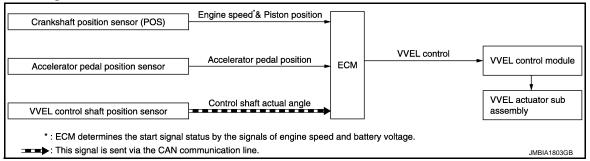
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VVEL SYSTEM

System Diagram

INFOID:0000000007462608



System Description

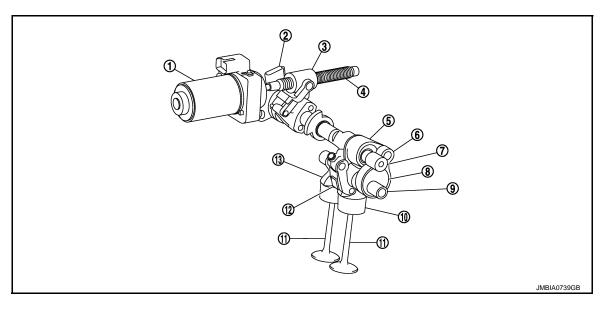
INFOID:0000000007462609

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



- 1. VVEL actuator motor
- 4. Ball screw shaft
- 7. Control shaft
- 10. Valve lifter
- 13. Output cam

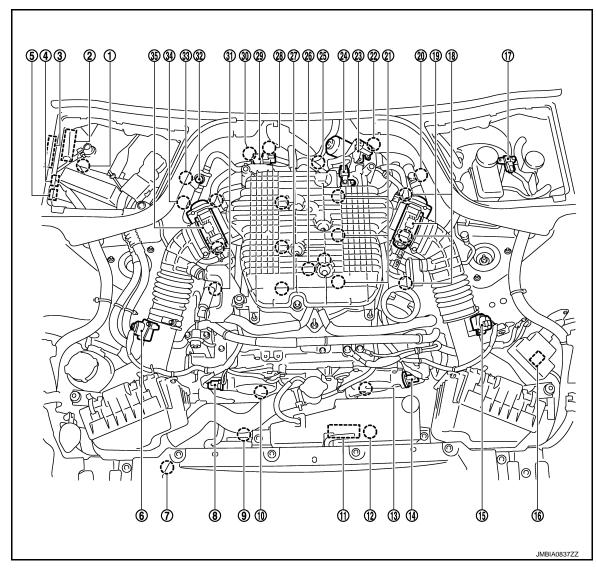
- VVEL control shaft position sensor
- 5. Rocker arm
- 8. Eccentric cam
- 11. Intake valve

- Ball screw nut
- 6. Link A
- Drive shaft
- 12. Link B

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.

Component Parts Location

INFOID:0000000007462610



- Battery current sensor
- 4. Cooling fan relay
- 7. Refrigerant pressure sensor
- 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
- VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- Cooling fan control module
- Camshaft position sensor (PHASE) (bank 2)
- 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
- 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 (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)
- VVEL control shaft position sensor (bank 1)

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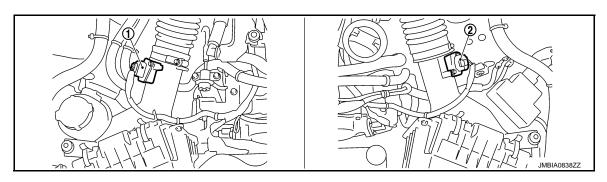
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- 31. Ignition coil (with power transistor) and spark plug (bank 1)

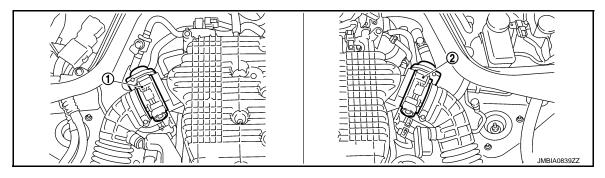
33. A/F sensor 1 (bank 1)

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

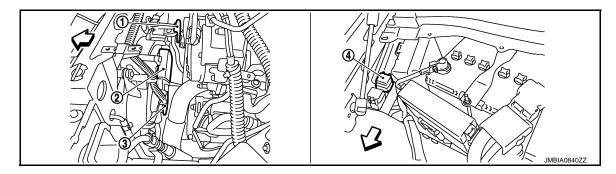
32. EVAP service port



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

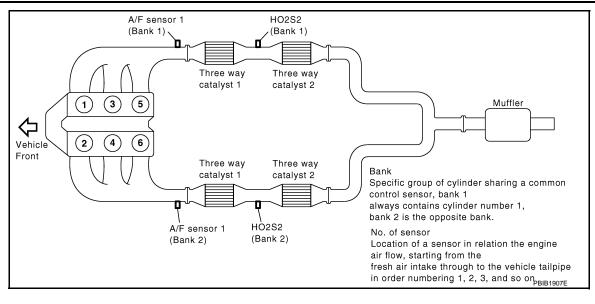


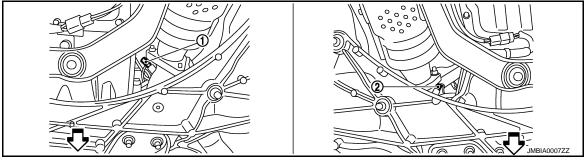
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



- ∵ : Vehicle front
- Cooling fan motor-2
- Cooling fan control module
- Cooling fan motor-1

Cooling fan relay

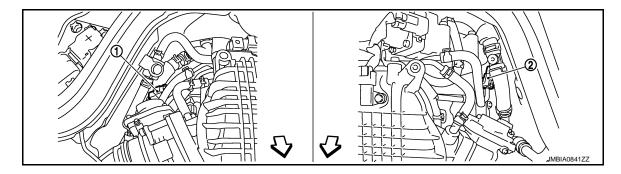




: Vehicle front

A/F sensor 1 (bank 1)

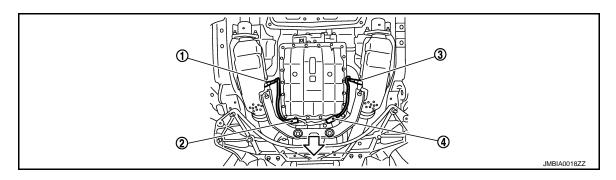
A/F sensor 1 (bank 2)



∵ : Vehicle front

nector

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



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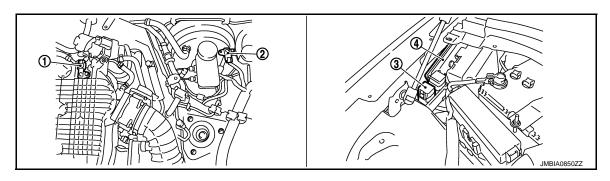
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: Vehicle front

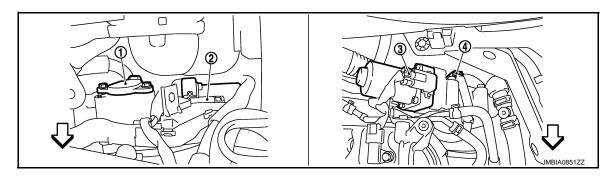
- 1. Heated oxygen sensor 2 (bank 2)
- 2. Heated oxygen sensor 2 (bank 2) harness connector
- 3. Heated oxygen sensor 2 (bank 1)

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



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

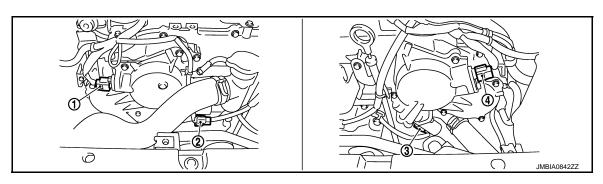
4. VVEL control module



∵ : Vehicle front

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

4. VVEL control shaft position sensor (bank 2)



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

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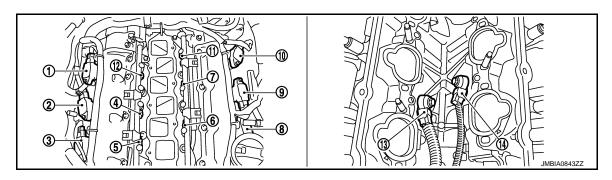
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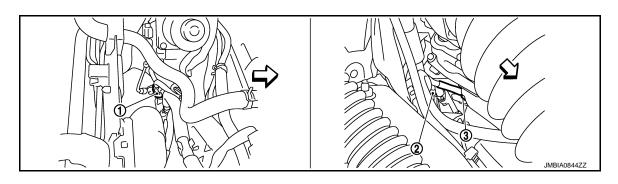
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- Ignition coil No.5 (with power transis- 2. tor)
- 4. Fuel injector No.3
- 7. Fuel injector No.4
- Ignition coil No.6 (with power transistor)
- 13. Knock sensor (bank 1)

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

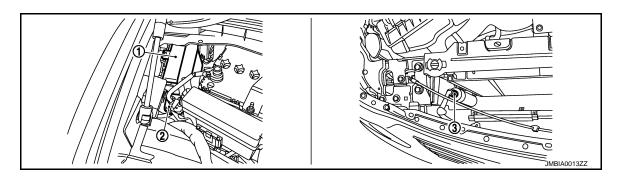
- Ignition coil No.1 (with power transistor)
- 6. Fuel injector No.2
- Ignition coil No.4 (with power transistor)
- 12. Fuel injector No.5



: Vehicle front

. Engine coolant temperature sensor 2. A/F sensor 1 (bank 1)

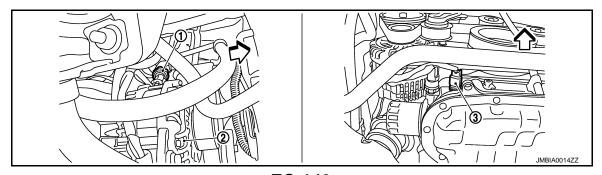
3. Crankshaft position sensor (POS)



1. IPDM E/R

2. Battery current sensor

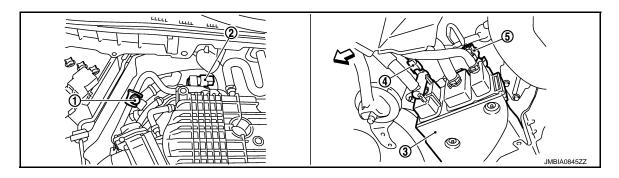
3. Refrigerant pressure sensor



: Vehicle front

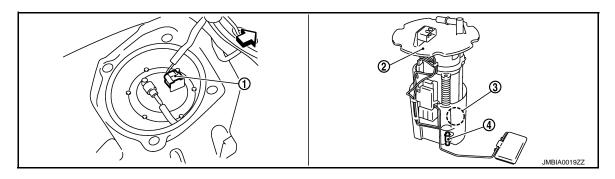
- 1. Power steering pressure sensor
- 2. Alternator

3. Engine oil temperature sensor



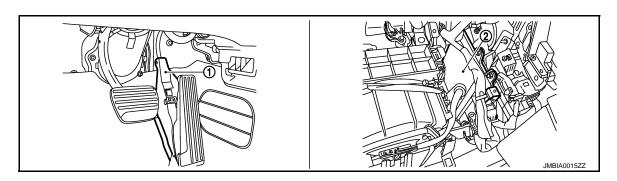
∵ : Vehicle front

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



: Vehicle front

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



1. Accelerator pedal position sensor

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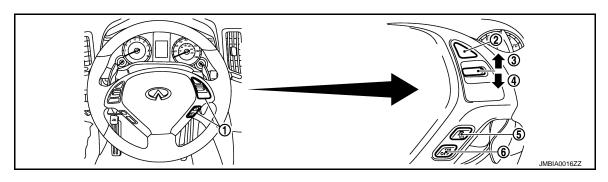
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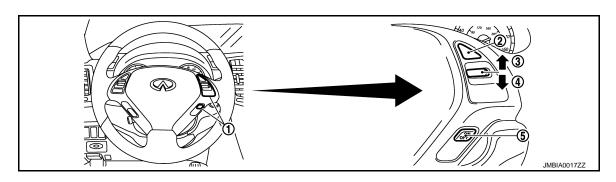
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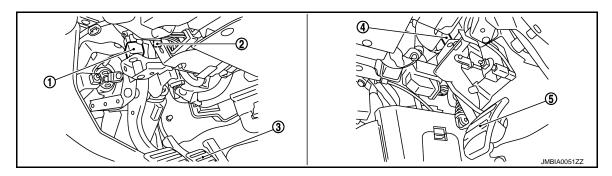
- 1. ICC steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. DISTANCE switch
- 3. RESUME/ACCELERATE switch
- 6. MAIN switch



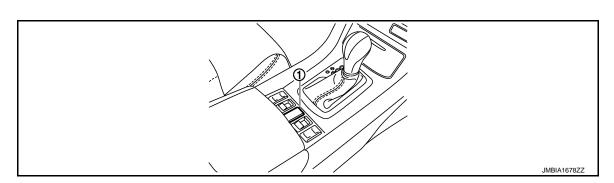
- 1. ASCD steering switch
- 4. SET/COAST switch
- 2. CANCEL switch
- 5. MAIN switch

3. RESUME/ACCELERATE switch

Brake pedal



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



Snow mode switch

VVEL SYSTEM

< SYSTEM DESCRIPTION >

[VQ37VHR]

Component Description

INFOID:0000000007462611

Component	Reference
Accelerator pedal position sensor	EC-502, "Description"
Crankshaft position sensor (POS)	EC-321, "Description"
VVEL actuator motor	EC-423, "Description"
VVEL actuator motor relay	EC-427, "Description"
VVEL control module	EC-492, "Description"
VVEL control shaft position sensor	EC-419, "Description"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[VQ37VHR]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000007462612

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in ECU memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

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GST (Generic Scan Tool)

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When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to EC-153, "Diagnosis Description".

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NOTE:

Service \$0A is not applied for regions where it is not mandated.

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DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION: 1st Trip Detection Logic and Two Trip Detection Logic

NFOID:0000000007462614

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 when 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.

×: Applicable —: Not applicable

		IV	IIL		D ⁻	TC	1st tri	p DTC
Items	19	st trip	2r	nd trip	1st trip	2nd trip	1st trip	2nd trip
	Blinking	Illuminated	Blinking	Illuminated	displaying	displaying	displaying	displaying
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0308 is being detected	×	_	_	_	_	_	×	_
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0308 is being detected	_	_	×	_	_	×	_	_
One trip detection diagnoses (Refer to EC-583, "DTC Index".)	_	×	_	_	×	_	_	_
Except above	_	_	_	×	_	×	×	_

DIAGNOSIS DESCRIPTION: DTC and Freeze Frame Data

INFOID:0000000007462615

DTC AND 1ST TRIP DTC

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 light up (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 saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored 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 light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

For malfunctions in which 1st trip DTCs are displayed, refer to <u>EC-583, "DTC Index"</u>. 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.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

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-21</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 or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

< SYSTEM DESCRIPTION >

[VQ37VHR]

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 stored 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. The ECM has the following priorities to update the data.

Priority		Items			
1	Freeze frame data	Misfire — DTC: P0300 – P0308 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175			
2		Except the above items			
3	1st trip freeze frame da	st trip freeze frame data			

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 can be stored in the ECM). If freeze frame data is stored in the ECM memory and 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.

DIAGNOSIS DESCRIPTION: Counter System

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 come on.
- The MIL will turn OFF after the vehicle is driven 3 times (driving pattern B) with no malfunction. The 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.
- 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 CONSULT 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.

COUNTER SYSTEM CHART

Items	Fuel Injection System	Misfire	Other
MIL (turns OFF)	3 (pattern B)	3 (pattern B)	3 (pattern B)
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)
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>", "Fuel Injection System"

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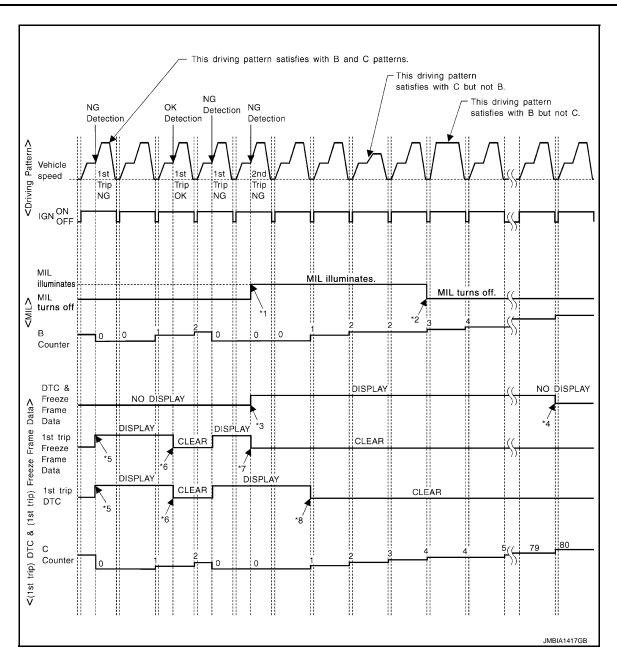
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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and 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 driv- *3: When the same malfunction is deen 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.
- tected 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

Refer to EC-158, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern C

Refer to EC-158, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Example:

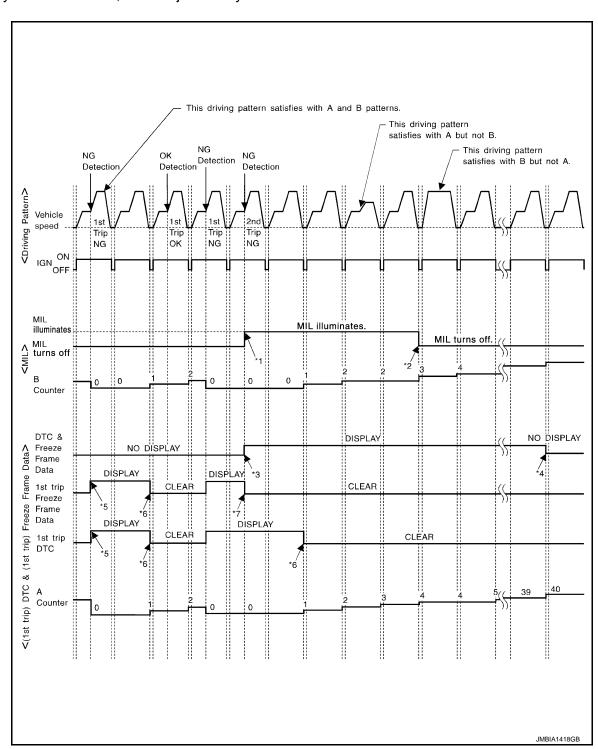
If the stored freeze frame data is as per the following:

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: more than 70°C (158°F)

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"



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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *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.

- *2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 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.
- tected in two consecutive trips, the DTC and the 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.

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

Driving Pattern A

Refer to EC-158, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern B

Refer to EC-158, "DIAGNOSIS DESCRIPTION: Driving Pattern".

DIAGNOSIS DESCRIPTION: Driving Pattern

INFOID:0000000007462617

CAUTION:

Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A.

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 120 km/h (44 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 60 km/h (19 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- A lapse of 22 minutes or more after engine start.

NOTE:

- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ±375 rpm

< SYSTEM DESCRIPTION >

[VQ37VHR]

Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%] Engine coolant temperature condition:

- When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE:

- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DRIVING PATTERN D (EXCEPT FOR MEXICO)

Driving pattern D means a trip satisfying the following conditions.

- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

DIAGNOSIS DESCRIPTION: System Readiness Test (SRT) Code

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/ISO 15031-5.

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:

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 permanent DTC is stored or 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"), DTC (No DTCs) and permanent DTC (NO permanent DTCs) before the inspection.

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.

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				Example		
Self-diagn	osis result	Diagnosis	\leftarrow ON \rightarrow		on cycle \rightarrow OFF \leftarrow ON \rightarrow OFF	\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	OK	_	_
		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.

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. → Case 2 above

If one or more SRT related self-diagnoses show NG results in 2 consecutive cycles, the SRT will also indicate "CMPLT". → 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.
- During SRT driving pattern, the 1st trip DTC (NG) is detected prior to "CMPLT" of SRT and the self-diagnosis
 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".

DIAGNOSIS DESCRIPTION: Malfunction Indicator Lamp (MIL)

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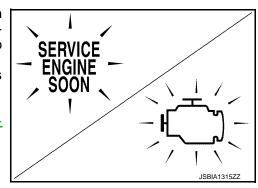
When emission-related ECU detects a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions), it turns on/blinks MIL to inform the driver that a malfunction has been detected.

 The MIL illuminates when ignition switch is turned ON (engine is not running).

NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to <u>EC-545</u>, "Component Function Check".

When the engine is started, the MIL should go off. NOTE:



^{-:} Self-diagnosis is not carried out.

< SYSTEM DESCRIPTION >

[VQ37VHR]

If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

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On Board Diagnosis Function

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC-35 , "ACCELER-ATOR PEDAL RELEASED POSITION LEARNING: Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Description".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-36, "IDLE AIR VOLUME LEARNING : Description".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-39, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Description".

BULB CHECK MODE

Description

This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).

Operation Procedure

- 1. Turn ignition switch ON.
- The MIL on the instrument panel should stay ON.
 If it remains OFF, check MIL circuit. Refer to <u>EC-545</u>, "<u>Diagnosis Procedure</u>".

SRT STATUS MODE

Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to EC-159, "DIAGNOSIS DESCRIPTION: System Readiness Test (SRT) Code".

Operation Procedure

- 1. Turn ignition switch ON and wait 20 seconds.
- 2. SRT status is indicated as shown blow.
 - ECM continues to illuminate MIL if all SRT codes are set.

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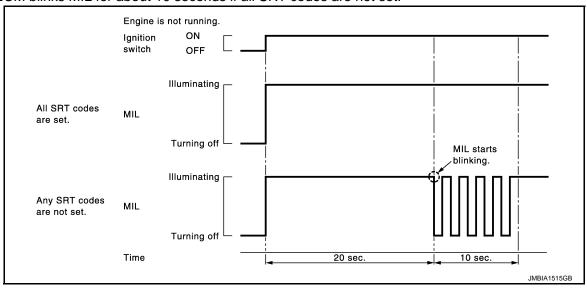
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ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

- 1. Turn ignition switch ON.
- Check that MIL illuminates.
 - If it remains OFF, check MIL circuit. Refer to EC-545, "Diagnosis Procedure".
- Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
 - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
 - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MIL is blinking.

How to Set Self-diagnostic Results 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.
- After ignition switch is turned off, ECM is always released from the "self-diagnostic results" mode.
- 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.

4. Fully release the accelerator pedal.

ECM has entered to "Self-diagnostic results" mode.

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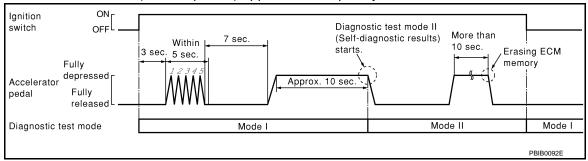
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NOTE:

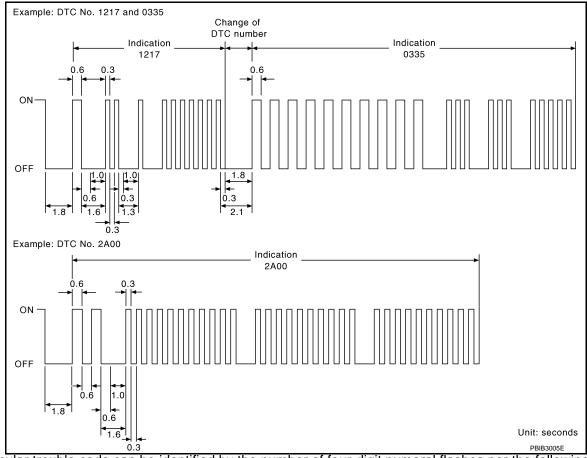
Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



How to Read Self-diagnostic Results

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 "malfunction warning" mode, 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 unidentified codes can be identified by using the CONSULT 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	Е	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.

< SYSTEM DESCRIPTION >

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to <u>EC-583</u>, "<u>DTC Index</u>".

How to Erase Self-diagnostic Results

By performing this procedure, ECM memory is erased and the following diagnostic information is erased as well.

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

NOTE:

Also, if a battery terminal is disconnected, ECM memory is erased and the diagnostic information as listed above is erased. (The amount of time required for erasing may vary from a few seconds to several hours.)

- 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. Turn ignition switch ON.
- 5. Set ECM in "self-diagnostic results" mode.
- 6. The diagnostic information has been erased from the backup memory in the ECM. Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
- 7. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT Function

INFOID:0000000007462621

[VQ37VHR1

FUNCTION

Diagnostic test mode	Function
Self-diagnostic result	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.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
ECU identification	ECM part number can be read.
DTC Work Support	The use of this mode enables quick and accurate performance of Confirmation Procedure.

^{*:} The following emission-related diagnostic information is 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

SELF-DIAG RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-583, "DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in "self-diag results".

- When ECM detects a 1st trip DTC, 1t" is displayed for "TIME".
- When ECM has detected a current DTC, "0" is displayed for "TIME".
- If "TIME" is neither "0" nor "1t", the DTC occurred in the past and ECM shows the number of times the vehicle has been driven since the last detection of the DTC.

How to Erase DTC and 1st Trip DTC

< SYSTEM DESCRIPTION > [VQ37VHR]

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-583</u>), skip step 1.
- Erase DTC in TCM. Refer to <u>TM-149</u>, "<u>Diagnosis Description</u>".
- Select "ENGINE" with CONSULT.
- 3. Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

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 EC-583, "DTC_Index".)
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 schedule.
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
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
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.
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
INT MANI PRES [kPa]	There items are displayed but are not applicable to this model
COMBUST CONDITION	These items are displayed but are not applicable to this model.

^{*:} The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

×: Applicable

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".

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Monitored item	Unit	Description	Remarks
A/F ALPHA-B1	%	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	 When the engine is stopped, a certain 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	
A/F SEN1 (B2)	·	of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	The signal voltage of the heated oxygen sen-	
HO2S2 (B2)	·	sor 2 is displayed.	
HO2S2 MNTR (B1)		Display of heated oxygen sensor 2 signal: PICLE respect to a require of any gar of the respect to the control of the respect to the control of the respect to the res	
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.
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	ACCEL SEN 2 signal is converted by
ACCEL SEN 2	V	voltage is displayed.	ECM internally. Thus, they differs from ECM terminal voltage signal.
TP SEN 1-B1		The throttle position copper signal voltage is	TP SEN 2-B1 signal is converted by
TP SEN 2-B1	V	The throttle position sensor signal voltage is displayed.	ECM internally. Thus, they differs 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*2	V	The signal voltage of EVAP control system pressure 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 posi- tion sensor signal.	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/ neutral 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.	

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
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 lighting 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.	
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 signals.	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.	
MASS AIRFLOW	g/s	Indicates the mass air flow computed by ECM according 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	
INT/V TIM (B2)		angle.	
INT/V SOL (B1) INT/V SOL (B2)	%	 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 TP SEN 2-B2	V	The throttle position sensor signal voltage is displayed.	TP SEN 2-B2 signal is converted by ECM internally. Thus, they differs from ECM terminal voltage signal.
AIR COND RLY	ON/OFF	The air conditioner relay control condition (de- termined by ECM according to the input sig- nals) 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* ²	ON/OFF	The control condition of the EVAP canister vent control valve (determined by ECM ac- cording 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)	0	Indicates [ON/OFF] condition of heated oxy-	
HO2S2 HTR (B2)	ON/OFF	gen sensor 2 heater determined by ECM according to the input signals.	
I/P PULLY SPD	rpm	Indicates the engine speed computed from the input speed sensor signal.	

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
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 Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
SNOW MODE SW	ON/OFF	Indicates [ON/OFF] condition from the snow mode switch signal.	
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by the signal voltage of the engine oil tempera- ture 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 val-	
A/F S1 HTR (B2)	%	ue 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.	
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/ ACCELERATE 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 DIS- TANCE 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 according 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		Indicates the correction of factor stored in	
A/F ADJ-B2	_	ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	

< SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
FAN DUTY	%	Indicates a command value for cooling fan. The value is calculated by ECM based on input signals.	
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 V36 models.	
BRAKE BST PRE SE	mv	Always a certain value is displayed.This item is not efficient for V36 models.	
VVEL SEN LEARN-B1	V	Indicates the VVEL learning value.	
VVEL SEN LEARN-B2 VVEL POSITION SEN-			
B1	V	The VVEL control shaft position sensor signal voltage is displayed.	
VVEL POSITION SEN- B2		voltage is displayed.	
VVEL TIM-B1	deg	Indicates [deg] of VVEL control shaft angle.	
VVEL TIM-B2	ueg		
VVEL LEARN	YET/DONE	Display the condition of VVEL learning YET: VVEL learning has not been performed yet. DONE: VVEL learning has already been performed successfully.	
EVAP LEAK DIAG* ²	YET/CMPLT	Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully.	
EVAP DIAG READY* ²	ON/OFF	Indicates the ready condition of EVAP leak diagnosis. ON: Diagnosis has been ready condition. OFF: Diagnosis has not been ready condition.	
THRTL STK CNT B1*1	-	-	
HO2 S2 DIAG1 (B1)	INCMP/CMPLT	Indicates DTC P0139 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG1 (B2)	INCMP/CMPLT	Indicates DTC P0159 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B1)	INCMP/CMPLT	Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B2)	INCMP/CMPLT	Indicates DTC P0159 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	

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Monitored item	Unit	Description	Remarks
A/F SEN1 DIAG2 (B1)* ¹	INCMP/CMPLT	Indicates DTC P014C or P014D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2 (B2)*1	INCMP/CMPLT	Indicates DTC P014E or P014F self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	

^{*1:} The item is indicated, but not used.

NOTE:

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

WORK SUPPORT MODE

Work Item

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* ²	Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. Ignition switch 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 will discontinue it and display appropriate instruction. NOTE: When starting engine, consult may display "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", 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" during 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 coefficient.	When clearing mixture ratio self-learning value
TARGET IDLE RPM ADJ*1	Idle condition	When setting target idle speed
TARGET IGN TIM ADJ*1	Idle condition	When adjusting target ignition timing
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position
VVEL POS SEN ADJ PREP	 Use this item only when replacing VVEL actuator sub assembly. Ignition on and engine stopped. 	When adjusting VVEL control shaft position sensor

^{*1:} This function is not necessary in the usual service procedure.

ACTIVE TEST MODE

Test Item

^{*2:} Except for Mexico

^{*2:} Except for Mexico

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TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)	А
VENT CONTROL/V	Ignition switch: ON (Engine stopped) Turn solenoid valve ON and OFF with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	Harness and connectors Solenoid valve	EC
ENG COOLANT TEMP	 Engine: Return to the original trouble condition Change the engine coolant temperature using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	Harness and connectors Engine coolant temperature sensor Fuel injector	С
FUEL INJECTION	 Engine: Return to the original trouble condition Change the amount of fuel injection using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	Harness and connectorsFuel injectorAir fuel ratio (A/F) sensor 1	D
FUEL/T TEMP SEN	Change the fuel tank temperature using CC	NSULT.		
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 CONSULT. 	Engine speed changes according to the opening percent.	Harness and connectors Solenoid valve	E F
FUEL PUMP RELAY	Ignition switch: ON (Engine stopped) Turn the fuel pump relay ON and OFF using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	Harness and connectors Fuel pump relay	G
IGNITION TIMING	 Engine: Return to the original trouble condition Timing light: Set Retard the ignition timing using CONSULT. 	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.	Н
FAN DUTY CONTROL*	Ignition switch: ON Change duty ratio using CONSULT.	Cooling fan speed changes.	 Harness and connectors Cooling fan motor Cooling fan relay Cooling fan control module IPDM E/R 	I
ALTERNATOR DUTY	Engine: Idle Change duty ratio using CONSULT.	Battery voltage changes.	Harness and connectors IPDM E/R Alternator	J
POWER BALANCE	 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. 	Engine runs rough or dies.	 Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil 	K L

^{*:} Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

DTC WORK SUPPORT MODE

Test mode	Test item	Corresponding DTC No.	Reference page
EVAPORATIVE SYSTEM*2	EVP SML LEAK P0442*1/P1442*1	_	_
	EVP V/S LEAK P0456/P1456*	P0456	EC-369
	PURG VOL CN/V P1444	P0443	EC-339
	PURG FLOW P0441	P0441	EC-334
A/F SEN1	A/F SEN1 (B1) P1278/P1279	P0133	EC-259
	A/F SEN1 (B1) P1276	P0130	EC-249
	A/F SEN1 (B2) P1288/P1289	P0153	EC-259
	A/F SEN1 (B2) P1286	P0150	EC-249

< SYSTEM DESCRIPTION >

Test mode	Test item	Corresponding DTC No.	Reference page
	HO2S2 (B1) P1146	P0138	EC-270
	HO2S2 (B1) P1147	P0137	EC-264
HO2S2	HO2S2 (B1) P0139	P0139	EC-278
110202	HO2S2 (B2) P1166	P0158	EC-270
	HO2S2 (B2) P1167	P0157	EC-264
	HO2S2 (B2) P0159	P0159	<u>EC-278</u>

^{*1:} DTC P0442, P1442 and P1456 does not apply to V36 models but appears in DTC Work Support Mode screens.

^{*2:} Except for Mexico

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description INFOID:0000000007462622

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" in "DATA MONI-TOR" mode of CONSULT 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 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 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-
- 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

INFOID:0000000007462623

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.

TESTING CONDITION

- 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)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Transmission: Warmed-up
- 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.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

>> GO TO 2.

2.PERFORM SPEC IN DATA MONITOR MODE

(P)With CONSULT

NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

- Perform EC-29, "BASIC INSPECTION: Special Repair Requirement".
- 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.
- 3. Make sure that monitor items are within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Go to EC-174, "Diagnosis Procedure".

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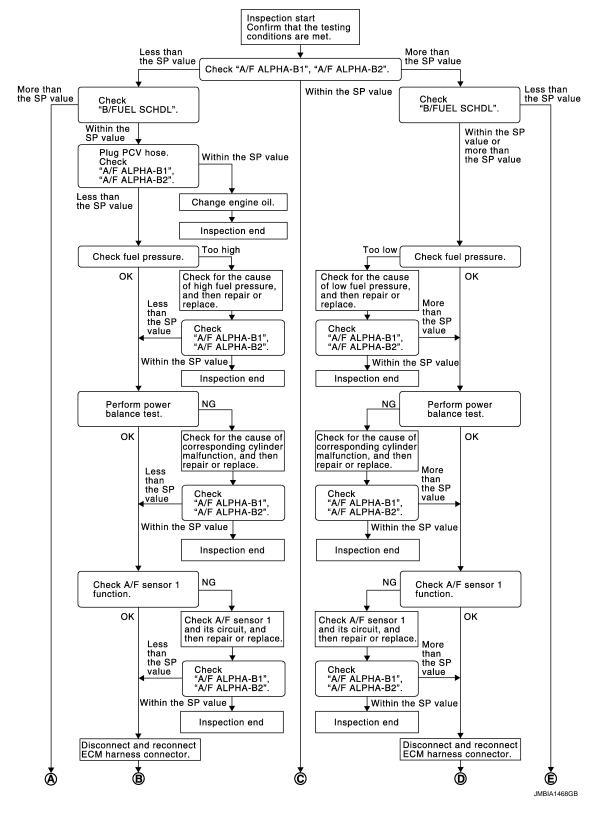
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[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462624

OVERALL SEQUENCE



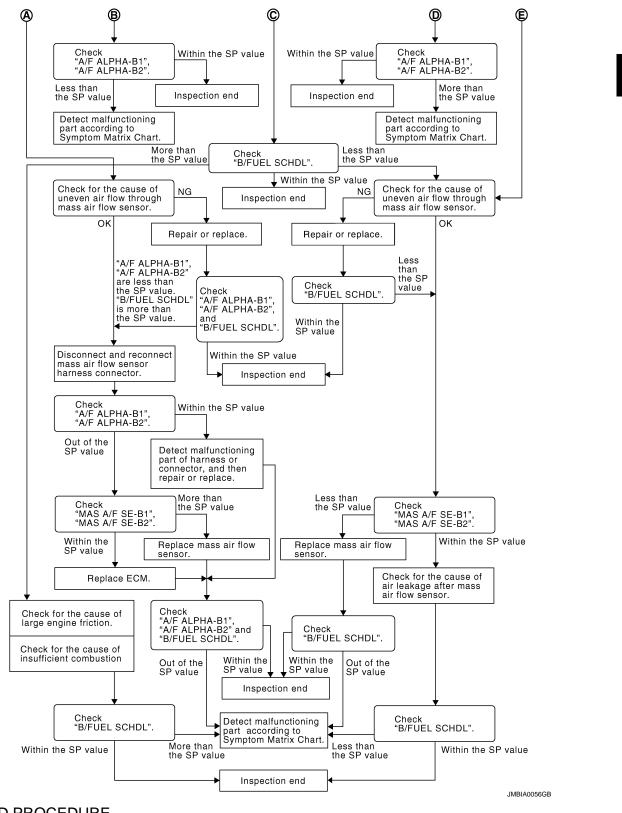
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DETAILED PROCEDURE

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

(I) With CONSULT

- Start engine.
- Confirm that the testing conditions are met. Refer to <u>EC-173, "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.
- 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-622, "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.

7. 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"

TROUBLE DIAGNOSIS - SPECIFICATION VALUE	
< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]	
 Start engine. 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? 	А
YES >> INSPECTION END NO >> GO TO 9.	EC
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?	D
YES >> GO TO 12. NO >> GO TO 10.	
10. DETECT MALFUNCTIONING PART	Е
 Check the following bellow. Ignition coil and its circuit (Refer to <u>EC-540, "Component Function Check".)</u> Fuel injector and its circuit (Refer to <u>EC-531, "Component Function Check".)</u> Intake air leakage 	F
Low compression pressure (Refer to <u>EM-168, "Inspection"</u> .)	
Is the inspection result normal?	G
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"	Н
 Start engine. 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. 	ı
Is the measurement value within the SP value?	
YES >> INSPECTION END NO >> GO TO 12.	J
12. CHECK A/F SENSOR 1 FUNCTION	
Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1. • For DTC P0130, P0150, refer to EC-249. "DTC Logic". • For DTC P0131, P0151, refer to EC-253, "DTC Logic". • For DTC P0132, P0152, refer to EC-256, "DTC Logic".	K
 For DTC P0132, P0132, refer to <u>EC-250. DTC Logic</u>". For DTC P0133, P0153, refer to <u>EC-515, "DTC Logic"</u>. For DTC P2A00, P2A03, refer to <u>EC-515, "DTC Logic"</u>. 	L
Are any DTCs detected?	
YES >> GO TO 13. NO >> GO TO 15.	M
13. CHECK A/F SENSOR 1 CIRCUIT	1.4
Perform Diagnosis Procedure according to corresponding DTC.	Ν

>> GO TO 14.

$14. {\sf CHECK~"A/F~ALPHA-B1"}, "{\sf A/F~ALPHA-B2"}$

- 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

>> GO TO 15. NO

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

Stop the engine.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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"

- 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 EC-610, "Symptom Table".

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. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

< DTC/CIRCUIT DIAGNOSIS >

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

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?

>> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-214, "Diagnosis Procedure". Then GO TO 29.

NO >> GO TO 23.

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 sure that each indication is within the SP value.

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 TO 29.

24.REPLACE ECM

Replace ECM.

2. Go to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> 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 is within the SP value.

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 sure that each indication is within the SP value.

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 TO 30.

28. CHECK INTAKE SYSTEM

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

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< DTC/CIRCUIT DIAGNOSIS >

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· Malfunctioning seal in intake air system, etc.

>> GO TO 30.

 $29.\mathsf{CHECK}$ "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 EC-610, "Symptom Table".

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 EC-610, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

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1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal	Glound	Continuity
F101	8		Existed
	123		
M107	124	Ground	
IVI I O 7	127		
	128		

3. Also check harness for short to power.

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F103, M116
- Harness for open or short between ECM and ground

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

4. CHECK ECM POWER SUPPLY CIRCUIT-I

- 1. Reconnect ECM harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

-	F	-	_	Voltage
Connector	Terminal	Connector	Terminal	
F102	53	M107	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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
		Terminal	
M107	125	128	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to 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.
- 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. Refer to PCS-31, "Exploded View".

8.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> 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.
- Disconnect IPDM E/R harness connector.
- Check the continuity between ECM harness connector and IPDM E/R harness connector.

E	СМ	IPDI	M E/R	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F101	24	E7	69	Existed

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRC	UIT DIAGNO	SIS >				[VQ37VHR]
4. Also che	ck harness foi	short to grou	nd and short	to power.		
	tion result nor	mal?				Α
_	GO TO 12. GO TO 11.					_
	T MALFUNCT	IONING DAD	r			EC
		IONING PAR	<u> </u>			
Check the followingHarness or	llowing. connectors E	40 F39				
 Harness or 	connectors F	104, F105 (2V				С
	connectors F			E/D		
• Harriess 10	r open or shor	t between EC	IVI AIIU IFDIVI	E/K		D
>> F	Repair open ci	rcuit. short to	around or sh	ort to power in	harness or connectors.	
12. CHECK	•		9.00	от то рошот пт		_
	ect 15 A fuse ((No. 50) from	IDDM E/D			E
2. Check 1		140. 30) 110111	II DIVI L/IX.			
Is the inspec	tion result nor	mal?				F
	GO TO 15.					
	Replace 15 A f					
13.CHECK	ECM POWER	R SUPPLY CI	RCUIT-VI			G
	ect ECM harne					
	ect IPDM E/R re continuity be			ector and IPD	M E/R harness connector.	Н
E	CM	IPDN	I E/R	Otimit		
Connector	Terminal	Connector	Terminal	- Continuity		I
M107	125	E7	49	Existed		
4. Also che	ck harness for	short to grou	nd and short	to power.		J
<u>-</u>	<u>tion result nor</u>	mal?				
	GO TO 15. GO TO 14.					K
4 4		IONING DAD	-			K
	T MALFUNCT	IONING PAR	I			
Check the fo	llowing. connectors E	106 M6				L
	r open or shor		M and IPDM	E/R		
	·					M
. —			-	ort to power in	harness or connectors.	IVI
15. check	INTERMITTE	NT INCIDEN	Т			
Refer to GI-4	3, "Intermitten	t Incident".				N
	tion result nor					
				ploded View".		
NO >> F	Repair open ci	rcuit, short to	ground or she	ort to power in	harness or connectors.	O
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POWER SUPPLY AND GROUND CIRCUIT (VVEL CONTROL MODULE)

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

POWER SUPPLY AND GROUND CIRCUIT (VVEL CONTROL MODULE)

Diagnosis Procedure

INFOID:0000000007462626

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK VVEL CONTROL MODULE GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect VVEL control module harness connector.
- 2. Check the continuity between VVEL control module harness connector and ground.

VVEL con	trol module	Ground	Continuity
Connector	Terminal	Glound	Continuity
E15	14	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK VVEL CONTROL MODULE POWER SUPPLY CIRCUIT-I

- 1. Reconnect VVEL control module harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between VVEL control module harness connector and ground.

VVI	EL control mo	dule		
Connector	+	_	Voltage	
Connector	Terminal Terminal			
E15	8	14	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0 V.	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. CHECK VVEL CONTROL MODULE POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Disconnect VVEL control module harness connector.
- 3. Disconnect IPDM E/R harness connector.
- 4. Check the continuity between VVEL control module harness connector and IPDM E/R harness connector.

VVEL con	VVEL control module		IPDM E/R	
Connector	Terminal	Connector	Terminal	Continuity
E15	8	E7	49	Existed

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

Is the inspection result normal?

YES >> EC-181, "Diagnosis Procedure"

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

5. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

POWER SUPPLY AND GROUND CIRCUIT (VVEL CONTROL MODULE)

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Exploded View".

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

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U0101 CAN COMM CIRCUIT

Description INFOID:000000007462627

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

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-186, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-17, "Trouble Diagnosis Flow Chart".

U0164 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

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U0164 CAN COMM CIRCUIT

Description INFOID:0000000007462630

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

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 communication signal of OBD (emission related diagnosis) 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 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-187, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-17, "Trouble Diagnosis Flow Chart".

U1001 CAN COMM CIRCUIT

Description INFOID:000000007462633

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

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 communication 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-188, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-17, "Trouble Diagnosis Flow Chart".

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

U1003 CAN COMM CIRCUIT

Description INFOID:0000000007462636

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 INFOID:0000000007462637

DTC DETECTION LOGIC

NOTE:

If DTC U1003 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607.

Refer to EC-406, "DTC Logic".

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

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

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

Is DTC detected?

YES >> Go to EC-189, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK VVEL CAN COMMUNICATION CIRCUIT

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

ECM		VVEL control module		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	54	E15	24	Existed
1 102	55	LIJ	11	LAISIEU

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

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.

Revision: 2013 February

EC-189

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U1003 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- Harness connector E40, F39
- Harness for open or short between ECM and VELL control module
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "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-33, "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 EC-189, "DTC Logic".
- Check DTC.

Is the DTC U1003 displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

U1024 CAN COMM CIRCUIT

Description INFOID:0000000007462639

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.

INFOID:000000007462640

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-406, "DTC Logic".

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DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1024	VVEL CAN communication	When VVEL control module cannot transmit/receive can communication signal from ECM. When detecting error during the initial diagnosis of CAN controller of VVEL control module.	Harness or connectors (CAN communication line is open or shorted) ECM VVEL control module

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-191, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462641

2012 G Sedan

1. CHECK VVEL CAN COMMUNICATION CIRCUIT

- 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 control module		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	54	E15	24	Existed
1 102	55	L13	11	LAISIEU

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Revision: 2013 February EC-191

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U1024 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Check the following.

- Harness connector E40, F39
- 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.

3. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "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-33, "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 EC-191, "DTC Logic".

Is the DTC U1024 displayed again?

YES >> GO TO 6.

NO >> INSPECTION END

6.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

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-210, "DTC Logic"</u>.
- If DTC P0011 or P0021 is displayed with DTC P0524, first perform the trouble diagnosis for DTC P0524. Refer to EC-391, "DTC Logic".

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011	Intake valve timing control performance (bank 1)		Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve control solenoid valve
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

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.
- 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.
- 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-194, "Diagnosis Procedure"

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

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< DTC/CIRCUIT DIAGNOSIS >

- Select "DATA MONITOR" mode with CONSULT.
- 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.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-194, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462643

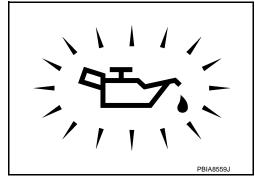
1. CHECK OIL PRESSURE WARNING LAMP

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

Is oil pressure warning lamp illuminated?

YES >> Go to LU-9, "Inspection".

NO >> GO TO 2.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-195, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-202, "Exploded View".

3.check crankshaft position sensor (pos)

Refer to EC-324, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS). Refer to EM-273, "Exploded View".

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-328, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-202, "Exploded View".

5. CHECK CAMSHAFT (INTAKE)

Check the following.

P0011, P0021 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

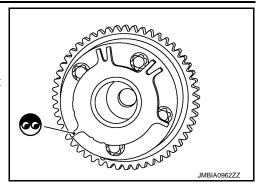
- Accumulation of debris on the signal plate of camshaft front end
- · Chipping signal plate of camshaft front end

Is the inspection result normal?

YES >> GO TO 6.

NO

>> Remove debris and clean the signal plate of camshaft front end or replace camshaft.



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?

>> Check timing chain installation. Refer to EM-203, "Removal and Installation".

NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to EM-256, "Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.
- 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. Refer to EM-202, "Exploded

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

Remove intake valve timing control solenoid valve.

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P0011, P0021 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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:

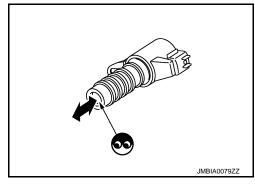
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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. Refer to EM-202, "Exploded View".

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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

Description INFOID:0000000007462645

SYSTEM DESCRIPTION

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

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:0000000007462646

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.
- Turn ignition switch ON.
- 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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

>> Go to EC-198, "Diagnosis Procedure". YES

>> INSPECTION END NG

EC-197 Revision: 2013 February 2012 G Sedan

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462647

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- 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	
ыс	Bank	Connector	Terminal	Giodila	voltage
P0031, P0032	1	F3	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.

${f 3.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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.
- Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

DTC	A/F sensor 1		ECM		Continuity	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0031, P0032	1	F3	3	F101	1	Existed
P0051, P0052	2	F20	3	1 101	5	LAISIEU

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-199, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-186, "Exploded View". CAUTION:

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 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).

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>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

>> Repair or replace.

Component Inspection

INFOID:0000000007462648

1. CHECK AIR FUEL RATIO (A/F) SENSOR 1

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Check resistance between A/F sensor 1 terminals as follows.

Terminal	Resistance (Ω)
3 and 4	1.8 - 2.44 [at 25°C (77°F)]
3 and 1, 2	∞
4 and 1, 2	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-186, "Exploded View".

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 Heated 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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P0037, P0038, P0057, P0058 HO2S2 HEATER

Description INFOID.000000007462649

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

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 sensor 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 sensor 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 sensor 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 sensor 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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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$\overline{2.}$ PERFORM DTC CONFIRMATION PROCEDURE

- 1. 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.
- 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.
- 7. Check 1st trip DTC.

Is 1st tip DTC detected?

YES >> Go to EC-201, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF.

Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- Turn ignition switch ON.
- Check the voltage between HO2S2 harness connector and ground.

DTC		HO2S2		Ground	Voltage	
ыс	Bank	Connector	Terminal	Ground	voltage	
P0037, P0038	1	F54	2	Ground	Battery voltage	
P0057, P0058	2	F53	2	Giodila	Battery voltage	

Is the inspection result normal?

YES >> GO TO 4.

>> GO TO 3. NO

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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.

f 4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2		E	Continuity		
ыс	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.

Is the inspection result normal?

EC-201

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P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

YES >> GO TO 5.

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

${f 5}$.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-202, "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. Refer to EX-5, "Exploded View".

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

.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462652

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

- 1. Turn ignition switch OFF.
- 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. Refer to <a>EX-5, "Exploded View".

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).

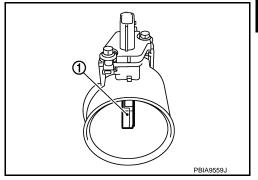
>> INSPECTION END

P006A, 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.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P006A, P0101 or P010B is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P006A	Manifold absolute pressure - mass air flow correlation	A difference exceeding the specified value develops between a value transmitted from the manifold absolute pressure (MAP) sensor to ECM and an estimated intake pressure of intake manifold calculated by ECM, based on a mass sir flow sensor signal.	Harness or connectors (The sensor circuit is open or shorted.) Mass air flow sensor Manifold absolute pressure (MAP) sensor EVAP control system pressure sensor Intake air leaks Intake air temperature sensor
P0101	Mass air flow sensor (bank 1) circuit range/ performance	A difference exceeding the specified value develops between a signal transmitted from the mass air flow	Mass air flow sensor (bank 1)
P010B	Mass air flow sensor (bank 2) circuit range/ performance	sensor (bank 1) to ECM and a signal transmitted from the mass air flow sensor (bank 2) to ECM.	Mass air flow sensor (bank 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.
- Turn ignition switch OFF and wait at least 10 seconds.

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

(P) With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Drive the vehicle under the following conditions.

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2012 G Sedan

< DTC/CIRCUIT DIAGNOSIS >

For A/T models

- Accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:

CAUTION:

Always drive at a safe speed.

NOTE:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

ACCEL SEN 1	1.4 – 2.0 V
Selector lever	D position

For M/T models

- Accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:

CAUTION:

Always drive at a safe speed.

NOTE:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

ACCEL SEN 1	1.4 – 2.0 V
Selector lever	3rd

4. Check 1st trip DTC.

Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Drive the vehicle under the following conditions.

For A/T models

With selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:

CAUTION:

Always drive at a safe speed.

NOTÉ:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

Accelerator peda	l position sensor 1	Ground	Voltage (V)	
Connector	Terminal	Ground	voltage (v)	
E112	3	Ground	1.4 – 2.0	

For M/T models

 With selector lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:

CAUTION:

Always drive at a safe speed.

NOTE:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

Accelerator peda	position sensor 1	Ground	Voltage (V)	
Connector	onnector Terminal		voltage (v)	
E112	3	Ground	1.4 – 2.0	

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-205, "Diagnosis Procedure".

NO >> INSPECTION END

P006A, P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462655

CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

Is the inspection result normal?

>> GO TO 2. YES

NO >> Reconnect the parts.

2.CHECK GROUND CONNECTION

Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT

- Disconnect mass air flow sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between mass air flow sensor harness connector and ground.

DTC	Mass air flow sensor			Ground	Voltage
Dio	Bank			Ground	voltage
P006A, P0101	1	F31	5	Ground	Battery
P006A, P010B	2	F42	5	Ground	voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. 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.

${f 5.}$ CHECK MASS AIR FLOW SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC	Mass air flow sensor		ECM		Continuity	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P006A, P0101	1	F31	4	F102	68	Existed
P006A, P010B	2	F42	4	F102	94	EXISTEC

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

Is the inspection result normal?

YES >> GO TO 6.

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

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6.CHECK MASS AIR FLOW SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

DTC		lass air flow s	ensor	ECM		Continuity	
DIO	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P006A, P0101	1	F31	3	F102	77	Existed	
P006A, P010B	2	F42	3	1 102	79	LAISIEU	

2. 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.

.CHECK MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

Check manifold absolute pressure (MAP) sensor. Refer to EC-222, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace manifold absolute pressure (MAP) sensor. Refer to EM-181, "Exploded View".

8. CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor. Refer to EC-229, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-179. "Exploded View".

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-357, "Component Inspection".

Is the inspection result normal?

YES-1 (Only DTC P006A is detected)>>GO TO 10.

YES-2 (DTC P006A and P0101 are detected)>>GO TO 11.

YES-3 (DTC P006A and P010B are detected)>>GO TO 12.

NO >> Replace EVAP control system pressure sensor. Refer to EM-181, "Exploded View".

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-215, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace mass air flow sensor (bank 1) and (bank 2). Refer to EM-179, "Exploded View".

11. CHECK MASS AIR FLOW SENSOR (BANK 1)

Check mass air flow sensor (bank 1). Refer to EC-215, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace mass air flow sensor (bank 1). Refer to EM-179, "Exploded View".

12. CHECK MASS AIR FLOW SENSOR (BANK 2)

Check mass air flow sensor (bank 2). Refer to EC-215, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace mass air flow sensor (bank 2). Refer to EM-179, "Exploded View".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

P006A, P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

>> INSPECTION END

Component Inspection

INFOID:0000000007462656

1. CHECK MASS AIR FLOW SENSOR-I

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(P)With CONSULT

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT 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.)				
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.

- Turn ignition switch OFF.
- 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	Terminal	
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77	68	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2
[MAF sensor (bank 1) signal]	(1) 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*
F 102			Ignition switch ON (Engine stopped.)	Approx. 0.4
	79		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2
signal]	[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.

<u>Is the inspection result normal?</u>

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.
- 2. 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 parts

Is the inspection result normal?

YES >> GO TO 4.

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NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

(I) With CONSULT

- Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 3. Connect CONSULT 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)
	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

- 1. Repair or replace malfunctioning part.
- Start engine and warm it up to normal operating temperature.
- 3. 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 operating 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*	
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4	
	79	79 [MAF sensor (bank 2) 94 signal]	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.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

(P)With CONSULT

- 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 and select "DATA MONITOR" mode.
- 5. Select "MAS A/F SE-B1" and "MAS A/F SE-B2", and check the indication.

P006A, P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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

- 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.

	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77	68	Idle (Engine is warmed-up to normal operating 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*
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4
	79		Idle (Engine is warmed-up to normal operating 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 >> Clean or replace malfunctioning mass air flow sensor. Refer to EM-179, "Exploded View".

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P0075, P0081 IVT CONTROL SOLENOID VALVE

Description INFOID:000000007462657

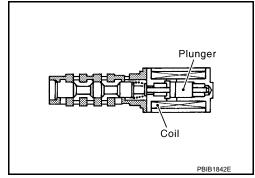
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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

INFOID:0000000007462658

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075	Intake valve timing control so- lenoid valve (bank 1) circuit	An improper voltage is sent to the ECM	Harness or connectors (Intake valve timing control solenoid)
P0081	Intake valve timing control so- lenoid valve (bank 2) circuit	through intake valve timing control solenoid valve.	valve circuit is open or shorted.) • Intake valve timing control solenoid valve

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.

>> GO TO 2.

2.perform dtc confirmation procedure

- 1. Start engine and let it idle for 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-210, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462659

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

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

DTC	IVT	control soleno	oid valve	Ground	Voltage
DIC	Bank	Connector	Terminal	Ground	
P0075	1	F28	2	Ground	Battery voltage
P0081	2	F29	2	Giodila	battery voltage

P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector.

DTC	IVT	control solen	oid valve	ECM		Continuity
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0075	1	F28	1	F101	18	Existed
P0081	2	F29	1	1 101	29	LAISIGU

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-211, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-202, "Exploded <a href="View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- Turn ignition switch OFF.
- 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. Refer to EM-202, "Exploded View".

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P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

2.check intake valve timing control solenoid valve-ii

- 1. Remove intake valve timing control solenoid valve.
- 2. 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:

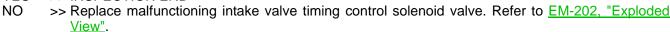
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

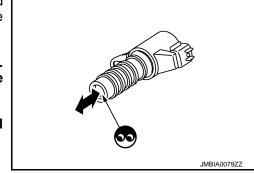
NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END



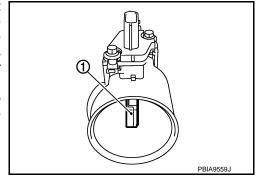


P0102, P0103, P010C, P010D MAF SENSOR

Description INFOID:0000000007462661

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.



DTC Logic INFOID:0000000007462662

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	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.

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

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

Is DTC detected?

YES >> Go to EC-214, "Diagnosis Procedure".

>> INSPECTION END NO

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

- Turn ignition switch ON and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

EC-213 Revision: 2013 February 2012 G Sedan

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P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

YES >> Go to EC-214, "Diagnosis Procedure".

NO >> GO TO 4.

f 4. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103 AND P010D-II

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

Is DTC detected?

YES >> Go to EC-214, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462663

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102, P010C>>GO TO 2.

P0103, P010D>>GO TO 3.

2.CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.

NO >> Reconnect the parts.

${f 3.}$ CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace ground connection.

4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect mass air flow (MAF) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between MAF sensor harness connector and ground.

DTC		MAF sens	or	Ground	Voltage	
ы	Bank	Connector	Terminal	Ground	voitage	
P0102, P0103	1	F31	5	Ground	Battery voltage	
P010C, P010D	2	F42	5	Giodila	Ballery Vollage	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 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.

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

$6.\mathsf{check}$ 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 senso	or	ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0102, P0103	1	F31	4	F102	68	Existed
P010C, P010D	2	F42	4	1 102	94	LXISIGU

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

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

DTC		MAF senso	or	ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0102, P0103	1	F31	3	F102	77	Existed
P010C, P010D	2	F42	3	F102	79	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

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

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-215, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning mass air flow sensor. Refer to EM-179, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK MASS AIR FLOW SENSOR-I

(P)With CONSULT

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

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INFOID:0000000007462664

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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	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4* ²

^{*1:} Except for Mexico

Without CONSULT

- Turn ignition switch OFF.
- 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 Terminal				
			Ignition switch ON (Engine stopped.)	Approx. 0.4		
	77		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2		
	[MAF sensor (bank 1) signal]	68	2,500 rpm (Engine is warmed-up to normal operating temperature.)*1	1.3 - 1.7		
F102			operating temperature.)*1 Idle to about 4,000 rpm 0.7 - 1.2 to Approx. 2.4*			
1 102	79		Ignition switch ON (Engine stopped.)	Approx. 0.4		
		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2			
	[MAF sensor (bank 2) signal] 94 2,500 rpm (Engine is warmed-up to norm operating temperature.)*1		2,500 rpm (Engine is warmed-up to normal operating temperature.)*1	1.3 - 1.7		
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4* ²		

^{*1:} Except for Mexico

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
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-II

(P)With CONSULT

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

^{*2:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

^{*2:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

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	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4* ²

^{*1:} Except for Mexico

⋈Without CONSULT

- Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- 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 operating temperature.)	0.7 - 1.2	
	[MAF sensor (bank 1) 68 signal]	68	2,500 rpm (Engine is warmed-up to normal operating temperature.)*1	1.3 - 1.7	
5 400			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4* ²	
F102	79 [MAF sensor (bank 2) 94 signal]		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	1.3 - 1.7		
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4* ²	

^{*1:} Except for Mexico

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR-III

(P)With CONSULT

- 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 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.) $^{\star 1}$	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4* ²

^{*1:} Except for Mexico

®Without CONSULT

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^{*2:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

^{*2:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

^{*2:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

P0102, P0103, P010C, P010D MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 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.

	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 operating temperature.)	0.7 - 1.2
			2,500 rpm (Engine is warmed-up to normal operating temperature.)*1	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4* ²
1 102	79 [MAF sensor (bank 2) 94 signal]		Ignition switch ON (Engine stopped.)	Approx. 0.4
			Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.2
		94	2,500 rpm (Engine is warmed-up to normal operating temperature.)*1	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4* ²

^{*1:} Except for Mexico

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace malfunctioning mass air flow sensor. Refer to EM-179, "Exploded View".

^{*2:} Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

< DTC/CIRCUIT DIAGNOSIS >

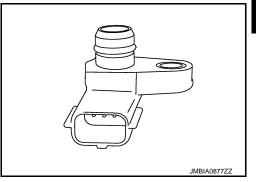
[VQ37VHR]

P0106 MANIFOLD ABSOLUTE PRESSURE SENSOR

Description INFOID:0000000007462665

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.



DTC Logic INFOID:0000000007462666

DTC DETECTION LOGIC

NOTE:

If DTC P0106 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0106	Manifold absolute pressure (MAP) circuit range/performance	A difference exceeding the specified value develops between a value transmitted from the manifold absolute pressure (MAP) sensor to ECM and an estimated intake pressure of intake manifold calculated by ECM.	Harness or connectors (The sensor circuit is open or shorted.) Manifold absolute pressure (MAP) sensor Intake 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.

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

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

(P) With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to normal operating temperature.
- Drive the vehicle under the following conditions.

For A/T models

Accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:

CAUTION:

Always drive at a safe speed.

NOTE:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

ACCEL SEN 1	1.4 – 2.0 V
Selector lever	D position

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

For M/T models

Accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:

CAUTION:

Always drive at a safe speed.

NOTE:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

ACCEL SEN 1	1.4 – 2.0 V
Selector lever	3rd

4. Check 1st trip DTC.

⋈ Without CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Drive the vehicle under the following conditions.

For A/T models

- With selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:

CAUTION:

Always drive at a safe speed.

NOTE:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

Accelerator peda	l position sensor 1	Ground	Voltage (V)
Connector Terminal		Cround	voltage (v)
E112 3		Ground	1.4 – 2.0

For M/T models

- With selector lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:

CAUTION:

Always drive at a safe speed.

NOTÉ:

- Accelerate with the accelerator pedal kept constant.
- The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.

Accelerator peda	l position sensor 1	Ground	Voltage (V)
Connector Terminal		Cround	voltage (v)
E112	E112 3		1.4 – 2.0

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-220, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

NFOID:000000000746266

1. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK GROUND CONNECTION

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< DTC/CIRCUIT DIAGNOSIS >

1	Turn	ignition	switch	OFF
	1 4111	IGHILIOH	SWILCII	O

2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK MAP SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect manifold absolute pressure (MAP) sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between MAP sensor harness connector and ground.

MAP	sensor	Ground	Voltage (V)	
Connector Terminal		Cround	voltage (v)	
F50	1	Ground	Approx. 5	

Is the inspection result normal?

>> GO TO 4. YES

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

f 4.CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

Turn ignition switch OFF.

- Disconnect ECM harness connector.
- Check the continuity between MAP sensor harness connector and ECM harness connector.

MAP sensor		ECM		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 5.

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

${f 5}.$ CHECK MAP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

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

Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 6.

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

6.CHECK MAP SENSOR

Refer to EC-222, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace MAP sensor. Refer to EM-181, "Exploded View".

.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Component Inspection

INFOID:0000000007462668

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.

ECM			
	+		_
Connector	Connector Terminal		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.

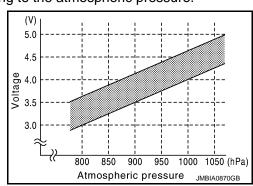
NOTE:

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

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. Refer to EM-181, "Exploded View".

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.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace MAP sensor. Refer to <u>EM-181</u>. "<u>Exploded View</u>".

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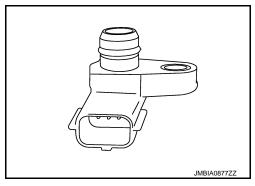
[VQ37VHR]

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

Description INFOID:00000000746266S

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.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-407, "DTC Logic".

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.
- 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.
- Check 1st rip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-224, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462671

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- 2. Turn ignition switch ON.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Check the voltage between MAP sensor harness connector and ground.

MAP sensor		Ground	Voltage (V)
Connector	Terminal	Ground	voitage (v)
F50	1	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.

3.check map sensor ground circuit for open and short

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

MAP sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F50	3	F102	96	Existed	

Also check harness for short to ground and power.

Is the inspection result normal?

YES >> GO TO 4.

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

f 4.CHECK MAP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

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

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-225, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace MAP sensor. Refer to EM-181, "Exploded View".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

>> INSPECTION END

Component Inspection 1.CHECK MAP SENSOR-I

Turn ignition switch OFF.

- 2. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
- Check the voltage between ECM harness connector terminals as follows.

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INFOID:0000000007462672

ECM			
	+		_
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.

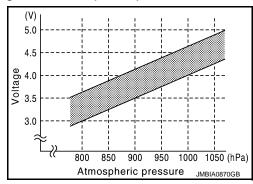
NOTE:

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

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. Refer to EM-181, "Exploded View".

2.CHECK MAP SENSOR-II

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

< 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. Refer to <u>EM-181, "Exploded View"</u>.

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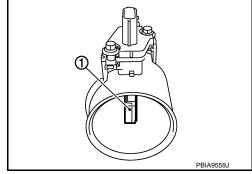
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P0112, P0113 IAT SENSOR

Description INFOID:000000007462673

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.

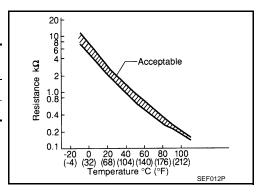
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the rise in temperature.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
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).



DTC Logic

INFOID:0000000007462674

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 shorted)	
P0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	(The sensor circuit is open or shorted 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-229, "Diagnosis Procedure".

NO >> INSPECTION END

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462675

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- Disconnect mass air flow (MAF) sensor (bank1) (intake air temperature sensor is built-into) harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between mass air flow sensor (bank 1) harness connector and ground.

MAF sensor (bank 1)		Ground	Voltage (V)
Connector	Connector Terminal		
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 short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between mass air flow sensor (bank 1) harness connector and ECM harness connector.

MAF sensor (bank 1)		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
F31	1	F102	68	Existed

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.

f 4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-229, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO

>> Replace mass air flow sensor (with intake air temperature sensor) (bank1). Refer to EM-179, "Exploded View".

CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462676

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect mass air flow sensor (bank 1) harness connector.
- Check resistance between mass air flow sensor (bank 1) terminals as follows.

EC-229

2012 G Sedan

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P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

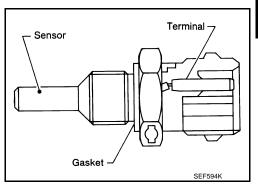
YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to EM-179, <a href="Exploded View".

P0116 ECT SENSOR

Description INFOID:0000000007462677

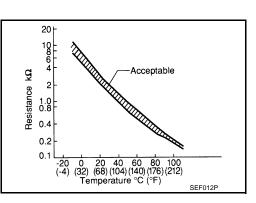
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-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

NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-234, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC [Engine coolant temperature (ECT) sensor circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the ECT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the ECT sensor circuit) ECT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-232, "Component Function Check".

NOTE:

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

Is the inspection result normal?

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< DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Proceed to EC-233, "Diagnosis Procedure".

3.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.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-233, "Diagnosis Procedure".

NO >> INSPECTION END

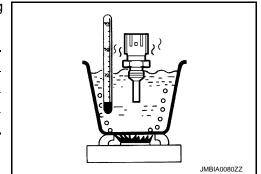
Component Function Check

INFOID:0000000007462679

1. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ECT sensor harness connector.
- 3. Remove ECT sensor. Refer to CO-32, "VQ37VHR: Exploded View"
- 4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (kΩ)
		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 >> GO TO 2.

NO >> Proceed to EC-233, "Diagnosis Procedure".

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-233, "Diagnosis Procedure".

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462680

1. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Check ECT sensor. Refer to EC-233, "Component Inspection".

Is the inspection result normal?

OK >> GO TO 2.

NG >> Replace ECT sensor. Refer to CO-32, "VQ37VHR: Exploded View".

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

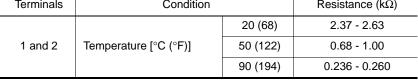
Component Inspection

INFOID:0000000007462681

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- Disconnect engine coolant temperature sensor harness connector. 2.
- Remove engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".
- Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

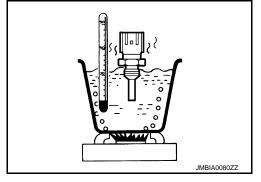
Terminals	Condition		Resistance (kΩ)
		20 (68)	2.37 - 2.63
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".



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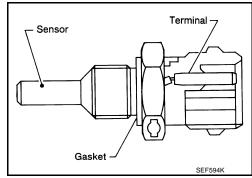
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INFOID:0000000007462683

P0117, P0118 ECT SENSOR

Description INFOID:000000007462682

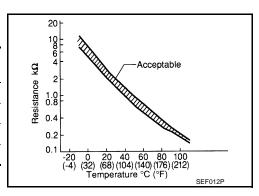
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-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

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause	
P0117	Engine coolant tem- perature sensor cir- cuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)	
P0118	Engine coolant tem- perature sensor cir- cuit 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 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.

>> 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-235, "Diagnosis Procedure".

NO >> INSPECTION END

Revision: 2013 February EC-234 2012 G Sedan

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462684

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

- Disconnect engine coolant temperature (ECT) sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between ECT sensor harness connector and ground.

ECT :	ECT sensor		Voltage (V)	
Connector	Terminal	Ground	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 F104, F105 (AWD models)
- Harness connectors F109, F110 (2WD models)
- Harness for open or short between ECT sensor harness connector and ECM

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

f 4.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT s	ECT sensor		ECM	
Connector	Terminal	Connector	Terminal	Continuity
F17	2	F102	84	Existed

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-236, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".

$\mathbf{6}$.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

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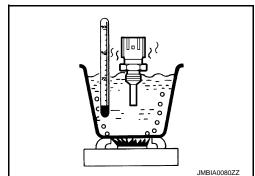
Component Inspection

INFOID:0000000007462685

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 (kΩ)
		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. Refer to CO-32, "VQ37VHR: Exploded View".

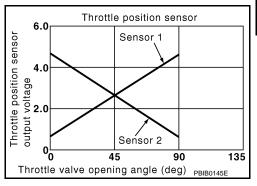
[VQ37VHR]

P0122, P0123, P0227, P0228 TP SENSOR

Description INFOID:0000000007462686

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.



DTC Logic INFOID:0000000007462687

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-407, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 (bank 1) circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	
P0123	Throttle position sensor 2 (bank 1) circuit high input	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 input	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 input	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.
- Turn ignition switch ON.
- 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

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

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>> Go to EC-238, "Diagnosis Procedure". YES

NO >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

Diagnosis Procedure

INFOID:0000000007462688

2012 G Sedan

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

- 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	Ground	Voltage (V)	
ыс	Bank	Connector	Terminal	Ground	voltage (v)
P0122, P0123	1	F6	6	Ground	Approx. 5
P0227, P0228	2	F27	1	Ground	дрийх. 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 2 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	Electric throttle control actuator			EC	CM	Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0122, P0123	1	F6	3	F101	40	Existed
P0227, P0228	2	F27	4	FIUI	48	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 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			ECM		Continuity
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0122, P0123	1	F6	5	F101	34	Existed
P0227, P0228	2	F27	3	1 101	35	LXISIEU

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-239, "Component Inspection".

P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.replace electric throttle control actuator

Replace malfunctioning electric throttle control actuator.

Go to EC-239, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK THROTTLE POSITION SENSOR

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- Perform EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- Turn ignition switch ON.
- Set selector lever to D (A/T) or 1st (M/T) position.
- Check the voltage between ECM harness connector terminals under the following conditions.

	ECM					
Connector	+	_	Condition Voltag		Voltage (V)	
Connector	Terminal	Terminal				
	30 [TP sensor 1 (bank 1)]	40		Fully released	More than 0.36	
	30 [TF Selisor T (Darik T)]	40		Fully depressed	Less than 4.75	
	31 [TP sensor 1 (bank 2)]	48	40		More than 0.36	
F101	31 [1F Selisor I (balik 2)]	-	, 40	Accelerator pedal	Fully depressed	Less than 4.75
FIUI	34 [TP sensor 2 (bank 1)]	40	Accelerator pedar	Fully released	Less than 4.75	
	34 [TF SellSOI 2 (Dalik 1)]	74 [11 Selisor 2 (Darik 1)]		Fully depressed	More than 0.36	
	35 [TP sensor 2 (bank 2)]	48		Fully released	Less than 4.75	
	35 [TF Selisor 2 (balik 2)]	40		Fully depressed	More than 0.36	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator.
- Go to EC-239, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

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EC-239

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P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

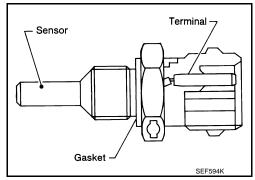
Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

P0125 ECT SENSOR

Description INFOID:000000007462691

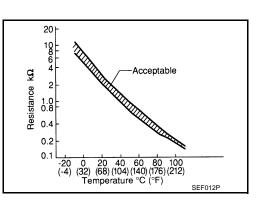
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-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

NOTE:

If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-234, "DTC Logic".

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.

- 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

Turn ignition switch ON.

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- 2. Select "DATA MONITOR" mode with CONSULT.
- 3. Check that "COOLAN TEMP/S" is above 10°C (50°F).

Is the temperature above 10°C (50°F)?

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P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

YES >> INSPECTION END

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. 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 because the test result will be OK.

CAUTION:

Be careful not to overheat engine.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-242, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462693

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-242, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".

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-28, "Removal and Installation".

4. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462694

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- Remove engine coolant temperature sensor.

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)	
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
		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. Refer to CO-32, "VQ37VHR: Exploded View".

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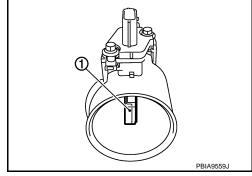
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P0127 IAT SENSOR

Description INFOID:000000007462695

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.

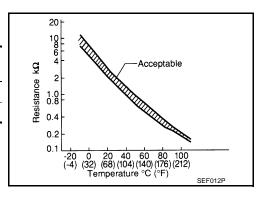
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
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).



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	

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.
- 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.
- 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.

P0127 IAT SENSOR [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > NOTE: Perform the following steps before engine coolant temperature is above 90°C (194°F). Α 2. Turn ignition switch ON. Select "DATA MONITOR" mode with CONSULT. Start engine. EC 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-245, "Diagnosis Procedure". >> INSPECTION END NO D Diagnosis Procedure INFOID:0000000007462697 Е 1. CHECK GROUND CONNECTION Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection". Is the inspection result normal?

NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-245, "Component Inspection".

Is the inspection result normal?

>> GO TO 2.

YES >> GO TO 3.

YES

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to EM-179. "Exploded View".

3.check intermittent incident

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor (bank 1) harness connector.
- 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

>> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to EM-179, NO "Exploded View".

EC-245 Revision: 2013 February 2012 G Sedan

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INFOID:0000000007462698

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[VQ37VHR]

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 EC-312.

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 engine has run long enough.	Thermostat Leakage from sealing portion of thermostat Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

NOTE:

Never refuel before and during the following 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.

>> GO TO 2.

2.PRECONDITIONING-II

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Check the following conditions:

Ambient temperature	-10°C (14°F) or more
A/C switch	OFF
Blower fan switch	OFF

- 3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Check the following conditions:

COOLAN TEMP/S	-10°C - 52°C (14 - 126°F)
---------------	---------------------------

Is the condition satisfied?

YES >> GO TO 3.

NO >> 1. Satisfy the condition.

2. GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

(I) With CONSULT

- Start engine.
- 2. Drive the vehicle until the following condition is satisfied.

CAUTION:

Always drive vehicle at safe speed.

STEP 1

Drive the vehicle under the conditions instructed below until the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" becomes at least 25°C (45°F).

P0128 THERMOSTAT FUNCTION

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[VQ37VHR]

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YES >> GO TO 2. NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR : Exploded View". CHECK THERMOSTAT Check thermostat. Refer to CO-29, "Inspection". In the inspection result normal? YES >> INSPECTION END NO >> Replace thermostat. Refer to CO-28, "Exploded View". Component Inspection INFOID:000000007462701 CHECK ENGINE COOLANT TEMPERATURE SENSOR			
Check thermostat. Refer to CO-29. "Inspection". In the inspection result normal? YES >> INSPECTION END NO >> Replace thermostat. Refer to CO-28. "Exploded View". Component Inspection INFOID:00000007462701 CHECK ENGINE COOLANT TEMPERATURE SENSOR			
Check thermostat. Refer to CO-29, "Inspection". In the inspection result normal? YES >> INSPECTION END NO >> Replace thermostat. Refer to CO-28, "Exploded View". Component Inspection INFOID:000000007462701 CHECK ENGINE COOLANT TEMPERATURE SENSOR		plant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".	
s the inspection result normal? YES >> INSPECTION END NO >> Replace thermostat. Refer to CO-28, "Exploded View". Component Inspection CHECK ENGINE COOLANT TEMPERATURE SENSOR	2.CHECK THERMOSTAT		
YES >> INSPECTION END NO >> Replace thermostat. Refer to CO-28, "Exploded View". Component Inspection CHECK ENGINE COOLANT TEMPERATURE SENSOR	Check thermostat. Refer to CO-	29, "Inspection".	
NO >> Replace thermostat. Refer to CO-28, "Exploded View". Component Inspection INFOID:00000007462701 CHECK ENGINE COOLANT TEMPERATURE SENSOR	s the inspection result normal?		
Component Inspection CHECK ENGINE COOLANT TEMPERATURE SENSOR		D (, 00 00 5	
.CHECK ENGINE COOLANT TEMPERATURE SENSOR	NO >> Replace thermostat	. Refer to CO-28, "Exploded View".	
	Component Inspection	INFOID:000000)007462701
Turn ignition switch OFF	1.CHECK ENGINE COOLANT	TEMPERATURE SENSOR	
· · · · · · · · · · · · · · · · · · ·	1. Turn ignition switch OFF.		

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2. Disconnect engine coolant temperature sensor harness connector.

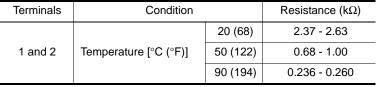
P0128 THERMOSTAT FUNCTION

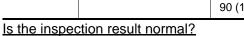
< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

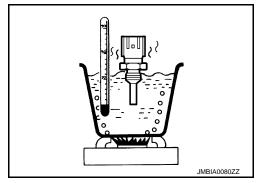
- Remove engine coolant temperature sensor.
- Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance ($k\Omega$)	
		20 (68)	2.37 - 2.63
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260





YES >> INSPECTION END NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".



[VQ37VHR]

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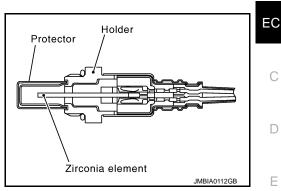
P0130, P0150 A/F SENSOR 1

Description INFOID:0000000007462702

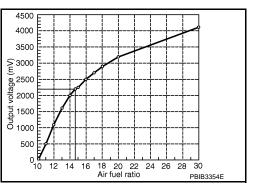
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 INFOID:0000000007462703

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
P0130	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.	
	(bank 1) circuit	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
	(bank 2) circuit	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	

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.
- Turn ignition switch ON.
- 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 for malfunction a

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let engine idle for 2 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-251, "Diagnosis Procedure".

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 7.

3.CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

- 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.
- 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-251, "Diagnosis Procedure".

f 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.
- 2. Touch "START".
- 3. When the following conditions are met, "TESTING" will be displayed on the CONSULT 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 screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 3.

${f 5}$ 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 screen?

OK >> INSPECTION END

NG >> Go to EC-251, "Diagnosis Procedure".

7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-251, "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

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS >

YES >> INSPECTION END

NO >> Go to EC-251, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007462704

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1. PERFORM COMPONENT FUNCTION CHECK

- Start engine and warm it up to normal operating temperature.
- Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
- Shift the selector lever to D position (A/T) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

Never apply brake when releasing the accelerator pedal.

- Repeat steps 2 and 3 for five times.
- Stop the vehicle and turn ignition switch OFF.
- Turn ignition switch ON.
- 7. Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine.
- Repeat steps 2 and 3 for five times.
- 10. Stop the vehicle and connect GST to the vehicle.
- 11. Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-251, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462705

1.check ground connection

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal	Oround	voltage
P0130	1	F3	4	Ground	Battery voltage
P0150	2	F20	4	Glound	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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.

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${f 4.}$ 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	
	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0130	1	F30	1		57	Existed
			2	F102	61	
P0150	2 F20		1	F102	65	EXISTED
		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
	Bank	Connector	Terminal	Giodila	Continuity
P0130	1	F3	1	Ground	Not existed
			2		
P0150	2	F20	1		
			2		

DTC	ECM			Ground	Continuity
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0130	1	- F102	57	Ground	Not existed
			61		
P0150	2		65		
			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.

CHECK INTERMITTENT INCIDENT

Perform GI-43, "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

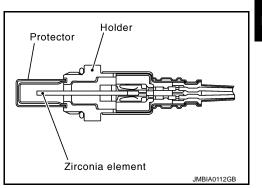
P0131, P0151 A/F SENSOR 1

Description

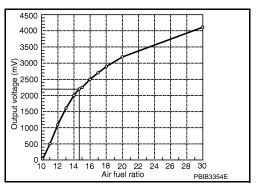
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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
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

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.
- 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.
- Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Is the indication constantly approx. 0 V?

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P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

YES >> Go to EC-254, "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.
- 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
- 7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-254, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462708

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage	
	Bank	Connector	Terminal	Glound	voltage	
P0130	1	F3	4	Ground	Battery voltage	
P0150	2	F20	4	Glound	ballery vollage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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 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	
	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0130	1	F3	1	F102	57	Existed
			2		61	
P0150 2		2 F20	1	1 102	65	LXISIGU
P0150	2 F20	Γ20	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	Ground	Not existed
P0130	ı	13	2		
P0150	2	F20	1		
F 0 150	2		2		

DTC	ECM			Ground	Continuity
DIC	Bank Connector Terminal		Giodila		
P0130	1	F102	57		Not existed
P0130	'		61	Ground	
P0150	2		65		
P0150			66		

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-43, "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

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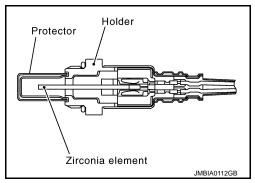
P0132, P0152 A/F SENSOR 1

Description INFOID:000000007462709

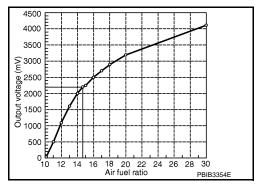
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 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.
- 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

- Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Is the indication constantly approx. 5 V?

P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

YES >> Go to EC-257, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure

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.
- 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.

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
- 7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-257, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal	Giodila	voltage
P0130	1	F3	4	Ground	Battery voltage
P0150	2	F20	4	Glound	Dattery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- IPDM E/R harness connector E7
- 15 A fuse (No. 46)
- Harness for open or short between A/F sensor 1 and fuse

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>> 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	Existed	
P0130	'		2	F102	61		
P0150	2	F20	1	1 102	65		
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	Ground	Continuity	
DIC	Bank Connector		Terminal		Giodila
P0130	1	F3	1		Not existed
F0130	'	13	2	Ground	
P0150	2	F20	1		
F0100	2 F20		2		

DTC	ECM			Ground	Continuity
DIC	Bank			Giodila	Continuity
P0130	1	F102	57	Ground	Not existed
P0130	'		61		
P0150	2		65		
			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-43, "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

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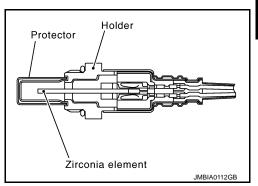
P0133, P0153 A/F SENSOR 1

Description INFOID:000000007462712

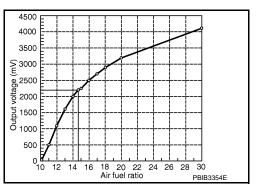
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 response		Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
P0153	Air fuel ratio (A/F) sensor 1 (bank 2) circuit slow response	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

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.

Do you have CONSULT?

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< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 2. NO >> GO TO 5.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- Start engine and warm it up to normal operating temperature.
- 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.
- 8. Touch "START".

Is "COMPLETED" displayed on CONSULT screen?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-261, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. After perform the following procedure, "TESTING" will be displayed on the CONSULT 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-173, "Component Function Check".

- Wait for about 20 seconds at idle under the condition that "TESTING" is displayed on the CONSULT screen.
- Make sure that "TESTING" changes to "COMPLETED".
 - If "TESTING" changed to "OUT OF CONDITION", go to EC-173, "Component Function Check".
- 4. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-261, "Diagnosis Procedure".

5. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

- 1. Start engine and warm it up to normal operating temperature.
- Select Service \$01 with GST.
- Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.

Is the total percentage within $\pm 15\%$?

YES >> GO TO 7. NO >> GO TO 6.

O. 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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

>> Repair or replace malfunctioning part.

7 Perform DTC Confirmation procedure

- 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.
- 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.
- 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.

Is 1st trip DTC detected?

YES >> Go to EC-261, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

INFOID:0000000007462714

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

>> GO TO 2. YFS

NO >> Repair or replace ground connection.

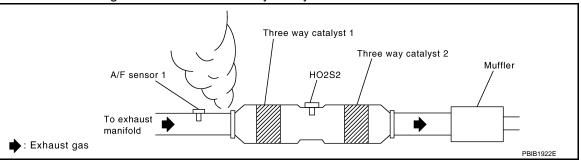
2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-186, "Removal and Installation".

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

Start engine and run it at idle. Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 5.

${f 5.}$ CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-39, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

EC-261

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?

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P0133, P0153 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-287, "DTC Logic"</u> or <u>EC-291, "DTC Logic"</u>.

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 sensor	r 1	Ground	Voltage	
ыс	Bank	Connector	Terminal	Glodila	voitage	
P0133	1	F3	4	Ground	Battery voltage	
P0153	2	F20	4	Ground		

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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.

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	'	13	2	F102	61	Existed	
P0153	2	F20	1	1 102	65	LXISIEU	
	2		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	Ground	Continuity		
DIC	Bank	Connector	Terminal	Giodila	Continuity	
P0133	1	F3	1			
F0133	'	13	2	Ground	Not existed	
P0153	2	E20	1	Giodila	INOL EXISTED	
FU103	2 F20		2			

		ECM				А
DTC	Bank	Connector	Terminal	Ground	Continuity	
			57			50
P0133	1		61	Out of Notes into 1		EC
D0450		F102	65	Ground	Not existed	
P0153	2		66			C
5. Also c	heck h	arness for	short to p	ower.		
Is the insp			nal?			D
	> GO 1		quit chart	to ground	or chart to	power in harness or connectors.
9.CHECK	•	-		•		ower in namess or connectors.
					HEATER	E
Refer to E		•	•	tion".		
	> GO 7		<u> 141 :</u>			F
	> GO 7					
10.che	CK MA	SS AIR FL	OW SEN	SOR		
Check bot					ank 2).	G
Refer to E		•	· ·	tion".		
Is the insp	ection > GO 1		nal?			Н
_		-	nctioning n	nass air flo	w sensor. F	efer to EM-179, "Exploded View".
11. CHE			J			
Refer to E			ent Inspec	tion".		
Is the insp			-			
	> <u>G</u> O 1			_		J
	-	air or replac				
12.CHE						K
Perform <u>G</u>						
Is the insp			nal?			
		air or replac	ce.			L
13. REPL	•	•		F) SENSO	R 1	
Replace m						M
CAUTION	:	· ·	,	,		
					ropped from a new one.	m a height of more than 0.5 m (19.7 in) onto a $^{ m N}$
 Before Cleaner 	installi [comi	ing new <i>l</i> mercial se	A/F sense ervice too	or, clean	exhaust s	vstem threads using Oxygen Sensor Thread (3897-12)] and approved Anti-seize Lubricant
(comme	rcial s	ervice too	1).			0
	< INIQE	ECTION E	ND			
	/ II NOF	LOTION	-140			P
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P0137, P0157 HO2S2

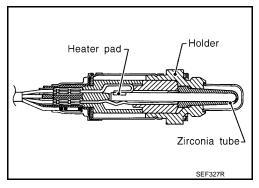
Description INFOID.000000007462715

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.

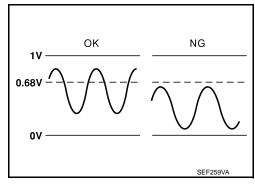


DTC Logic

INFOID:000000007462716

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 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 voltage	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 voltage	reach the specified voltage.	Fuel pressureFuel injectorIntake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 5.

2. PRECONDITIONING

If DTC confirmation Procedure has been previously conducted, always perform the following 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.

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

>> GO TO 3.

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

3.perform dtc confirmation procedure

(I) With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- 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).

- 9. Open engine hood.
- 10. Select "HO2S2 (B1) P1147" (for DTC P0137) or "HO2S2 (B2) P1167" (for DTC P0157) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- 11. Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-266, "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).
- Perform DTC confirmation procedure again.

>> GO TO 3.

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-265, "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-266, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

®Without CONSULT

- 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			
P0137	F102	76 Revving up to 4,000 rpm under no load		Revving up to 4,000 rpm under no load at	The voltage should be above 0.68 V at	
P0157	1 102	80	04	least 10 times	least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

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Revision: 2013 February EC-265 2012 G Sedan

< 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	Connector	+	_	Condition	Voltage	
	Connector	Terminal	Terminal			
P0137	F102	76 F102 84 Keep		Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at	
P0157			04	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 Connect	Connector	+ –		Condition	Voltage		
	Connector	Terminal	Terminal				
P0137	F102	76		F102 84 Coasting from 80 kill/if (50 MFH) if D F		Coasting from 80 km/h (50 MPH) in D po-	The voltage should be above 0.68 V at
P0157			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 EC-266, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007462718

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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 EC-39, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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 EC-287, "DTC Logic".

NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0137	1	F54	1	F102	84	Existed
P0157	2	F53	F53 1		04	Existed

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 HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	HO2S2			ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0137	1	F54	4	F102	76	Existed
P0157	2	F53	4		80	Existed

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity	
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0137	1	F54	4	Ground	Not existed
P0157	2	F53	4	Giodila	Not existed

DTC		ECM	Ground	Continuity	
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0137	1	F102	76	Ground	Not existed
P0157	2	1102	80	Giodila	

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.

${f 5.}$ CHECK HEATED OXYGEN SENSOR 2

Refer to EC-268, "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

7.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

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Component Inspection

INFOID:0000000007462719

1. INSPECTION START

Do you have CONSULT?

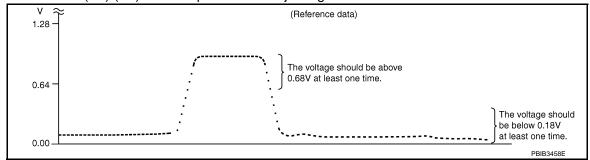
Do you have CONSULT?

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

2.CHECK HEATED OXYGEN SENSOR 2

(I) With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- 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

- 1. Start engine and warm it up to the normal operating temperature.
- 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.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

	ECM				
Connector -	+ -		Condition	Voltage	
	Terminal	Terminal			
E102	76 [HO2S2 (bank 1)]	9.4	Revving up to 4,000 rpm under no load at	The voltage should be above 0.68 V at least once during this procedure.	
F102 -	80 [HO2S2 (bank 2)]	84	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

	ECM				
Connector	+ -		Condition	Voltage	
	Terminal	Terminal			
F102 -	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.	
	80 [HO2S2 (bank 2)]		Keeping engine at idle for 10 minutes	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 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

ECM					
Connector -	+ -		Condition	Voltage	
	Terminal	Terminal			
F102 -	76 [HO2S2 (bank 1)]	84	Coasting from 80 km/h (50 MPH) in D po-	The voltage should be above 0.68 V at least once during this procedure.	
	80 [HO2S2 (bank 2)]		sition (A/T), 4th gear position (M/T)	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 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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P0138, P0158 HO2S2

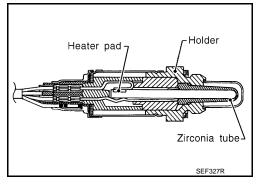
Description INFOID:000000007462720

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

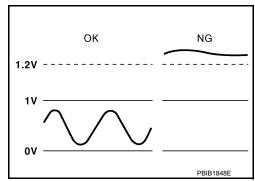
INFOID:0000000007462721

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.

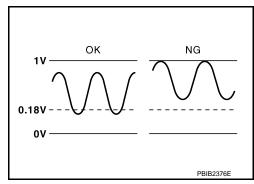
MALFUNCTION A

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 voltage	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

< DTC/CIR	CUIT DIAGNOSIS >			[VQ37VHR]
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
P0158	(bank 2) circuit high voltage	В)	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
	FIRMATION PROCI	EDU	RE	
	NDITIONING			
pefore cond L. Turn ig 2. Turn ig	nfirmation Procedure ducting the next test. nition switch OFF and nition switch ON. nition switch OFF and	l wait		s perform the following procedure
_	GO TO 2.			
∠.PERFOI	RM DTC CONFIRMAT	ΓΙΟN	PROCEDURE FOR MALFUNCTION	N A
 Turn ig Turn ig Turn ig Start er Let eng 	nition switch OFF and nition switch ON. nition switch OFF and	l wait I wait gine		n for at least 1 minute under no load.
s 1st trip D	TC detected?			
NO-1 >>	 Go to <u>EC-273, "Diag</u> With CONSULT: GO Without CONSULT: (TO 3	3.	
3.PERFO	RM DTC CONFIRMAT	ΓΙΟΝ	PROCEDURE FOR MALFUNCTION	N B
I. Select 2. Start er 3. Turn ig 4. Turn ig 5. Turn ig 6. Start er 7. Let eng 8. Make s	"DATA MONITOR" mongine and warm it up to nition switch OFF and nition switch ON. nition switch OFF and nition switch OFF and nition and keep the engine idle for 1 minute.	ode vote the state of the state	e normal operating temperature. t at least 10 seconds.	n for at least 1 minute under no load.
Open 6 Op	engine hood. "HO2S2 (B1) P1146" WORK SUPPORT" mongine and follow the interest at most 10 minute.	(for ode w nstrud s unt	DTC P0138) or "HO2S2 (B2) P116	,
Which is di	"SELF-DIAG RESULT splayed on CONSULT INSPECTION END Go to <u>EC-273, "Diag</u>	scre		
	BE DIAGNOSED>>0			U.S. A.GAIN

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

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2. Perform DTC confirmation procedure again.

>> GO TO 3.

${f 5.}$ PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-272, "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-273, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007462722

1.PERFORM COMPONENT FUNCTION CHECK-I

♥Without CONSULT

- 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.

DTC Conn	ECM					
	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 least once during this procedure.	
P0158		80	04	least 10 times		

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	DTC Connector	+	_	Condition	Voltage	
		Terminal	Terminal			
P0138	F102	76 84	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at		
P0158	1 102	80	04	Reeping engine at lule for 10 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.	

P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-273, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007462723

1. INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-270, "DTC Logic".

Which malfunction is detected?

Α >> GO TO 2

В >> GO TO 9.

2.CHECK GROUND CONNECTION

Turn ignition switch OFF.

Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	1	F102	84	Existed
P0158	2	F53	1	1 102	F1U2 04	

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

Is the inspection result normal?

>> GO TO 4. YES

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	Continuity	
	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	4	F102	76	Existed
P0158	2	F53	4	1 102	80	LAISIEU

Check the continuity between HO2S2 harness connector ground, or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity	
DIC	Bank	Connector	Terminal	Ground	Continuity
P0138	1	F54	4	Ground	Not existed
P0158	2	F53	4	Giodila	Not existed

DTC		ECM		Ground	Continuity
DIC	Bank	Connector	Terminal	Glound	Continuity
P0138	1	F102	76	Ground	Not existed
P0158	2	1 102	80	Giodila	Not existed

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< DTC/CIRCUIT DIAGNOSIS >

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.

$\mathbf{5}.$ 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-276, "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-43, "Intermittent Incident".

>> INSPECTION END

9. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Clear the mixture ratio self-learning value. Refer to <u>EC-39</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: Special Repair Requirement".
- 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 <u>EC-291, "DTC Logic"</u>.

NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.
- 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
P0138	1	F54	1	F102	8/1	Existed
P0158	2	F53	1	F102	84	LAISIEU

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

Is the inspection result normal?

>> GO TO 12.

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

12. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	HO2S2			EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	4	F102	76	Existed
P0158	2	F53	4	F102	80	Existed

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC		HO2S2		Ground	Continuity
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0138	1	F54	4	Ground	Not existed
P0158	2	F53	4	- Ground	NOI EXISIEU

DTC		ECM		Ground	Continuity
DIC	Bank	Connector	Terminal	Giodila	
P0138	1	F102	76	Ground	Not existed
P0158	2	F102	80	Ground	NOI EXISTED

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

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

13. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-276, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

14. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2.

- 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

15. CHECK INTERMITTENT INCIDENT

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Refer to GI-43, "Intermittent Incident"

>> INSPECTION END

Component Inspection

INFOID:0000000007462724

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

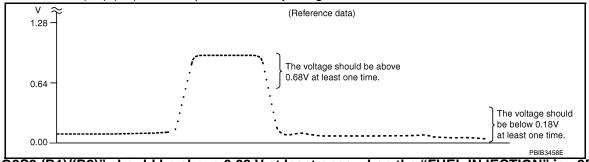
YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

(I) With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.
- 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

- 1. Start engine and warm it up to the normal operating temperature.
- 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.
- 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.
F102 80 [HO25	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?

< DTC/CIRCUIT DIAGNOSIS >

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NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

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	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.	
F102 (H	80 [HO2S2 (bank 2)]	04		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 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

	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.	I
F 102	80 [HO2S2 (bank 2)]	04	tion (A/T), 4th gear position (M/T)	The voltage should be below 0.18 V at least once during this procedure.	J

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

O.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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P0139, P0159 HO2S2

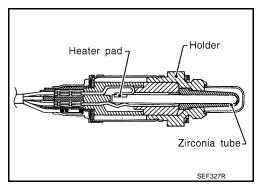
Description INFOID:000000007462725

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 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

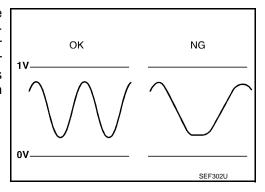


DTC Logic

INFOID:0000000007462726

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 response	The switching time between rich and lean	Harness or connectors (The sensor circuit is open or shorted)
P0159	Heated oxygen sensor 2 (bank 2) circuit slow response	of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.	 Heated oxygen sensor 2 Fuel system EVAP system Intake air system

DTC CONFIRMATION PROCEDURE (EXCEPT FOR MEXICO)

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3.perform dtc confirmation procedure

(P)With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- 7. Let engine idle for 1 minute.
- 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- 9. Drive the vehicle in a proper gear at 60 km/h (38MPH) and maintain the speed.

CAUTION:

Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.

CAUTION:

- Enable the engine brake.
- · Always drive carefully.
- Never apply brake when releasing the accelerator pedal.
- 11. Repeat step 9 and 10 at least 8 times.
- 12. Check the following item of "DATA MONITOR".

DTC	Data monitor item	Status
P0139	HO2 S2 DIAG1 (B1)	
F0139	HO2 S2 DIAG2 (B1)	CMPLT
P0159	HO2 S2 DIAG1 (B2)	CIVIFLI
F0159	HO2 S2 DIAG2 (B2)	

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 6.

NO-1: "CMPLT" is not displayed on DIAG 1>>Perform DTC confirmation procedure again.

NO-2: "CMPLT" is not displayed on DIAG 2>>GO TO 4.

4. PERFORM DTC WORK SUPPORT

- Open engine hood.
- Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 6.

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- Perform DTC confirmation procedure again.

>> GO TO 3.

O.PERFORM SELF-DIAGNOSIS

(P)With CONSULT

Perform ECM self-diagnosis.

Is DTC "P0139" or "P0159" detected?

YES >> Proceed to EC-282, "Diagnosis Procedure".

NO >> INSPECTION END

/ .PERFORM COMPONENT FUNCTION CHECK

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< DTC/CIRCUIT DIAGNOSIS >

Perform component function check. Refer to EC-281, "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 >> Proceed to EC-282, "Diagnosis Procedure".

DTC CONFIRMATION PROCEDURE (FOR MEXICO)

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 11.

2.PRECONDITIONING

- If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- "COMPLETED" will appear on CONSULT screen when all tests "COND1", "COND2" and "COND3" are completed.

TESTING CONDITION:

- For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).
- Never stop engine during this procedure. If the engine is stopped, retry procedure from PERFORM PROCEDURE FOR COND1-II.

>> GO TO 3.

3.PERFORM PROCEDURE FOR COND1-I

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

>> GO TO 4.

4.PERFORM PROCEDURE FOR COND1-II

Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 5.

5. PERFORM PROCEDURE FOR COND1-III

- 1. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 3. Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- 4. Touch "START".
- 5. Let engine idle for at least 30 seconds.
- 6. Rev engine up to 2,000 rpm two or three times quickly under no load.

Is "COMPLETED" appears on CONSULT screen?

YES >> GO TO 9.

NO >> GO TO 6.

6.PERFORM PROCEDURE FOR COND1-IV

When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED"

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec

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	P0139, P0159 HO2S2	
< DTC/CIRCUIT	,]
COOLAN TEMP/S	70 - 105°C	_
Selector lever	Suitable position	Α
CAUTION:		
_	nicle at a safe speed.	E
	on CONSULT screen?	
"COND1: COMP	OF CONDITION">>GO TO 4. PLETED", "COND2: INCOMPLETE">>GO TO 7. PLETED", "COND2: COMPLETED">>GO TO 8.	
7. PERFORM PR	ROCEDURE FOR COND2	
COND1-III) until " approximately 4 s	ease accelerator pedal completed from the above condition (PERFORM PROCEDURE FOR INCOMPLETE" at "COND2" on CONSULT screen has turned to "COMPLETED" (It will take seconds).	е
CAUTION: Always drive yel	nicle at a safe speed.	[
-	on CONSULT screen?	
"COND2: COMP	PLETED", "COND3: INCOMPLETE">>GO TO 8. PLETED", "COND3: COMPLETED">>GO TO 9.	ı
8.PERFORM PR	ROCEDURE FOR COND3-I	
Stop vehicle and PLETED"	let it idle until "INCOMPLETE" of "COND3" on CONSULT screen has turned to "COM]-
>> GO T	·O 9.	H
^	ROCEDURE FOR COND3-II	
Touch "SELF-DIA	G RESULTS".	_
	on CONSULT screen?	
_	ECTION END.	
	eed to EC-282, "Diagnosis Procedure".	,
	DIAGNOSED">>GO TO 10.	
I U.PERFORM F	PROCEDURE FOR COND3-III	-
2. Turn ignition s	switch OFF and leave the vehicle in a cool place (soak the vehicle). switch ON and select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT.	

- Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT.
- When "COOLAN TEMP/S" indication reaches 70°C (158°F).

>> GO TO 5.

11. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-281, "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

>> Proceed to EC-282, "Diagnosis Procedure". NO

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

- 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.

Let engine idle for 1 minute.

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INFOID:0000000007462727

5. Check the voltage between ECM harness connector terminals under the following condition.

		ECM				
DTC	DTC Connector		_	Condition	Voltage	
Com	Connector	Terminal	Terminal			
P0139	F102	76	84	Revving up to 4,000 rpm under no load at	A change of voltage should be more than	
P0159	1 102	80	04	least 10 times	0.24 V for 1 second 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	
			Terminal			
P0139	F102	76	84	Keeping engine at idle for 10 minutes	A change of voltage should be more than	
P0159			04	recepting engine at tale for 10 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		+	_	Condition	Voltage	
	Connector		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 EC-282, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007462728

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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-39</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: Special Repair Requirement".
- 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-287, "DTC Logic"</u> or <u>EC-291, "DTC Logic"</u>.

NO >> GO TO 3.

${f 3.}$ CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- Disconnect ECM harness connector.
- Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		ECM		Continuity	
ыс	Bank	Bank Connector Te		Connector	Terminal		
P0139	1	F54	1	F102	84	Existed	
P0159	2	F53	1	1 102	04	LXISIGU	

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 HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0139	1	F54	4	F102	76	Existed
P0159	9 2 F53 4		1 102	80	LAISIGU	

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity	
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0139	1	F54	4	Ground	Not existed
P0159	2	F53	4	Giodila	NOI EXISIEU

DTC		ECM	Ground	Continuity	
ыс	Bank	Connector	Terminal	Giodila	Continuity
P0139	1	F102	76	Ground	Not existed
P0159	2	F102	80	Giodila	

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.

${f 5.}$ CHECK HEATED OXYGEN SENSOR 2

Refer to EC-284, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7. >> GO TO 6. NO

$\mathsf{6}.\mathsf{REPLACE}$ 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.

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- 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

7.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462729

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

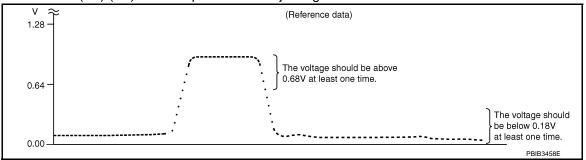
YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

(P)With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.
- 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

- 1. Start engine and warm it up to the normal operating temperature.
- 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.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

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	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.	
	80 [HO2S2 (bank 2)]			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.

	ECM				
Connector	+	_	Condition	Voltage	
Connector	Terminal	Terminal			
F102 -	76 [HO2S2 (bank 1)]	- 84	Kooping opging at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.	
	80 [HO2S2 (bank 2)]		Keeping engine at idle for 10 minutes	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 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

	ECM				
Connector	+	_	Condition	Voltage	L
Connector	Terminal	Terminal			
E102	76 [HO2S2 (bank 1)]		Coasting from 80 km/h (50 MPH) in D posi-	The voltage should be above 0.68 V at least once during this procedure.	
F102 (H	80 [HO2S2 (bank 2)]	84	tion (A/T), 4th gear position (M/T)	The voltage should be below 0.18 V at least once during this procedure.	Ν

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 (19.7 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

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

DTC Logic INFOID:0000000007462730

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.
- Turn ignition switch ON.
- 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 EC-39, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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?

YFS >> Go to EC-288, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

- Keep engine idle for at least 5 minutes.
- Check 1st trip DTC.

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P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Is 1st trip DTC detected?

YES >> Go to EC-288, "Diagnosis Procedure".

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Start engine.
- 4. Maintain the following conditions for at least 10 consecutive minutes.

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.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-288, "Diagnosis Procedure".

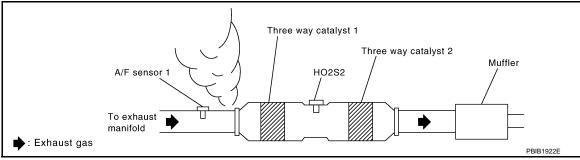
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462731

1. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

- 1. Listen for an intake air leak after the mass air flow sensor.
- Check PCV hose connection.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 3.

${f 3.}$ CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

DTC	A/F sensor 1			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0171	1	F3	1		57	Existed
PUITI	'	гэ	2	F102	61	
P0174	2 F20	1	F102	65	Existed	
P0174	2	F20	2		66	

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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 Termina		Giodila	Continuity
P0171	1	F3	1		Not existed
10171		гэ	2	Ground	
P0174	2	F20	1	Ground	NOT EXISTED
10174		1 20	2		

DTC	ECM			Ground	Continuity
DIC	Bank	Bank Connector Ter		Giodila	Continuity
P0171	1		57	Ground	Not existed
FUITI	'	F102	61		
P0174	2		65		
F0174			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

Release fuel pressure to zero. Refer to EC-622, "Inspection".

Install fuel pressure gauge and check fuel pressure. Refer to EC-622, "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.

DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to FL-5, "Exploded View".

NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

- Install all removed parts.
- Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT. For specification, refer to EC-625, "Mass Air Flow Sensor".

With GST

- 1. Install all removed parts.
- Check mass air flow sensor signal in Service \$01 with GST.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

For specification, refer to EC-625, "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 EC-214, "Diagnosis Procedure".

7.CHECK FUNCTION OF FUEL INJECTOR

(P)With CONSULT

- 1. Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Make sure that each circuit produces a momentary engine speed drop.

®Without CONSULT

- Start engine and let it idle.
- Listen to each fuel injector operating sound.

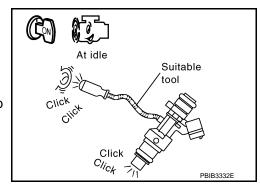
Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO

>> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-531, "Diagnosis Procedure".



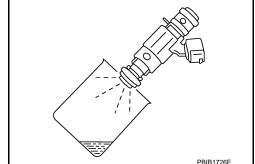
8. CHECK FUEL INJECTOR

- Turn ignition switch OFF.
- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- Disconnect all fuel injector harness connectors.
- 4. Remove fuel tube assembly. Refer to EM-189, "Removal and Installation". 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.
- 8. 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-43, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

DTC Logic INFOID:0000000007462732

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.	•
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.
- Turn ignition switch ON.
- 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 EC-39, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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-292, "Diagnosis Procedure".

NO >> Remove spark plugs and check for fouling, etc.

f 4 . PERFORM DTC CONFIRMATION PROCEDURE-II

- Keep engine idle for at least 5 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-292, "Diagnosis Procedure".

>> GO TO 5. NO

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EC-291

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

5. PERFORM DTC CONFIRMATION PROCEDURE-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine.
- 3. Maintain the following conditions for at lest 10 consecutive minutes.

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.

Is 1st trip DTC detected?

YES >> Go to EC-292, "Diagnosis Procedure".

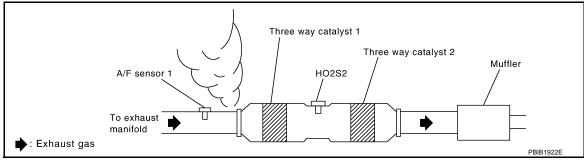
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462733

1. CHECK EXHAUST GAS LEAK

- Start engine and run it at idle.
- Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace.

NO >> GO TO 2.

2 . CHECK FOR INTAKE AIR LEAK

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		57	
F0172	ļ	13	2	F102	61	Existed
P0175	2	F20	1	F102	65	Existed
FU1/5		F20	2		66	

Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

		A/F sensor	· 1					
DTC	Bank	Connector	Terminal	Ground	Continuity	_		
P0172	1	F3	1					
P0172	1	F3	2	Cround	nd Not evicted	Not existed		
D0175	2	F20	1	Ground	Ground Not existed		Not existed	
P0175	2	F20	2					
DTC		ECM		Ground	Continuity			
DIC	Bank	Connector	Terminal	Giodila	Continuity			
P0172	1		57					
F0172	'	F102	61	Ground	Not existed			
D0475	0	F102	65	Ground	Not existed			
P0175	2		66					
. Also cl	heck h	arness for	short to po	ower.	l .			
the inspe	ection i	result norm	al?					
_	> GO T	_	_					
	-	•		to ground	or short to	er in harness or connectors.		
LCHECK	FUEL	PRESSUF	RE					
					622, "Inspe			
. Install	fuel pr	essure gau	ige and ch	neck fuel p	ressure Re	to FC 600 "Inoncotion"		
		J	5		.0000.01.110	to EC-622, "Inspection".		
				·		·		
At i	idling:	Approxim	ately 350	·	7 kg/cm ² , 5	·		
At i	idling: ection i	Approxim	ately 350	·		·		
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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

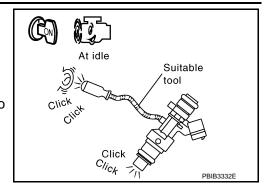
Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-531, "Diagnosis Procedure".



7. CHECK FUEL INJECTOR

- Remove fuel injector assembly. Refer to <u>EM-189</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 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. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injector.
- 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

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

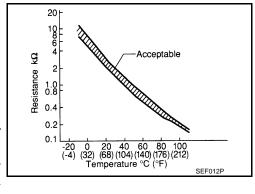
P0181 FTT SENSOR

Description INFOID:000000007462734

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

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition		Possible cause
	FTT SENSOR	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor.	Harness or connectors (The FTT sensor circuit is open or shorted) FTT sensor
P0181	[Fuel tank temperature (FTT) sensor circuit range/ performance]	B)	The comparison result of signals transmitted to ECM from each temperature sensor (ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the FTT sensor circuit) FTT sensor

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7.

NO >> GO TO 2.

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

>> GO TO 3.

3.perform dtc confirmation procedure-i

- 1. Turn ignition switch ON and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-297, "Diagnosis Procedure".

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NO >> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE

- 1. Select "COOLAN TEMP/S" in "DATA MONITOR" with CONSULT.
- Check "COOLAN TEMP/S" value.

"COOLAN TEMP/S" less than 60°C (140°F)?

YES >> INSPECTION END

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
- 2. Wait at least 10 seconds.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-297, "Diagnosis Procedure".

NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-297, "Component Function Check".

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-297, "Diagnosis Procedure".

7.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.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 8.

8. PERFORM DTC CONFIRMATION PROCEDURE B

- 1. Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-297, "Diagnosis Procedure".

NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

Component Function Check

[VQ37VHR] INFOID:0000000007462736

1. CHECK FUEL TANK TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit. Refer to FL-5, "Exploded View".
- 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 ($k\Omega$)
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7
4 and 5	remperature [O (1)]	50 (122)	0.79 - 0.90

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-297, "Diagnosis Procedure".



Check intermittent incident, Refer to GI-43, "Intermittent Incident",

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-297, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-295, "DTC Logic".

Which malfunction is detected?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to MWI-54, "Component Function Check".

3.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 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.

	nsor unit and pump	Ground	Voltage (V)
Connector	Terminal		
B22	B22 4		Approx. 5

Is the inspection result normal?

YES >> GO TO 5.

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"

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>> 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

- Turn ignition switch OFF.
- 2. Disconnect "unified meter and A/C amp." harness connector.
- 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 me	Continuity	
Connector	Terminal	Connector	Terminal	
B22	5	M67	58	Existed

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 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-298, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View".

8.check intermittent incident

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462738

1. CHECK FUEL TANK TEMPERATURE SENSOR

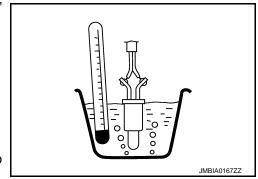
- Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit. Refer to FL-5, "Exploded View".
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (kΩ)
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7
4 and 5	remperature [O (1)]	50 (122)	0.79 - 0.90

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View".



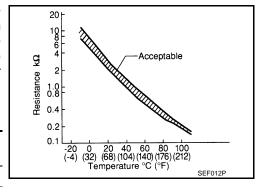
P0182, P0183 FTT SENSOR

Description INFOID:0000000007462739

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:0000000007462740

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.	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.
- Turn ignition switch ON.
- 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 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-299, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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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INFOID:0000000007462741

< DTC/CIRCUIT DIAGNOSIS >

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to MWI-54, "Component Function Check".

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.

	nsor unit and pump	Ground	Voltage (V)
Connector	Terminal		
B22	B22 4		Approx. 5

Is the inspection result normal?

YES >> GO TO 5. 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 sensor unit and fuel pump		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.

O. 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-301, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View".

8. CHECK INTERMITTENT INCIDENT

P0182, P0183 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

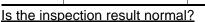
Component Inspection

INFOID:0000000007462742

1. CHECK FUEL TANK TEMPERATURE SENSOR

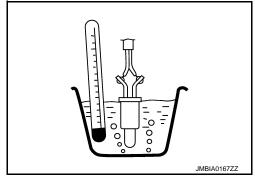
- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Remove fuel level sensor unit.
- 4. Check resistance between "fuel level sensor unit and fuel pump" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (kΩ)
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7
4 and 5	remperature [O (1)]	50 (122)	0.79 - 0.90



YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-5, "Exploded View".



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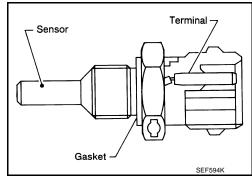
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P0196 EOT SENSOR

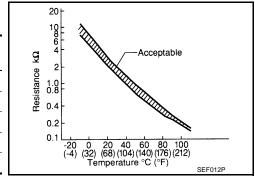
Description INFOID:000000007462743

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 (kΩ)
-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 EC-306, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition		Possible cause
	EOT SENSOR	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	 Harness or connectors (The EOT sensor circuit is open or shorted) EOT sensor
P0196	[Engine oil temperature (EOT) sensor range/performance	В)	The comparison result of signals transmitted to ECM from each temperature sensor (ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the EOT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the EOT sensor circuit) EOT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 6. NO >> GO TO 2.

2.PRECONDITIONING

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > If DTC Confirmation Procedure has been previously conducted, always perform the following procedure

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

before conducting the next test.

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 3.

3.perform dtc confirmation procedure-i

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 3.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for 5 minutes and 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

>> EC-305, "Diagnosis Procedure". YES

NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

- Select "DATA MONITOR" mode with CONSULT.
- 2. Check that "COOLAN TEMP/S" indicates above 80°C (176°F).

If it is above 80°C (176°F), go to the following steps.

If it is below 80°C (176°F), warm engine up until "COOLAN TEMP/S" indicates more than 80°C (176°F). Then perform the following steps.

- Turn ignition switch OFF and soak the vehicle in a cool place.
- 4. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.

NOTE:

Do not turn ignition switch OFF until step 10.

- 7. Select "DATA MONITOR" mode with CONSULT.
- 8. 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)

If they are within the specified range, perform the following steps.

If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.

NOTE:

- Do not turn ignition switch OFF.
- If it is supposed to need a long period of time, do not deplete the battery.
- 9. Start engine and let it idle for 5 minutes.
- 10. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-305, "Diagnosis Procedure".

NO >> GO TO 5.

$oldsymbol{5}$.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-304, "Component Function Check".

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

NO >> Proceed to EC-305, "Diagnosis Procedure".

6.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.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 7.

7.PERFORM DTC CONFIRMATION PROCEDURE B

- 1. Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-305, "Diagnosis Procedure".

NO >> INSPECTION END

Component Function Check

INFOID:0000000007462745

1. CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect EOT sensor harness connector.
- 3. Remove EOT sensor. Refer to EM-234, "2WD: Exploded View".
- 4. Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (kΩ)
		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 >> GO TO 2.

NO >> Proceed to EC-305, "Diagnosis Procedure".

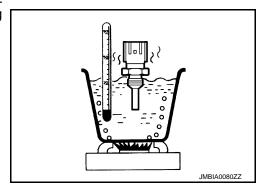
2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-305, "Diagnosis Procedure".



P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462746

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-305, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace engine oil temperature sensor. Refer to EM-234, "2WD : Exploded View".

3. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462747

1. CHECK ENGINE OIL TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect engine oil temperature sensor harness connector.
- 3. Remove engine oil temperature sensor. Refer to EM-234, "2WD : Exploded View"
- Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

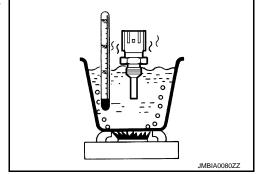
Terminals	Condition		Resistance (kΩ)
		20 (68)	2.1 - 2.9
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO

>> Replace engine oil temperature sensor. Refer to EM-234, "2WD: Exploded View".



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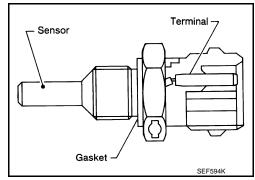
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P0197, P0198 EOT SENSOR

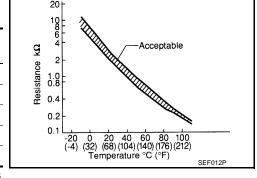
Description INFOID:000000007462748

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 (kΩ)
-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	
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.)	
P0198	Engine oil tempera- ture sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine oil 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.
- 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 wait at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

P0197, P0198 EOT SENSOR

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > YES >> Go to EC-307, "Diagnosis Procedure". NO >> INSPECTION END Α Diagnosis Procedure INFOID:0000000007462750 EC CHECK GROUND CONNECTION Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection". Is the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. D 2.check eot sensor power supply circuit Disconnect engine oil temperature (EOT) sensor harness connector. Turn ignition switch ON. Е Check the voltage between EOT sensor harness connector and ground. EOT sensor Ground Voltage (V) Connector **Terminal** F38 Ground Approx. 5 Is the inspection result normal? YFS >> GO TO 3. NO >> Repair open circuit, short to ground or short to power in harness or connectors. Н ${f 3.}$ CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT Turn ignition switch OFF. 2. Disconnect ECM harness connector. Check the continuity between EOT sensor harness connector and ECM harness connector. EOT sensor **ECM** Continuity Connector Terminal Connector **Terminal** F38 2 F102 84 Existed 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. f 4.CHECK ENGINE OIL TEMPERATURE SENSOR Refer to EC-307, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. N NO >> Replace engine oil temperature sensor. Refer to EM-234, "2WD: Exploded View". ${f 5}.$ CHECK INTERMITTENT INCIDENT Refer to GI-43, "Intermittent Incident". >> INSPECTION END Component Inspection INFOID:0000000007462751 ${f 1}$.CHECK ENGINE OIL TEMPERATURE SENSOR 1. Turn ignition switch OFF. 2. Disconnect engine oil temperature sensor harness connector.

Remove engine oil temperature sensor.

P0197, P0198 EOT SENSOR

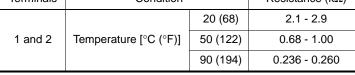
< DTC/CIRCUIT DIAGNOSIS >

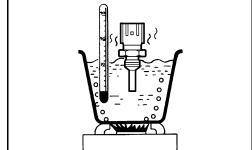
[VQ37VHR]

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Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance ($k\Omega$)
		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

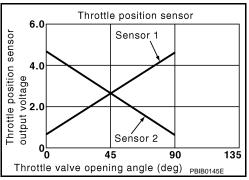
>> Replace engine oil temperature sensor. Refer to $\underline{\sf EM-234,"2WD:Exploded\ View"}$. NO

P0222, P0223, P2132, P2133 TP SENSOR

Description INFOID:0000000007462752

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 the throttle valve opening angle properly in response to driving condition via the throttle control motor.



DTC Logic INFOID:0000000007462753

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 EC-407, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 (bank 1) circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	
P0223	Throttle position sensor 1 (bank 1) circuit high input	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 input	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 input	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.

- 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.

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

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-309, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

- 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	Electric throttle control actuator			Ground	Voltage (V)
ы	Bank	Connector	Terminal	Ground	voitage (v)
P0222, P0223	1	F6	6	Ground	Approx. 5
P2132, P2133	2	F27	1	Ground	дриох. 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 1 ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			ECM		Continuity	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0222, P0223	1	F6	3	F101	40	Existed	
P2132, P2133	2	F27	4	1 101	48	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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator		ECM		Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0222, P0223	1	F6	4	F101	30	Existed
P2132, P2133	2	F27	2	31		LAISIEU

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-311, "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.

P0222, P0223, P2132, P2133 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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2.	Go to	EC-311.	"Special	Repair	Requireme	ent".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-35, "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 when the following conditions.

	ECM					
Connector	+ -		Condition		Voltage (V)	
Connector	Terminal					
	00 [TD			Fully released	More than 0.36	
	30 [TP sensor 1 (bank 1)]	40	- 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	04 ITD 0 /h h 4)1	40		Fully released	Less than 4.75	
	34 [TP sensor 2 (bank 1)]	40		Fully depressed	More than 0.36	
	25 [TD concer 2 /hank 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.
- Go to <u>EC-311</u>, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

Revision: 2013 February

INFOID:0000000007462756

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

DTC Logic INFOID:000000007462757

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crank-shaft 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.

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 illuminating.

If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

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 illuminating 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 shorted
P0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	Lack of fuel Signal plate
P0306	No. 6 cylinder misfire detected No. 6 cylinder	No. 6 cylinder misfires.	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.
- 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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS >

YES >> Go to EC-313, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure-ii

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.
- 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 the same time.

CAUTION:

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

Engine speed	Engine speed in the freeze frame data \pm 400 rpm		
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6MPH)		
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).		
condition	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).		

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

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-313, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- Start engine and run it at idle speed.
- 2. Listen for the sound of the intake air leak.
- Check PCV hose connection.

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.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.

YES-2 >> Without CONSULT: GO TO 4.

NO >> Repair or replace it.

3.perform power balance test

(P)With CONSULT

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.

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2012 G Sedan

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 4.

f 4.CHECK FUNCTION OF FUEL INJECTOR-I

- Start engine and let it idle.
- Listen to each fuel injector operation sound.

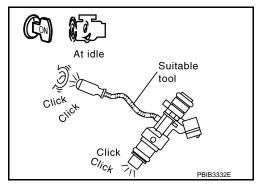
Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 5.

NO

>> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-531. "Diagnosis Procedure".



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

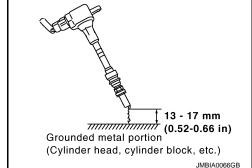
Perform the following procedure in a place where with no combustible objects and good ventilation.

- Turn ignition switch OFF.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 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.
- 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.

- 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.

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

6.CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- Disconnect spark plug and connect a non-malfunctioning spark plug.
- Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

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Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-540, "Diagnosis Procedure".

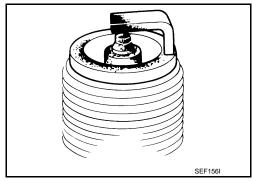
7. CHECK SPARK PLUG

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 EM-176, "Inspection".

NO >> Repair or clean spark plug. Then GO TO 8.



8.CHECK FUNCTION OF IGNITION COIL-III

- Reconnect the initial spark plugs.
- 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?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-175, "Removal and Installation".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-176, "Inspection".

Is the inspection result normal?

YFS >> GO TO 10.

NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10.CHECK FUEL PRESSURE

- Install all removed parts.
- Release fuel pressure to zero. Refer to EC-622, "Inspection". 2.
- Install fuel pressure gauge and check fuel pressure. Refer to EC-622. "Inspection".

At idle: Approximately 350 kPa (3.57 kg/cm², 51 psi)

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 11.

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.

EC-315 Revision: 2013 February 2012 G Sedan

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P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

12. CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to <u>EC-29</u>, "<u>BASIC INSPECTION</u>: <u>Special Repair Requirement</u>". For specification, refer to <u>EC-625</u>, "<u>Idle Speed</u>" and <u>EC-625</u>, "<u>Ignition Timing</u>".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-29, "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 senso	or 1	E	Continuity		
Bank	Connector	Terminal	Connector	Terminal	Continuity	
1	F3	1		57		
'	10	2	F102	61	Existed	
2	E20	1	1102	65	LAISIEU	
2	F20	2		66		

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			Giouna	Continuity	
1	F3	1		Not existed	
ı	13	2	Ground		
2	F20	1	Giouna		
2	F2U	2			

	ECM	Ground	Continuity	
Bank	Bank Connector Terminal			Continuity
1		57		
I	F102	61	Ground	Not existed
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-199, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace (malfunctioning) A/F sensor 1. Refer to EM-186, "Exploded View".

15. CHECK MASS AIR FLOW SENSOR

(I) With CONSULT

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT.

For specification, refer to EC-625, "Mass Air Flow Sensor".

With GST

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE	
: DTC/CIRCUIT DIAGNOSIS > [VQ37VHR	:]
Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to <u>EC-625, "Mass Air Flow Sensor"</u> .	<u> </u>
s 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 of ground. Refer to EC-214 , "Diagnosis Procedure".	or E
6.check symptom table	
Check items on the rough idle symptom in <u>EC-610, "Symptom Table"</u> .	_
s the inspection result normal?	
YES >> GO TO 17.	
NO >> Repair or replace.	
7.ERASE THE 1ST TRIP DTC	_
Some tests may cause a 1st trip DTC to be set. Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>EC-161, "On Board Diagno</u>) -
is Function", EC-164, "CONSULT Function".	<u></u>
>> GO TO 18.	
8.check intermittent incident	
Refer to GI-43, "Intermittent Incident".	
>> INSPECTION END	

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P0327, P0328, P0332, P0333 KS

Description INFOID:000000007462759

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

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.
- 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 EC-318, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462761

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- Check the continuity between knock sensor harness connector and ECM harness connector.

DTC	Knock sensor			ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0327, P0328	1	F203	2	F102	72	Existed
P0332, P0333	2	F202	2	1 102	12	LXISIEG
Also check harness for short to ground and short to power.						

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3. 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F9, F201
- Harness for open or short between knock sensor and ECM

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

4. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Knock sensor		ECM		Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0327, P0328	1	F203	1	F102	73	Existed
P0332, P0333	2	F202	1	F102	69	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

${f 5.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F9, F201
- Harness for open or short between ECM and knock sensor

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

6. CHECK KNOCK SENSOR

Refer to EC-319, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

>> Replace malfunctioning knock sensor. Refer to EM-273, "Exploded View".

.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.CHECK KNOCK SENSOR

- Turn ignition switch OFF.
- Disconnect knock sensor harness connector.
- Check resistance between knock sensor terminals as per the following. NOTE:

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INFOID:0000000007462762

It is necessary to use an ohmmeter which can measure more than 10 M Ω .

Terminals	Resistance (k Ω)
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. <u>Is the inspection result normal?</u>

YES >> INSPECTION END

NO >> Replace malfunctioning knock sensor. Refer to EM-273, "Exploded View".

P0335 CKP SENSOR (POS)

Description INFOID:0000000007462763

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.

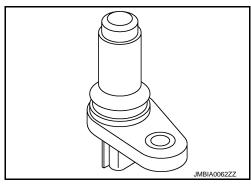
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

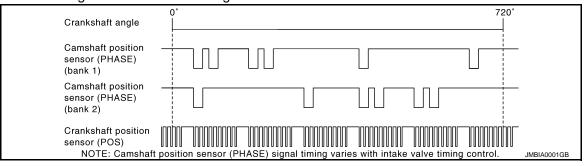
The changing gap causes the magnetic field near the sensor to change.

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.





DTC Logic INFOID:0000000007462764

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (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 running.	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.) Crankshaft position sensor (POS) Accelerator pedal position sensor EVAP control system pressure sensor* Refrigerant pressure sensor Brake booster pressure sensor. Signal plate

^{*:} Except for Mexico

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

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< DTC/CIRCUIT DIAGNOSIS >

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

If engine does not start, crank engine for at least 2 seconds.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-322, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462765

2012 G Sedan

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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		Glodila	voltage (v)	
F2	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 3.

3.check crankshaft position (ckp) sensor (pos) power supply circuit-ii

- Turn ignition switch ON.
- 2. Disconnect ECM harness connector.
- Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sens	or (POS)	EC	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.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
45		Brake booster pressure sensor	E48	1		
F101	46	CKP sensor (POS)	F2	'		
	103	APP sensor	E112	6		
M107	107	EVAP control system pressure sensor*	B252	3		
		Refrigerant pressure sensor	E77	3		

P0335 CKP SENSOR (POS)

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS >

*: Except for Mexico

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.

- Brake booster pressure sensor (Refer to <u>EC-400, "Component Inspection"</u>.)
- EVAP control system pressure sensor (Refer to <u>EC-357</u>, "Component Inspection".) (Except for Mexico)
- Refrigerant pressure sensor (Refer to <u>HAC-95, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-504, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

/ REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- 2. Go to EC-504, "Special Repair Requirement".

>> INSPECTION END

8.check ckp sensor (pos) ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F2	2	F101	47	Existed

Also check harness for short to ground and 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.

${f 9}.$ CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F2	3	F101	37	Existed

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 crankshaft position sensor (pos)

Refer to EC-324, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

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P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-273, "Exploded View"</u>.

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-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462766

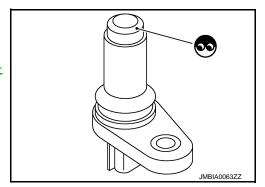
1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

- 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). Refer to <u>EM-273</u>, "Exploded View".



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). Refer to EM-273, "Exploded View".

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P0340, P0345 CMP SENSOR (PHASE)

Description INFOID:000000007462767

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.

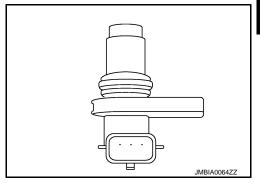
The sensor consists of a permanent magnet and Hall IC.

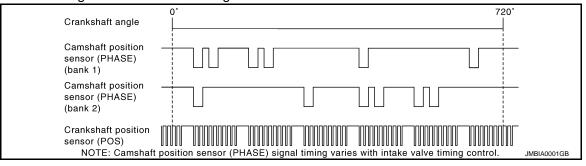
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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-407, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (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
P0345	Camshaft position sensor (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

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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P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 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

1. 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-326, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- 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-326, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462769

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-21</u>, "Work Flow".)

2.check ground connection

- Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- 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	С	CMP sensor (PHASE)			Voltage (V)
DIC	Bank	Connector	Terminal	Ground	voltage (v)
P0340	1	F5	1	Ground	Approx. 5
P0345	2	F18	1	Ciodila	Αρρίολ. 3

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F109, F110 (2WD models)
- Harness for open or short between CMP sensor (PHASE) and ECM

[VQ37VHR]

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

${f 5.}$ CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

DTC	CI	MP sensor (Pl	HASE)	EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0340	1	F5	2	F102	96	Existed
P0345	2	F18	2	F102	92	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

$oldsymbol{6}.$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F109, F110 (2WD models)
- Harness for open or short between CMP sensor (PHASE) and ECM

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

.CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

DTC	CI	MP sensor (Pl	HASE)	ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0340	1	F5	3	F102	59	Existed	
 P0345	2	F18	3	1 102	63	LXISIGU	

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F109, F110 (2WD models)
- Harness for open or short between CMP sensor (PHASE) and ECM

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

9. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-328, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-202, "Exploded View".

10. CHECK CAMSHAFT (INTAKE)

Check the following.

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P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

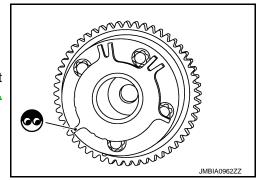
- Accumulation of debris to the signal plate of camshaft front end
- · Chipping signal plate of camshaft front end

Is the inspection result normal?

YES >> GO TO 11.

NO

>> Remove debris and clean the signal plate of camshaft front end or replace camshaft. Refer to EM-202, "Exploded View".



11. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

NEOID:000000000746277

1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

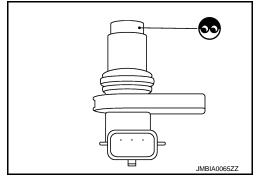
- 1. Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor (PHASE) harness connector.
- 4. Remove the sensor.
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace

>> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-202, "Exploded View".



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). Refer to EM-202, "Exploded View".

[VQ37VHR]

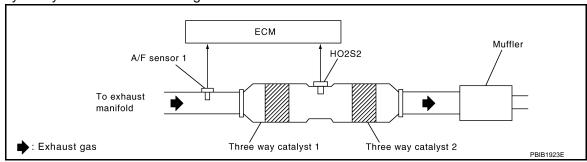
P0420, P0430 THREE WAY CATALYST FUNCTION

DTC Logic INFOID:000000000746277

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
P0430	Catalyst system efficiency below threshold (bank 2)	erate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	Intake air leaksFuel injectorFuel injector leaksSpark plugImproper ignition timing

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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.

- 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.

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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. 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.
- Let engine idle for 1 minute.

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P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 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.
- 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 screen?

CMPLT>> GO TO 6.

INCMP >> GO TO 4.

f 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-331, "Diagnosis Procedure".

NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-330, "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-331, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007462772

1. PERFORM COMPONENT FUNCTION CHECK

⋈Without CONSULT

- 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. Open engine hood.
- 6. Check the voltage between ECM harness connector terminals under the following condition.

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

		ECM				
DTC	0	+	_	Condition	Voltage	
	Connector	Terminal	Terminal			
P0420	F102	76 [HO2S2 (bank 1)]	84	Keeping engine speed at 2,500 rpm	The voltage fluctuation cycle takes more than 5 seconds.	
P0430		80 [HO2S2 (bank 2)]		constant under no load	• 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0	
	•	sult normal?				
YES NO		CTION END C-331, "Dia	anneie Proc	edure"		
			giiusis Fiuc	cuuic .		
Jiagn	osis Proc	edure			INFOID:0000000007462773	
1. CHE	CK EXHAU	ST SYSTEM	1			
/isually	check exh	aust tubes ar	nd muffler fo	r dents.		
	•	sult normal?				
YES NO	>> GO TO					
_	•	or replace. ST GAS LEA	\ K			
		ıd run it at idl khaust qas le		ne three way catalyst 1.		
	∳ : Exhaust	A/F sen: To exhau manifold gas		Three way catalyst 1 Three way c	atalyst 2 Muffler → PBIB1922E	
	ust gas leak	detected?				
s exhai	_					
<u>s exhai</u> YES NO	>> Repair >> GO TC	or replace.				
YES NO	>> GO TC	or replace.				
YES NO 3. CHE	>> GO TO	or replace. 3. AIR LEAK	the mass a	air flow sensor.		
YES NO 3. CHE	>> GO TO	or replace. 3. AIR LEAK air leak after	the mass a	air flow sensor.		
YES NO 3.CHE listen for s intake YES	>> GO TC CK INTAKE or an intake e air leak de >> Repair	or replace. 3. AIR LEAK air leak after tected? or replace.	the mass a	air flow sensor.		
YES NO 3.CHE isten for s intake YES NO	>> GO TO CK INTAKE or an intake e air leak de >> Repair >> GO TO	or replace. 3. AIR LEAK air leak after tected? or replace. 4.				
YES NO 3.CHE isten for s intake YES NO	>> GO TO CK INTAKE or an intake e air leak de >> Repair >> GO TO	or replace. 3. AIR LEAK air leak after tected? or replace.				
YES NO 3.CHE isten for s intake YES NO 4.CHE	>> GO TO CK INTAKE or an intake e air leak de >> Repair >> GO TO CK IDLE SI cedure, refe	or replace. 3. AIR LEAK air leak after stected? or replace. 4. PEED AND I	GNITION T		<u>uirement"</u> .	

YES >> GO TO 5.

Is the inspection result normal?

NO >> Follow the EC-29, "BASIC INSPECTION: Special Repair Requirement".

5. CHECK FUEL INJECTORS

- 1. Stop engine and then turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as per the following.

Revision: 2013 February EC-331 2012 G Sedan

+		_		Voltage
Connector	Terminal	Connector	Terminal	
F102	81	M107	128	Battery voltage
	82			
	85			
	86			
	89			
	90			

Is the inspection result normal?

YES >> GO TO 6.

>> Perform EC-531, "Diagnosis Procedure". NO

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.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT 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.

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

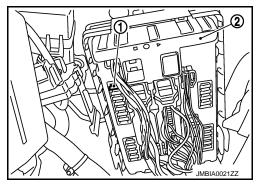
Is the inspection result normal?

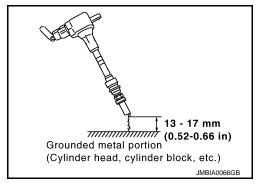
YES >> GO TO 10. NO >> GO TO 7.

Revision: 2013 February

7.CHECK FUNCTION OF IGNITION COIL-II

Turn ignition switch OFF.





P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

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 8.

NO >> Check ignition coil, power transistor and their circuits. Refer to <u>EC-540</u>, "Diagnosis Procedure".

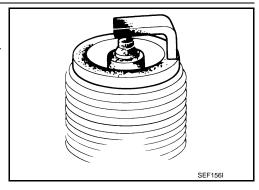
8. CHECK SPARK PLUG

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 EM-176, "Inspection".

NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

Reconnect the initial spark plugs.

2. 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 EM-175, "Removal and Installation".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.

Remove fuel injector assembly.

Refer to EM-189, "Removal and Installation".

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. Refer to EM-189, "Exploded View".

NO >> GO TO 11.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace three way catalyst assembly. Refer to EX-5, "Exploded View".

NO >> Repair or replace harness or connector.

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P0441 EVAP CONTROL SYSTEM

DTC Logic

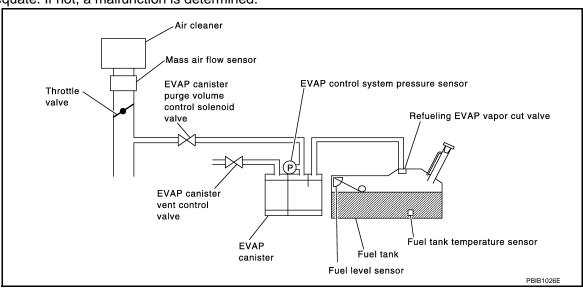
DTC DETECTION LOGIC

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 incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake 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?

Do you have CONSULT?

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.

Turn ignition switch OFF and wait at least 10 seconds.

P0441 EVAP CONTROL SYSTEM

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS >

- Turn ignition switch ON.
- 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 3.

3.perform dtc confirmation procedure-i

(P)With CONSULT

- 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.
- Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-SULT.
- Touch "START".

Is "COMPLETED" displayed on CONSULT screen?

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 screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

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 screen?

YES >> GO TO 5.

NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 3.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-336, "Diagnosis Procedure".

6.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-335, "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?

YES >> INSPECTION END

NO >> Go to EC-336, "Diagnosis Procedure".

Component Function Check

1. PERFORM COMPONENT FUNCTION CHECK

Lift up drive wheels.

EC-335 Revision: 2013 February 2012 G Sedan

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< DTC/CIRCUIT DIAGNOSIS >

- 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	+	_		
Cominector	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-336, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007462776

1. CHECK EVAP CANISTER

- 1. Turn ignition switch OFF.
- Check EVAP canister for cracks.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

NO >> Replace EVAP canister.

2. CHECK PURGE FLOW

(P)With CONSULT

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- Start engine and let it idle.
- Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- 4. Touch "Qd" and "Qu" on CONSULT 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 >> GO TO 4.

3. CHECK PURGE FLOW

⋈ Without CONSULT

P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- Start engine and warm it up to normal operating temperature.
- Stop engine. 2.
- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-116, "System Diagram".
- Start engine and let it idle. 4.

Do not depress accelerator pedal even slightly.

Check vacuum gauge indication before 60 seconds passed after starting engine.

Vacuum should not exist.

Revving engine up to 2,000rpm after 100 seconds passed after starting engine.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 4.

4.CHECK EVAP PURGE LINE

- Turn ignition switch OFF.
- Check EVAP purge line for improper connection or disconnection. Refer to EC-116, "System Diagram".

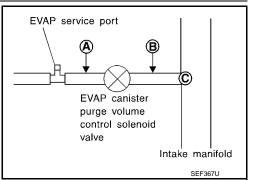
Is the inspection result normal?

>> GO TO 5. YES

NO >> Repair it.

${f 5.}$ CHECK EVAP PURGE HOSE AND PURGE PORT

- Disconnect purge hoses connected to EVAP service port A and EVAP canister purge volume control solenoid valve **B**.
- Blow air into each hose and EVAP purge port **C**.



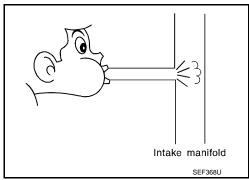
Check that air flows freely.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.

YES-2 >> Without CONSULT: GO TO 7.

NO >> Repair or clean hoses and/or purge port.



6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Start engine.
- 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 8.

EC-337 Revision: 2013 February

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P0441 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> GO TO 7.

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-342, "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-358, "DTC Logic" for DTC P0452, EC-363, "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-349, "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-116, "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-43, "Intermittent Incident".

>> INSPECTION END

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

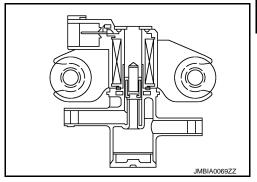
< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:0000000007462777

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 INFOID:0000000007462778

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	C
P0443	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	EVAP control system pressure sensor EVAP canister purge volume control solenoid valve (The valve is stuck open.) EVAP canister vent control valve EVAP canister Hoses (Hoses are connected incorrectly or clogged.)	F

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.
- 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.

Do you have CONSULT

YES >> GO TO 2.

NO >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 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.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 6. Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
- Touch "START".
- Start engine and let it idle until "TESTING" on CONSULT changes to "COMPLETED". (It will take approximately 10 seconds.)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

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P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VQ37VHR1 < DTC/CIRCUIT DIAGNOSIS >

OK >> INSPECTION END

NG >> Go to EC-340, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to 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.
- 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-340, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462779

${f 1}$.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- 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 volun	Ground	Voltage	
Connector	Orouna	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.
- Disconnect ECM harness connector.
- 3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volum	EC	М	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F7	2	F101	21	Existed

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

Is the inspection result normal?

YES >> GO TO 5. >> GO TO 4.

NO

4. DETECT MALFUNCTIONING PART

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VQ37VHR1 < DTC/CIRCUIT DIAGNOSIS > Check the following. Harness connectors F104, F105 (2WD models) Α Harness connectors F109, F110 (AWD models) Harness for open or short between EVAP canister purge volume control solenoid valve and ECM EC >> 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. D Water should not exist. Is the inspection result normal? YES >> GO TO 6. Е NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View". 6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Refer to EC-357, "Component Inspection". Is the inspection result normal? YES-1 >> With CONSULT: GO TO 7. YES-2 >> Without CONSULT: GO TO 8. >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View". .CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE (P)With CONSULT Turn ignition switch OFF. Reconnect harness connectors disconnected. Start engine. 4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. 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. K 8.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE Refer to EC-342, "Component Inspection". Is the inspection result normal? YES >> GO TO 9. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-181, "Exploded View". 9. CHECK RUBBER TUBE FOR CLOGGING M Disconnect rubber tube connected to EVAP canister vent control valve. Check the rubber tube for clogging. N 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-349, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace EVAP canister vent control valve. Refer to EM-181, "Exploded View".

11.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

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Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

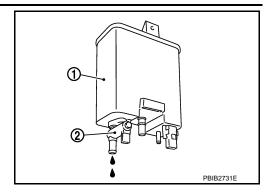
[VQ37VHR]

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 12. NO >> GO TO 14.



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. Refer to FL-14, "Exploded View".

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

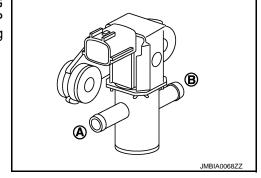
INFOID:0000000007462780

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- 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.
- Touch "Qd" and "Qu" on CONSULT 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

- 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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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)
12V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-181, "Exploded View".

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P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

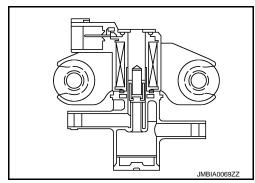
< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:000000007462781

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.	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 solenoid 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 solenoid 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

- 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-344, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462783

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.

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 ground.

EVAP canister purge vol- ume control solenoid valve		Ground	Voltage
Connector	Terminal		
F7	1	Ground	Battery voltage

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Is the inspection result normal?

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

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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.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge vol- ume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector Terminal		
F7	2	F101	21	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 5.

YES-2 >> Without CONSULT: GO TO 6.

NO >> GO TO 4.

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4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F104, F105 (2WD models)
- Harness connectors F109, F110 (AWD models)
- 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 CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- 1. Reconnect all harness connectors disconnected.
- Start engine.

3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 7.

NO >> GO TO 6.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Refer to EC-346, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-181, "Exploded View".

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

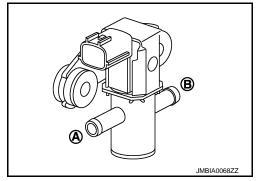
INFOID:0000000007462784

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(I) With CONSULT

- 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.
- Touch "Qd" and "Qu" on CONSULT 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.

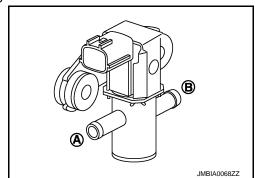
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



♥Without CONSULT

- 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. Refer to EM-181, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P0447 EVAP CANISTER VENT CONTROL VALVE

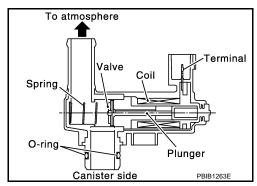
Description INFOID:0000000007462785

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 valve 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 INFOID:0000000007462786

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent control 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

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.
- Turn ignition switch ON.
- 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

- Start engine and wait at least 8 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-347, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YFS >> GO TO 2. NO >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

(P)With CONSULT

- Turn ignition switch OFF and then ON.
- Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT.

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EC-347 Revision: 2013 February 2012 G Sedan

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 3. Touch "ON/OFF" on CONSULT screen.
- 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 v	ent control valve	Ground	Voltage	
Connector	Terminal	Glound		
B253	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 E40, F39
- Harness connectors F103, M116
- · Harness connectors M7, B1
- Harness connectors B39, B331
- Harness connectors B254, B332
- 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.
- Disconnect ECM harness connector.
- 3. Check the continuity between EVAP canister vent control valve harness connector and ECM harness connector.

EVAP canister vent control valve		ECM		Continuity
Connector	Terminal	Connector Terminal		
B253	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 connectors B39, B331
- Harness connectors B254, B332
- 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.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

INFOID:0000000007462788

7.CHECK RUBBER TUBE FOR CLOGGING

- 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 8.

NO >> Clean the rubber tube using an air blower.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-349, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

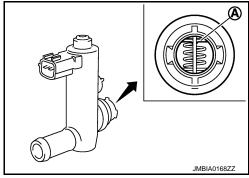
1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

- Turn ignition switch OFF.
- Remove EVAP canister vent control valve from EVAP canister.
- Check portion (A) of EVAP canister vent control valve for rust.

Is it rusted?

YES >> Replace EVAP canister vent control valve. Refer to FL-14. "Exploded View".

NO >> GO TO 2.



2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

(P)With CONSULT

- Reconnect harness connectors disconnected.
- Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- Check air passage continuity and operation delay time.

Make sure that new O-ring is installed properly.

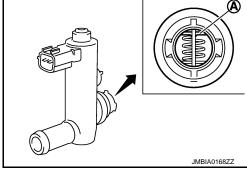
Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

♥Without CONSULT

- 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.



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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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 >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

(I) With CONSULT

- 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.
- Check air passage continuity and operation delay time.Make sure that new O-ring is installed properly.

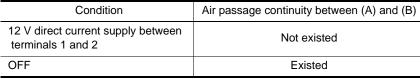
Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- Check air passage continuity and operation delay time under the following conditions.

Make sure that new O-ring is installed properly.

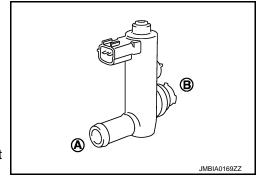


Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".



[VQ37VHR]

P0448 EVAP CANISTER VENT CONTROL VALVE

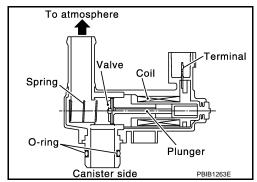
Description

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 valve 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 No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	EVAP canister vent control valve EVAP control system pressure sensor and the circuit Blocked rubber tube to EVAP canister vent control valve EVAP canister is saturated with water	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.
- Turn ignition switch ON.
- 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.
- 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.

Do not exceed 2 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.
- 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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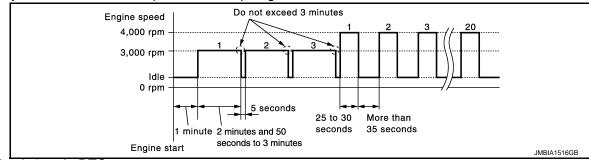
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[VQ37VHR]

Fully released accelerator pedal and keep engine idle for at least 35 seconds.



Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-352, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462791

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-353, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

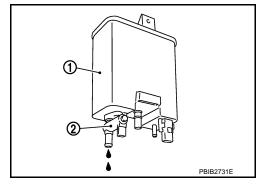
NO >> Replace EVAP canister vent control valve.

${f 3}.$ 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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection
 - >> Repair hose or replace EVAP canister. Refer to FL-14, "Exploded View".

6.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 7.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-357, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

8.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

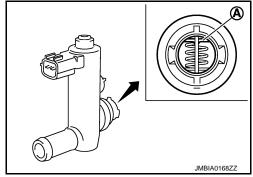
$oldsymbol{1}$.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 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. Refer to FL-14, "Exploded View".

>> GO TO 2. NO



2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

(P)With CONSULT

- 1. Reconnect harness connectors disconnected.
- Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time.

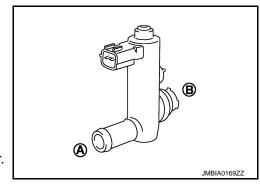
Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

♥Without CONSULT

Disconnect EVAP canister vent control valve harness connector.



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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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 >> GO TO 3.

3.check evap canister vent control valve-iii

(I) With CONSULT

- 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

- 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.

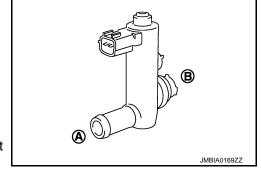
Condition	Air passage continuity between (A) and (B)	
12 V direct current supply between terminals 1 and 2	Not existed	
OFF	Existed	

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".



P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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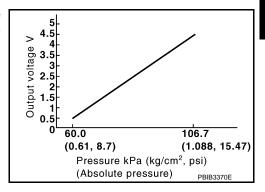
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P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:000000007462793

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

Trouble diagnosis name DTC No. DTC detecting condition Possible cause Harness or connectors (EVAP control system pressure sensor circuit is shorted.) [CKP sensor (POS) circuit is shorted.] Н (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is EVAP control system ECM detects a sloshing signal from the EVAP P0451 pressure sensor perforcontrol system pressure sensor (Brake booster pressure sensor circuit is mance 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.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-355, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462795

1. CHECK GROUND CONNECTION

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P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- 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.

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		
B252	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.

EC	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	B252	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-324. "Component Inspection".)
- Brake booster pressure sensor (Refer to <u>EC-400, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to HAC-95, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-504, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

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P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > NO >> GO TO 7. 7.replace accelerator pedal assembly Α Replace accelerator pedal assembly Go to EC-504, "Special Repair Requirement". EC >> INSPECTION END 8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Refer to EC-357, "Component Inspection". Is the inspection result normal? D YES >> GO TO 9. NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View". 9. CHECK INTERMITTENT INCIDENT Е Refer to GI-43, "Intermittent Incident". F >> INSPECTION END Component Inspection INFOID:0000000007462796 1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Turn ignition switch OFF. 2. Remove EVAP control system pressure sensor with its harness connector. Н Always replace O-ring with a new one. 3. Install a vacuum pump to EVAP control system pressure sensor. 4. Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions. **ECM** Condition Voltage (V) [Applied vacuum kPa (kg/cm², psi)] Connector **Terminal Terminal** Not applied 1.8 - 4.8 M107 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. L • 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. Refer to <u>FL-14. "Exploded View"</u>.

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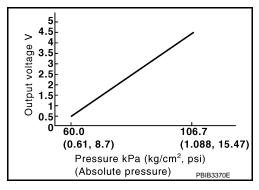
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[VQ37VHR]

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:000000007462797

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

INFOID:0000000007462798

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low input	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

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.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 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.
- 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.

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P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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Set voltmeter probes to ECM harness connector terminals as per the following.

ECM + Connector Terminal **Terminal** 106 128 M107 (Fuel tank temperature sensor signal) (ECM ground)

Make sure that the voltage is less than 4.2 V. 3.

- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and wait at least 20 seconds.
- 8. Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-359, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462799

CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- 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-I

- Turn ignition switch ON.
- Check the voltage between EVAP control system pressure sensor harness connector and ground. 2.

EVAP control syste	em pressure sensor	Ground	Voltage (V)	
Connector	Terminal	Ground		
B252	3	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 4.

f 4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EC-359

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B252	3	M107	107	Existed

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 connectors B39, B331
- Harness connectors B254, B332
- 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	
	46	CKP sensor (POS)	F2	1	
M107	103	APP sensor	E112	6	
	107	EVAP control system pressure sensor	B252	3	
		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 <u>EC-324, "Component Inspection"</u>.)
- Brake booster pressure sensor (Refer to <u>EC-400, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to <u>HAC-95</u>, "<u>Diagnosis Procedure</u>".)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8. CHECK APP SENSOR

Refer to EC-504, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly
- Go to <u>EC-504</u>, "Special Repair Requirement".

>> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and

< DTC/CIRCUIT DIAGNOSIS >

SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure **ECM** sensor Continuity Connector Terminal Connector **Terminal** B252 M107 112 Existed

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 connectors B39, B331
- Harness connectors B254, B332
- 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

Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

	EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal		
B252	2	M107	102	Existed	

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 B1, M7
- Harness connectors B39, B331
- Harness connectors B254, B332
- 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 EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-362, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

15. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

>> INSPECTION END

Component Inspection

INFOID:0000000007462800

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector.

Always replace O-ring with a new one.

- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. 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	[ripplied vacadin in a (ng/cm , pol/)]	
M107	102	110	Not applied	1.8 - 4.8
M107	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. Refer to FL-14, "Exploded View".

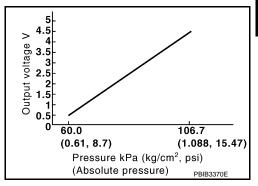
< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:0000000007462801

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. DTC detecting condition Possible cause Trouble diagnosis name Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] Н (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Brake booster pressure sensor circuit is shorted) An excessively high voltage EVAP control system pressure EVAP control system pressure sensor P0453 from the sensor is sent to sensor high input Crankshaft position sensor (POS) ECM. · 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.

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

(P)With CONSULT

- 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.
- Turn ignition switch OFF and wait at least 10 seconds. 4.
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT. 6.
- Make sure that "FUEL T/TMP SE" is more than 0°C (32°F). 7.
- Start engine and wait at least 20 seconds.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Check 1st trip DTC.

With GST

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

- 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-364, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462803

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- 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.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch ON.
- Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control syste	em pressure sensor	Ground	Voltage (V)
Connector	Terminal	Giodila	voltage (v)
B252	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

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	system pressure nsor	ECM		Continuity
Connector	Terminal	Connector	Terminal	
B252	3	M107	107	Existed

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Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

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5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M7, B1
- Harness connectors B39, B331
- Harness connectors B254, B332
- Harness for open between ECM and EVAP control system pressure sensor

>> Repair open circuit.

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6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

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ECIVI		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	B252	3	
		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.

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7. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-324, "Component Inspection"</u>.)
- Brake booster pressure sensor (Refer to <u>EC-400, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to <u>HAC-95</u>, "<u>Diagnosis Procedure</u>".)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8. CHECK APP SENSOR

Refer to EC-504, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 20.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly
- 2. Go to EC-504, "Special Repair Requirement".

>> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

SHORT

- 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 pressure sensor		EC	M	Continuity
Connector	Terminal	Connector	Terminal	Continuity
B252	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 connectors B39, B331
- Harness connectors B254, B332
- 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

Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

	ystem pressure nsor	E	ECM	
Connector	Terminal	Connector	Terminal	
B252	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.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M7
- · Harness connectors B39, B331
- Harness connectors B254, B332
- 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-349, "Component Inspection".

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Is the inspection result normal? Α YES >> GO TO 16. NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View". 16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR EC Refer to EC-367, "Component Inspection". Is the inspection result normal? YES >> GO TO 17. NO >> Replace EVAP control system pressure sensor. Refer to . 17.CHECK IF EVAP CANISTER IS SATURATED WITH WATER D Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Check if water will drain from the EVAP canister (1). Е 2 : EVAP canister vent control valve Does water drain from EVAP canister? **①** F >> GO TO 18. YES NO >> GO TO 20. PBIB2731E Н 18. 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 20. NO >> GO TO 19. 19. 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. Refer to FL-14, "Exploded View".

20.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Turn ignition switch OFF.

Component Inspection

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.

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INFOID:0000000007462804

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

ECM			Condition	
Connector	+	_	Condition [Applied vacuum kPa (kg/cm², psi)] Terminal	Voltage (V)
Connector	Terminal	Terminal		
M107	102	112	Not applied	1.8 - 4.8
MTU7	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.
- 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. Refer to <u>FL-14, "Exploded View"</u>.

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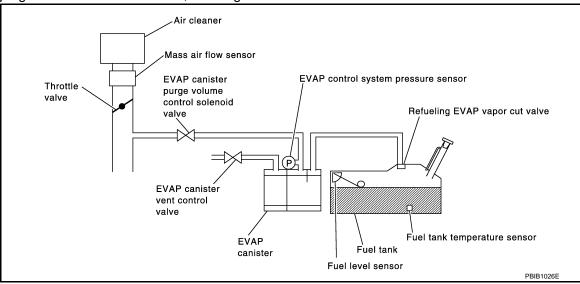
P0456 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.

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 leak	 EVAP system has a 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 Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing 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 solenoid valve 	

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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P0456 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

If DTC Confirmation Procedure has been previously conducted, always perform the following 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.

Do you have CONSULT?

YES >> GO TO 2. NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode with CONSULT.
- Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON".

NOTE:

It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".

3. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

- 4. Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode with CONSULT.
- 5. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 3.

YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3.PERFORM COMPONENT FUNCTION CHECK-II

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-370, "Diagnosis Procedure".

NO >> INSPECTION END

4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait engine idle for at least 2 hours.
- 2. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-370, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462806

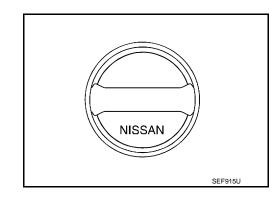
1. CHECK FUEL FILLER CAP DESIGN

- 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.



P0456 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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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. Then 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?

>> GO TO 5. YES

NO >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-549, "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-623, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.

NO >> GO TO 6.

6.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

EVAP canister vent control valve is installed properly.

Refer to FL-16, "Removal and Installation".

EVAP canister vent control valve.

Refer to EC-349, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-14, "Exploded View".

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

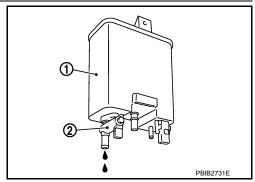
- Remove EVAP canister (1) with EVAP canister vent control valve (2) and EVAP control system pressure sensor attached.
- Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 8.

NO-1 >> With CONSULT: GO TO 10.

NO-2 >> Without CONSULT: GO TO 11.



8. CHECK EVAP CANISTER

Weigh the EVAP canister assembly 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: GO TO 10.

YES-2 >> Without CONSULT: GO TO 11.

NO >> GO TO 9.

Revision: 2013 February

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. Refer to FL-14, "Exploded View".

10.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- 1. Disconnect vacuum hose connected to EVAP service port and EVAP canister purge volume control solenoid valve from EVAP service port.
- Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- 4. Touch "Qu" on CONSULT 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

- 1. Start engine and warm it up to normal operating temperature.
- 2. Stop engine.
- 3. Disconnect vacuum hose 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-116, "System Diagram".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-342, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-181, "Exploded View".

14. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-298, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace fuel level sensor unit. Refer to FL-5, "Exploded View".

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-357, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

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P0456 EVAP CONTROL SYSTEM

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View". 16. CHECK EVAP PURGE LINE Α Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-116, "System Diagram". EC 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. D >> GO TO 18. 18. CHECK EVAP/ORVR LINE Е Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kinks, looseness and improper connection. For location, refer to EC-546, "Description". Is the inspection result normal? F YES >> GO TO 19. NO >> Repair or replace hoses and tubes. 19. CHECK RECIRCULATION LINE Check recirculation line between fuel filler tube and fuel tank for clogging, kinks, cracks, looseness and improper connection. Н Is the inspection result normal? YES >> GO TO 20. NO >> Repair or replace hose, tube or fuel filler tube. 20.CHECK REFUELING EVAP VAPOR CUT VALVE Refer to EC-549, "Component Inspection". Is the inspection result normal? YES >> GO TO 21. >> Replace refueling EVAP vapor cut valve with fuel tank. NO 21. CHECK FUEL LEVEL SENSOR K Refer to MWI-56, "Component Inspection". Is the inspection result normal? YES >> GO TO 22. NO >> Replace fuel level sensor unit. Refer to FL-5, "Exploded View". 22.check intermittent incident M Refer to GI-43, "Intermittent Incident". N >> INSPECTION END Component Inspection INFOID:0000000007462807 1. CHECK FUEL TANK VACUUM RELIEF VALVE Turn ignition switch OFF. Remove fuel filler cap. Р

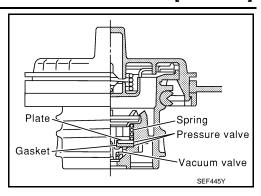
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P0456 EVAP CONTROL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

3. Wipe clean valve housing.



4. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm², 2.22 -

2.90 psi)

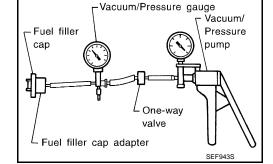
Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm²,

-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.

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INFOID:0000000007462810

P0460 FUEL LEVEL SENSOR

Description INFOID:0000000007462808

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:000000007462809

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 EC-406, "DTC Logic".

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	G
-	P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being 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	Н

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and wait maximum of 2 consecutive minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-375, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to MWI-54, "Component Function Check".

2.CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

EC-375

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P0461 FUEL LEVEL SENSOR

Description INFOID:0000000007462811

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:0000000007462812

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 EC-406, "DTC Logic".

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	G
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 distance.	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	Н

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-377, "Component Function Check".

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-378, "Diagnosis Procedure".

Component Function Check

1.PRECONDITIONING

When performing the following procedure, always observe the handling of the fuel. Refer to FL-6, "Removal and Installation".

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.PERFORM COMPONENT FUNCTION CHECK

(P)With CONSULT

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.

Prepare a fuel container and a spare hose.

EC-377

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P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- Release fuel pressure from fuel line, refer to <u>EC-622, "Inspection"</u>.
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
- 6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT.
- 7. Check "FUEL LEVEL SE" output voltage and note it.
- 8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT.
- 9. 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.
- 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 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-378, "Diagnosis Procedure".

3.perform component function check

⊗Without CONSULT

NOTE:

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.
- 2. Release fuel pressure from fuel line. Refer to EC-622, "Inspection".
- 3. Remove the fuel feed hose on the fuel level sensor unit.
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch ON.
- 6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 7. 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.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-378, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007462814

2012 G Sedan

1. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to MWI-54, "Component Function Check".

2. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

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P0462, P0463 FUEL LEVEL SENSOR

Description INFOID:0000000007462815

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

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-406, "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.

- 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-379, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

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NO >> Go to MWI-54, "Component Function Check".

2. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

EC-379

2012 G Sedan

INFOID:0000000007462817

P0462, P0463 FUEL LEVEL SENSOR

[VQ37VHR]

P0500 VSS

A/T MODELS

A/T MODELS: Description

INFOID:0000000007462818

ECM receives vehicle speed signals from two different paths via CAN communication line: One is from the ABS actuator and electric unit (control unit) via the combination unit and the other is from TCM.

A/T MODELS: DTC Logic

INFOID:0000000007462819

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 EC-406, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	At 20 km/h (13 MPH), ECM detects the following status continuously for 5 seconds or more: The difference between a vehicle speed calculated by a output speed sensor transmitted from TCM to ECM via CAN communication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).	 Harness or connector (The CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM Output speed 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.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 2.

2.perform dtc confirmation procedure

- Shift the selector lever to D range and wait at least for 2 seconds. 2.
- Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more.

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.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-381, "A/T MODELS: Diagnosis Procedure"

>> INSPECTION END NO

A/T MODELS: Diagnosis Procedure

INFOID:0000000007462820

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-150, "CONSULT Function".

Is the inspection result normal?

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YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-27, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated.

3.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble shooting relevant to DTC indicated.

4. CHECK OUTPUT SPEED SENSOR

Check output speed sensor. Refer to TM-290, "2WD: Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace or replace error-detected parts.

5. CHECK WHEEL SENSOR

Check wheel sensor. Refer to BRC-110, "FRONT WHEEL SENSOR: Removal and Installation".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Replace or replace error-detected parts.

M/T MODELS

M/T MODELS: Description

INFOID:0000000007462821

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.

M/T MODELS : DTC Logic

INFOID:0000000007462822

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-406</u>, "<u>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 shorted) 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?

Do you have CONSULT?

>> GO TO 5.

YES >> GO TO 2.

NO

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.
- Turn ignition switch ON.
- 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

- Start engine (VDC switch OFF).
- Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT. The vehicle speed on CONSULT 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 EC-384, "M/T MODELS : Diagnosis Procedure".

f 4 -PERFORM DTC CONFIRMATION PROCEDURE

- Select "DATA MONITOR" mode with CONSULT.
- Warm engine up to normal operating temperature.
- Maintain the following conditions for at least 50 consecutive seconds.

Always drive 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 Neutral position
PW/ST SIGNAL	OFF

Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-384, "M/T MODELS: Diagnosis Procedure".

NO >> INSPECTION END

${f 5}$.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-383, "M/T MODELS: Component Function Check".

Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

>> Go to EC-384, "M/T MODELS: Diagnosis Procedure".

M/T MODELS : Component Function Check

1. PERFORM COMPONENT FUNCTION CHECK

With GST

- 1. Lift up drive wheels.
- Start engine.
- Read vehicle speed signal in Service \$01 with GST.

The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

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P0500 VSS

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-384, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Diagnosis Procedure

INFOID:0000000007462824

 $1.\mathsf{CHECK}\ \mathsf{DTC}\ \mathsf{WITH}\ \mathsf{``ABS}\ \mathsf{ACTUATOR}\ \mathsf{AND}\ \mathsf{ELECTRIC}\ \mathsf{UNIT}\ (\mathsf{CONTROL}\ \mathsf{UNIT})"$

Refer to BRC-27, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

P0506 ISC SYSTEM

Description INFOID:0000000007462825

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:0000000007462826

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 actuator Intake 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.

- 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.

If the idle speed is out of the specified value, perform EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement", 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

- 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.
- Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and run it for at least 1 minute at idle speed.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-385, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1.CHECK INTAKE AIR LEAK

- Start engine and let it idle.
- Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

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INFOID:0000000007462827

Revision: 2013 February

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

YES >> Discover air leak location and repair.

NO >> GO TO 2.

2.REPLACE ECM

- 1. Stop engine.
- 2. Replace ECM.
- 3. Go to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

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P0507 ISC SYSTEM

Description INFOID:0000000007462828

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

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 actuator Intake air leak PCV 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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

If the idle speed is out of the specified value, perform <u>EC-36, "IDLE AIR VOLUME LEARNING : Special 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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-387, "Diagnosis Procedure".

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.

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EC-387

2012 G Sedan

INFOID:0000000007462830

P0507 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> Repair or replace.

2. 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?

YES >> Discover air leak location and repair.

NO >> GO TO 3.

3. REPLACE ECM

- 1. Stop engine.
- 2. Replace ECM.
- 3. Go to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

P050A, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P050A, P050E COLD START CONTROL

Description INFOID:0000000007462831

ECM controls ignition timing and engine idle speed when engine is started with pre-warming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

INFOID:0000000007462832

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P050A or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P050A	Cold start idle air control system performance	ECM does not control engine idle speed properly when engine is started with pre-warming up condition.	Lack of intake air volume
P050E	Cold start engine exhaust temperature too low	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	Fuel injection system 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.
- Turn ignition switch ON.
- 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

(P)With CONSULT

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- Check the indication of "COOLAN TEMP/S".

Follow the procedure "With CONSULT" above.

Is the value of "COOLAN TEMP/S" between 4°C (39°F) and 36°C (97°F)?

>> GO TO 3.

NO-1 [If it is below 15°C (59°F)]>>Warm up the engine until the value of "COOLAN TEMP/S" reaches 15°C (59°F) or more. Retry from step 1.

NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

(P)With CONSULT

- Set the select lever in N range.
- Start the engine and warm up in idle with the value of "COOLAN TEMP/S" between -10°C (14°F) and 40°C (104°F) for more than 15 seconds.
- 3. Check 1st trip DTC.

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-390, "Diagnosis Procedure".

NO >> INSPECTION END

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Revision: 2013 February

P050A, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462833

1. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-36, "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
- Clogging of throttle body

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part

3.check fuel injection system function

Perform DTC Confirmation Procedure for DTC P0171, P0174. Refer to EC-287, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-288, "Diagnosis Procedure" for DTC P0171, P0174.

4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure.

See EC-389, "DTC Logic".

Is the 1st trip DTC P050A or P050E displayed again?

YES >> GO TO 5.

NO >> INSPECTION END

5.REPLACE ECM

- 1. Replace ECM.
- Go to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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 EC-210, "DTC Logic"

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-9, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to LU-9, "Inspection".

3.PERFORM DTC CONFIRMATION PROCEDURE

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

ENG SPEED	More than 1,700 rpm	
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.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-392, "Diagnosis Procedure"

NO >> INSPECTION END

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Diagnosis Procedure

INFOID:0000000007462835

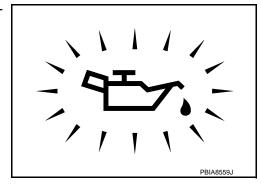
1. CHECK OIL PRESSURE WARNING LAMP

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

Is oil pressure warning lamp illuminated?

YES >> Go to <u>LU-9</u>, "Inspection".

NO >> GO TO 2.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-195, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-202, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-324, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS). Refer to EM-273, "Exploded View".

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-328, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-202, "Exploded View".

5.CHECK CAMSHAFT (INTAKE)

Check the following.

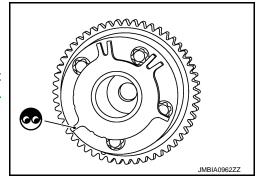
- Accumulation of debris to the signal plate of camshaft front end
- · Chipping signal plate of camshaft front end

Is the inspection result normal?

YES >> GO TO 6.

NO >> Remove

>> Remove debris and clean the signal plate of camshaft front end or replace camshaft. Refer to EM-246, "Exploded View".



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-203, "Removal and Installation".

NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to EM-256, "Inspection".

P0524 ENGINE OIL PRESSURE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

INFOID:0000000007462836

>> INSPECTION END

Component Inspection

${f 1}$.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- Turn ignition switch OFF.
- 2. Disconnect intake valve timing control solenoid valve harness connector.
- 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. Refer to EM-202, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

- Remove intake valve timing control solenoid valve.
- 2. 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:

NO

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

Is the inspection result normal?

YES >> INSPECTION END

>> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-202, "Exploded View".

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P0550 PSP SENSOR

Description INFOID:000000007462837

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

DTC DETECTION LOGIC

NOTE:

If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-407, "DTC Logic".

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

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.
- 2. Turn ignition switch ON.
- 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 at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-394, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462839

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

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	Giodila	voltage (v)
F35	3	Ground	Approx. 5

P0550 PSP SENSOR

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS >

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 PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

PSP sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Outlinuity	
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 sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
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-395, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace PSP sensor. Refer to ST-56, "2WD: Exploded View".

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK POWER STEERING PRESSURE SENSOR

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 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	Being turned	0.5 - 4.5
				Not being turned	0.4 - 0.8
		1.	10		

Is the inspection result normal?

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P0550 PSP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

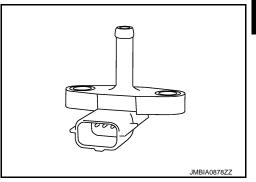
YES >> INSPECTION END

NO >> Replace power steering pressure sensor. Refer to <u>ST-56, "2WD : Exploded View"</u>.

P0555 BRAKE BOOSTER PRESSURE SENSOR

Description INFOID:0000000007462841

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 INFOID:0000000007462842

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

^{*:} Except for Mexico

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.
- Turn ignition switch ON.
- 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 10 seconds.
- Check DTC.

Is DTC detected?

>> Go to EC-397, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

>> GO TO 2. YES

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INFOID:0000000007462843

P0555 BRAKE BOOSTER PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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	pressure sensor	Ground	Voltage (V)	
Connector Terminal		Ground	vollage (v)	
E48	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

3.CHECK BRAKE BOOSTER PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- 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		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E48	1	F101	45	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- · Harness for open between ECM and brake booster pressure sensor

>> Repair open circuit.

5. 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*	B252	3	
		Refrigerant pressure sensor	E77	3	

^{*:} Except for Mexico

Is the inspection result normal?

YES >> GO TO 6.

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

6. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-324, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-357, "Component Inspection".) (Except for Mexico)
- Refrigerant pressure sensor (Refer to <u>HAC-95, "Component Function Check"</u>.)

P0555 BRAKE BOOSTER PRESSURE SENSOR [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Is the inspection result normal? Α YES >> GO TO 7. NO >> Replace malfunctioning component. 7. CHECK APP SENSOR EC Refer to EC-504, "Component Inspection". Is the inspection result normal? YES >> GO TO 14. NO >> GO TO 8. 8.REPLACE ACCELERATOR PEDAL ASSEMBLY Replace accelerator pedal assembly Go to EC-504, "Special Repair Requirement". Е >> INSPECTION END 9.check brake booster pressure sensor ground circuit for open and short Turn ignition switch OFF. Disconnect ECM harness connector. Check the continuity between brake booster pressure sensor harness connector and ECM harness connector. Brake booster pressure sensor **ECM** Continuity Connector Terminal Connector Terminal Н E48 F101 36 Existed

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 E40, F39
- 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

Check the continuity between brake booster pressure sensor harness connector and ECM harness connector.

Brake booster	ECM		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 E40, F39
- 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.

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P0555 BRAKE BOOSTER PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

13. CHECK BRAKE BOOSTER PRESSURE SENSOR

Refer to EC-400, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace brake booster pressure sensor. Refer to <u>BR-41</u>, "Exploded View".

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462844

1. CHECK BRAKE BOOSTER PRESSURE SENSOR-I

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

ECM				
Connector	+	_		
Connector	Terminal	Terminal		
F101	39	36		

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 depends 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.

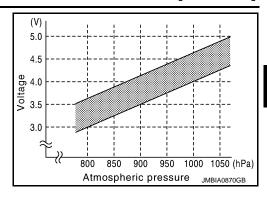
Altitude (m)	Compensated pressure (hPa)
0	0
200	-24
400	-47
600	-70
800	-92
1000	-114
1500	-168
2000	-218

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

P0555 BRAKE BOOSTER PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Voltage (V)
3.1 – 3.7
3.3 – 3.9
3.5 – 4.1
3.8 – 4.3
4.0 – 4.6
4.2 - 4.8



Is the inspection result normal?

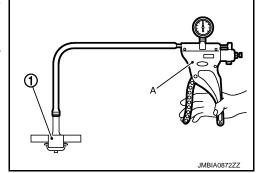
YES >> GO TO 2.

NO >> Replace brake booster pressure sensor. Refer to <u>BR-41</u>, "Exploded View".

2.CHECK BRAKE BOOSTER PRESSURE SENSOR-II

- 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.
- 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. Refer to <u>BR-41</u>, "Exploded View".

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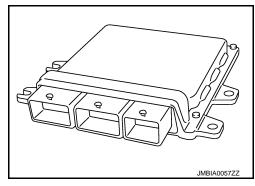
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P0603 ECM POWER SUPPLY

Description INFOID:000000007462845

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
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.] 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.
- 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. 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-402, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462847

1. CHECK ECM POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the voltage between ECM harness connector terminals as per the following.

P0603 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

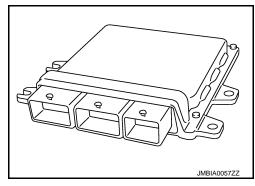
[VQ37VHR]

	E	СМ				А
	+	-	_	Voltage	_	
Connector	Terminal	Connector	Terminal			EC
F102	93	M107	128	Battery voltage		
Is the inspe						
	GO TO 3. GO TO 2.					С
2.DETEC	T MALFUN	CTIONING	PART			
Check the	following.					D
Harness15 A fuse		E40, F39				
		connector Ei short betwe		nd hattary		Е
• паптезз	ioi open oi	SHOIL DELWE	en Ecivi ai	id battery		
>>	> Repair or	replace har	ness or con	nectors.		F
3. CHECK	INTERMIT	TENT INCI	DENT			
Refer to GI	-43, "Interm	nittent Incide	ent".			G
Is the inspe						
	GO TO 4. Repair or	replace har	ness or con	nectors.		Н
4	-	ONFIRMAT				
	nition switc	h ON.			_	
 Erase Perfor 		nfirmation	Procedure			I
See <u>E(</u>	C-402, "DTO	C Logic".		•		
	=	603 displaye	ed again?			J
_	ON TO 5. INSPECT					
5.REPLAC						K
	e ECM.					
	EC-32, "AI ement".	DDITIONAL	SERVICE	WHEN REPLA	CING CONTROL UNIT (ECM) : Special Repair	L
•						
>>	NSPECT	ION END				\mathbb{N}
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P0605 ECM

Description INFOID:0000000007462848

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	
			ECM calculation function is malfunctioning.		
P0605	Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM	
		C)	ECM self shut-off function is malfunctioning.		

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

- 1. Turn ignition switch ON.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-405, "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.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-405, "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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

P0605 ECM

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > YES >> Go to EC-405, "Diagnosis Procedure". NO >> INSPECTION END Α Diagnosis Procedure INFOID:0000000007462850 1. INSPECTION START EC Turn ignition switch ON. Erase DTC. C 3. Perform DTC Confirmation Procedure. See EC-404, "DTC Logic". Is the 1st trip DTC P0605 displayed again? D YES >> GO TO 2. NO >> INSPECTION END 2.REPLACE ECM Е 1. Replace ECM. 2. Go to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement". F >> INSPECTION END Н K L M Ν 0 Р

P0607 ECM

Description INFOID:000000007462851

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

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- Check DTC.

Is DTC detected?

YES >> Go to EC-406, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462853

1. INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure.

See EC-406, "DTC Logic".

4. Check DTC.

Is the DTC P0607 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P0643 SENSOR POWER SUPPLY

DTC Logic

DTC DETECTION LOGIC

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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	C D

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.
- 2. Turn ignition switch ON.
- 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-407, "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-46, "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.
- Check the voltage between APP sensor harness connector and ground.

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2012 G Sedan

INFOID:0000000007462855

< DTC/CIRCUIT DIAGNOSIS >

APP	sensor	Ground	Voltage (V)	
Connector	Terminal	Giodila	voitage (v)	
E112	5	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3.

3.check sensor power supply circuits

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
43		Electric throttle control actuator (bank 2)	F27	1		
F101 44	44	Electric throttle control actuator (bank 1)	F6	6		
		CMP sensor (PHASE) (bank 1)	F5	1		
	60	Manifold absolute pressure (MAP) sensor	F50	1		
F102		PSP sensor	F35	3		
		CMP sensor (PHASE) (bank 2)	F18	1		
		Battery current sensor	E21	1		
M107	99	APP sensor	E112	5		

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK COMPONENTS

Check the following.

- Camshaft position sensor (PHASE) (bank 1) (Refer to <u>EC-328, "Component Inspection"</u>.)
- Manifold absolute pressure (MAP) sensor (Refer to <u>EC-225</u>, "Component Inspection".)
- Power steering pressure sensor (Refer to EC-395, "Component Inspection".)
- Camshaft position sensor (PHASE) (bank 2) (Refer to <u>EC-328, "Component Inspection"</u>.)
- Battery current sensor (Refer to EC-457, "Component Inspection".)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning component.

CHECK TP SENSOR

Refer to EC-239, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace electric throttle control actuator.
- Go to EC-239, "Special Repair Requirement".

>> INSPECTION END

7. CHECK APP SENSOR

Refer to EC-504, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

P0643 SENSOR POWER SUPPLY

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > NO >> GO TO 8. 8.REPLACE ACCELERATOR PEDAL ASSEMBLY Α Replace accelerator pedal assembly.
 Go to <u>EC-504</u>, "Special Repair Requirement". EC >> INSPECTION END 9.CHECK INTERMITTENT INCIDENT Refer to GI-43, "Intermittent Incident". D >> INSPECTION END Е F Н K L M Ν 0 Р

EC-409 Revision: 2013 February 2012 G Sedan

P0850 PNP SWITCH

Description INFOID.000000007462856

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

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 CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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 PNP SWITCH SIGNAL

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
N or P position (A/T) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-411, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- Maintain the following conditions for at least 50 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

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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? VES SO to EC-411	'Diagnosis Procedure"			
YES >> Go to <u>EC-411, "Diagnosis Procedure"</u> . NO >> INSPECTION END 5. PERFORM COMPONENT FUNCTION CHECK				

Perform component function check. Refer to EC-411, "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-411, "Diagnosis Procedure".

Component Function Check

1. PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.

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

ECM						
Connector	+	_	Condition		Voltage (V)	
Connector	Terminal	Terminal				
M107	109	128	P or N (A/ Selector lever Neutral (M		Battery voltage	
				Except above	Approx. 0	

Is the inspection result normal?

>> INSPECTION END YES

>> Go to EC-411, "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 DTC WITH TCM

Refer to TM-149, "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?

INFOID:0000000007462859

INFOID:0000000007462858

EC-411

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 4.

NO >> Check DTC with BCM. Refer to <u>BCS-16, "COMMON ITEM : CONSULT Function (BCM - COM-MON ITEM)"</u>.

${f 4.}$ CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect A/T assembly harness connector.
- 3. Disconnect ECM harness connector.
- 4. Check the continuity between A/T assembly harness connector and ECM harness connector.

A/T ass	embly	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F51	9	M107	109	Existed

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

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- Harness connectors E106, M6
- · Harness for open or short between A/T assembly and ECM

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

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

7.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect park/neutral position (PNP) switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between PNP switch harness connector and ground.

PNP	switch	Ground	Voltage	
Connector	Connector Terminal		vollage	
F55	2	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 10 A fuse (No. 43)
- IPDM E/R harness connector E7
- Harness for open or short between PNP switch and fuse

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

9. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

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P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

3. Check the continuity between PNP switch harness connector and ECM harness connector.

 PNP switch
 ECM
 Continuity

 Connector
 Terminal
 Connector
 Terminal

 F55
 1
 M107
 109
 Existed

EC

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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-10, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace PNP switch. Refer to TM-10, "Component Parts Location".

12. CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Exploded View".

NO >> Repair or replace.

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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-427</u>, "<u>DTC Logic</u>".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P100A	VVEL response malfunction (bank 1)		Harness or connectors (VVEL actuator motor circuit is open or shorted.)
P100B	VVEL response malfunction (bank 2)	Actual event response to target is poor.	VVEL actuator motorVVEL actuator sub assemblyVVEL ladder assemblyVVEL 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.

- 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.
- 2. Depress the accelerator pedal rapidly half or more under no load conditions, and then release it.
- 3. Wait at idle for 5 seconds or more.
- 4. Repeat steps 2 to 3 for three times.
- Check 1st trip DTC.

Is DTC detected?

YES >> Go to EC-414, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462861

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- Disconnect VVEL actuator motor harness connector.
- Check the continuity between VVEL control module harness connector and VVEL actuator motor harness connector.

DTO N	\	VVEL control module		VVEL actuator motor		Continuity	
DTC No.	Bank	Connector	Terminal	Connector	Terminal	- Continuity	_
			40		1	Existed	
D4004	4		12	F40	2	Not existed	
P100A	0A 1		0.5	F48	1	Not existed	
			25		2	Existed	
		E15			1	Existed	
Dicop	•		2	5 40	2	Not existed	
P100B	2			F49	1	Not existed	
			15		2	Existed	
YES >> G NO >> G	ion result no GO TO 4. GO TO 3. MALFUNCTI	ONING PART					
	nnectors E40), F39 rt between VVI	EL actuator m	notor and VVE	L control mo	dule	
		inavit abantta	ground or che				
		•	ground or sne	ort to power in	harness or o	connectors.	
.CHECK V\	VEL ACTUA	TOR MOTOR		· 		connectors.	
•CHECK VV	VEL ACTUA	TOR MOTOR		· 		connectors.	
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- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-414, "DTC Logic"</u>.

Is the DTC P100A or P100B displayed again?

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< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

YES >> GO TO 9.

NO >> INSPECTION END

9. CHECK VVEL ACTUATOR SUB ASSEMBLY

Refer to EC-416, "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-417, "Special Repair Requirement".

>> INSPECTION END

11. CHECK VVEL LADDER ASSEMBLY

Refer to EM-256, "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-417, "Special Repair Requirement".

>> INSPECTION END

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (VVEL ACTUATOR MOTOR)

INFOID:0000000007462862

1. CHECK VVEL ACTUATOR MOTOR

- Turn ignition switch OFF.
- 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-417, "Special Repair Requirement".

>> INSPECTION END

Component Inspection (VVEL ACTUATOR SUB ASSEMBLY)

INFOID:0000000007462863

1. CHECK VVEL ACTUATOR SUB ASSEMBLY

1. Turn ignition switch OFF.

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P100A, P100B VVEL SYSTEM

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Remove VVEL actuator sub assembly. Refer to EM-247, "Disassembly and Assembly". Turn the ball screw shaft to check that it works smoothly. Α Is the inspection result normal? YES >> INSPECTION END >> GO TO 2. NO EC 2.replace vvel actuator sub assembly Replace VVEL actuator sub assembly. Go to EC-417, "Special Repair Requirement". >> INSPECTION END D Special Repair Requirement INFOID:0000000007462864 1. PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT Е Refer to EC-38, "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT: Special Repair Requirement". F >> GO TO 2. 2.PERFORM IDLE AIR VOLUME LEARNING Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement". Н >> END K M Ν

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P1087, P1088 VVEL SYSTEM

DTC Logic

DTC DETECTION LOGIC

NOTE

If DTC P1087 or P1088 is displayed with DTC P1090 or P1093.

Perform the trouble diagnosis for DTC P1090 or P1093. Refer to EC-423, "DTC Logic".

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
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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

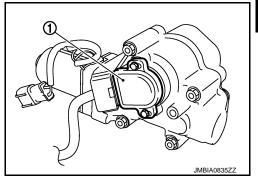
Description INFOID:0000000007462866

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.



DTC Logic INFOID:0000000007462867

DTC DETECTION LOGIC

NOTE:

If DTC P1089 or P1092 is displayed with DTC P1608, first perform the trouble diagnosis for DTC P1608. Refer to EC-496, "DTC Logic".

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 position 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.

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

- Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

>> Go to EC-419, "Diagnosis Procedure". YES

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

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INFOID:0000000007462868

[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.vvel control shaft position sensor power supply circuit

- 1. Disconnect VVEL control shaft position sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between VVEL control shaft position sensor harness connector and ground.

DTC No.	VVEL control shaft position sensor			Ground	\/oltogo (\/)	
DIC No.	Bank	Connector Terminal		Ground	Voltage (V)	
P1089	1	F46	3			
F 1009	'	1 40	6	Ground	A = = = = = = = = =	
P1002	P1092 2		3	Ground	Approx. 5	
F 1092	2 F47	Г47	6			

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

${f 3.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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.

4. CHECK VVEL CONTROL SHAFT POSITION SENSOR GROUND 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 control shaft position sensor			VVEL control module			
DTC No.	Bank	·		Connector Terminal		Continuity	
D4000	4	F40	2		4		
P1089	P1089 1	F46	5	F45	17	Existed	
D4000	2	F47	2	- E15	6		
P1092	2 F47	5		19			

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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.

6. 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]

5-0.11	VVEL co	ontrol shaft position sensor VVEL control mode		VVEL control module		_	
DTC No.	Bank	Connector	Terminal	Connector	Terminal	Continuity	
D4000	4	F40	1		3		_
P1089	1	F46	4	F45	16	- Cylinta d	
D4000	2	E47	1	- E15	5	Existed	
P1092	2	F47	4		18		
2. Also chec	k harness for	short to groun	d and power.				_
s the inspecti	on result norn	nal?					
	O TO 8.						
_	O TO 7.						
DETECT N	MALFUNCTIO	NING PART					
Check the follo		F20					
	nnectors E40, open or short	t between VVE	L control sha	ft position sen	sor and VVFI	control mod	ule
	-1.5 5. 6						
>> R	epair open cir	rcuit, short to g	round or sho	rt to power in h	narness or cor	nnectors.	
	TERMITTEN	_					
Refer to GI-43	3, "Intermitten	t Incident"					
	on result norn						
-	O TO 9.	<u></u>					
	epair or repla	ce.					
REPLACE	VVEL CONT	ROL MODULE					
	/VEL control						
2. Go to <u>EC</u>	-33, "ADDITI	ONAL SERVIC	CE WHEN RE	EPLACING CO	NTROL UNI	T (VVEL COI	NTROL MOD-
<u>ULE) : Sp</u>	<u>eciai Repair F</u>	Requirement".					
>> G	O TO 10.						
		IFIRMATION F					
			ROCLDONL				
. Turn igniti . Erase DT	ion switch ON C.	I.					
. Perform D	OTC Confirma	tion Procedure	Э.				
· · · · · · · · · · · · · · · · · · ·	19, "DTC Log	•					
		2 displayed aga	ain?				
	O TO 11. ISPECTION E	=ND					
_		LND UATOR SUB <i>F</i>	CCEMDIV				
		r sub assembl <u>y</u> I Repair Requi					
. 00 10 <u>LC</u>	TZ I, OPECIAI	г керап кечиг	ionioni.				
>> IN	ISPECTION E	END					
	pair Requi						
, peciai 11 6	pan Nequii	i Gili Gill					INFOID:0000000007462869
.PERFORM	I VVEL CONT	TROL SHAFT I	POSITION SE	ENSOR ADJU	STMENT		
efer to EC-3	38, "VVEL CO	ONTROL SHA	FT POSITIO	N SENSOR A	DJUSTMENT	: Special Re	epair Require-

>> GO TO 2.

ment".

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

 $2.\mathsf{PERFORM}$ IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

INFOID:0000000007462871

P1090, P1093 VVEL ACTUATOR MOTOR

Description INFOID:0000000007462870

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.

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DTC Logic

DTC DETECTION LOGIC

If DTC P1090 or P1093 is displayed with DTC P1091, first perform the trouble diagnosis for DTC P1091. Refer to EC-427, "DTC Logic".

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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.

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

- Start engine and let it idle for 10 second.
- Keep the engine speed at about 3,500 rpm for at least 10 seconds under no load.
- Check DTC.

Is DTC detected?

YES >> Go to EC-423, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect VVEL control module harness connector.
- Disconnect VVEL actuator motor harness connector.
- Check the continuity between VVEL control module harness connector and VVEL actuator motor harness connector.

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INFOID:0000000007462872

DTC No.	VVEL control module			VVEL actuator motor		Continuity
DIC NO.	Bank	Connector	Terminal	Connector	Terminal	Continuity
			12		1	Existed
P1090	1		12	F48	2	Not existed
F 1090	ı	E15	25 2	F40	1	Not existed
					2	Existed
		E13		F40	1	Existed
D4000	2				2	Not existed
P1093			15	F49	1	Not existed
					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.

${f 3.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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-425, "Component Inspection (VVEL ACTUATOR MOTOR)".

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

REPLACE VVEL ACTUATOR SUB ASSEMBLY

- Replace VVEL actuator sub assembly.
- 2. Go to EC-426, "Special Repair Requirement".

>> INSPECTION END

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "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.
- Go to EC-33, "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.
- Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-423</u>, "<u>DTC Logic"</u>.

Is the DTC P1090 or P1093 displayed again?

P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGN	NOSIS >	[VQ37VHR]	
YES >> GO TO 9. NO >> INSPECTION	N END		А
9. CHECK VVEL ACTUA	ATOR SUB ASSEMBLY		
Refer to EC-425, "Compo	onent Inspection (VVEL ACTUATOR SUB ASSEMBLY)".	E(\sim
Is the inspection result no	ormal?		U
YES >> GO TO 11. NO >> GO TO 10.			
	CTUATOR SUB ASSEMBLY	(С
Replace VVEL actual			
2. Go to <u>EC-426, "Spec</u>	cial Repair Requirement".]	D
>> INSPECTION		ľ	Е
11.CHECK VVEL LADI			
Refer to EM-256, "Inspec			_
Is the inspection result no YES >> GO TO 13.	<u>omair</u>	ŀ	F
NO >> GO TO 12.			
12. REPLACE CYLIND	ER HEAD, VVEL LADDER ASSEMBLY AND VVEL ACTUATO	R SUB ASSEMBLY	G
Replace cylinder hea	ad, VVEL ladder assembly and VVEL actuator sub assembly.		
2. Go to <u>EC-426, "Spec</u>	cial Repair Requirement".	ŀ	Н
>> INSPECTIO	N END		
13.CHECK INTERMIT	TENT INCIDENT		ı
Refer to GI-43, "Intermitte	ent Incident".		
>> INSPECTIO	N END		J
Component Inspect	tion (VVEL ACTUATOR MOTOR)	INFOID:000000007462873	
1. CHECK VVEL ACTUA	ATOR MOTOR	ŀ	K
1. Turn ignition switch (
	ctuator motor harness connector. etween VVEL actuator motor terminals as follows.	l	L
VVEL actuator motor	Resistance	[M
Terminal			
1 and 2	16 Ω or less	1	Ν
Is the inspection result no YES >> INSPECTION			
NO >> GO TO 2.		(0
2.REPLACE VVEL ACT	TUATOR SUB ASSEMBLY		
 Replace VVEL actual Go to <u>EC-426</u>, "Special 	ator sub assembly. cial Repair Requirement".	ŀ	Ρ
>> INSPECTIO	N END		
	tion (VVEL ACTUATOR SUB ASSEMBLY)	INFOID:000000007462874	
1.CHECK VVEL ACTUA			
Turn ignition switch (

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P1090, P1093 VVEL ACTUATOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 2. Remove VVEL actuator sub assembly. Refer to EM-247, "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

- Replace VVEL actuator sub assembly.
- 2. Go to EC-426, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007462875

1. PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

Refer to EC-38, "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT: Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

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P1091 VVEL ACTUATOR MOTOR RELAY

Description INFOID:0000000007462876

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.

INFOID:0000000007462877

DTC Logic

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 EC-427, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462878

1. VVEL ACTUATOR MOTOR RELAY POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- Disconnect VVEL actuator motor relav.
- Check the voltage between VVEL actuator motor relay harness connector and ground.

VVEL actuator motor relay		Ground	Voltage	
Connector	Terminal	Ground	voltage	
E16	2	Ground	Battery voltage	
210	5	Glound	Battery voltage	

Is the inspection result normal?

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

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< DTC/CIRCUIT DIAGNOSIS >

2.DETECT MALFUNCTIONING PART

Check the following.

- 50 A fusible link (letter N)
- · Harness for open or short between VVEL actuator motor relay and battery
 - >> Repair open circuit, short to ground or short to power in harness or connectors.

3.vvel actuator motor relay power supply circuit-ii

- 1. Disconnect VVEL control module harness connector.
- Check the continuity between VVEL actuator motor relay harness connector and VVEL control module harness connector.

VVEL control module		VVEL actuator motor relay		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E15	23	E16	1	Existed

3. 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.

4. VVEL ACTUATOR MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between VVEL actuator motor relay harness connector and VVEL control module harness connector.

VVEL control module		VVEL actuator motor relay		Continuity	
Bank	Connector	Terminal	Connector	Terminal	Continuity
1	E15	13	E16	3	Existed
2	E13	1	LIO	3	LAISIEU

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.

${f 5.}$ CHECK VVEL ACTUATOR MOTOR RELAY

Refer to EC-429. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace VVEL actuator motor relay. Refer to EC-58, "Component Parts Location".

6.CHECK ABORT CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- Check the continuity between VVEL control module harness connector and ECM harness connector.

VVEL control module		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E15	21	F101	28	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

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P1091 VVEL ACTUATOR MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- Harness connector E40, F39
- Harness connector F109, F110 (AWD models)
- 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-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace.

9 REPLACE VVEL CONTROL MODULE

- Replace VVEL control module.
- 2. Go to EC-33, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE): Special Repair Requirement".

>> GO TO 10.

10.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- 2. Erase DTC.
- Perform DTC Confirmation Procedure. See EC-427, "DTC Logic".

Is the DTC P1091 displayed again?

YES >> GO TO 11.

NO >> INSPECTION END

11.REPLACE ECM

- Replace ECM.
- Go to EC-32, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

Component Inspection

1.CHECK VVEL ACTUATOR MOTOR RELAY

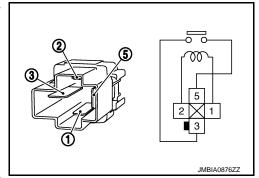
- Turn ignition switch OFF.
- Remove VVEL actuator motor relay.
- Check the continuity between VVEL actuator motor relay terminals under the following conditions.

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. Refer to EC-58. "Component Parts Location".



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P1148, P1168 CLOSED LOOP CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P1148, P1168 CLOSED LOOP CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

DTC P1148 or P1168 is displayed with DTC for A/F sensor 1.

When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1148	Closed loop control function (bank 1)	The closed loop control function for bank 1 does not operate even when vehicle is being driven in the specified condition.	Harness or connectors (The A/F sensor 1 circuit is open or shorted.)	
P1168	Closed loop control function (bank 2)	The closed loop control function for bank 2 does not operate even when vehicle is being driven in the specified condition.	A/F sensor 1A/F sensor 1 heater	

P1211 TCS CONTROL UNIT [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > P1211 TCS CONTROL UNIT Α Description INFOID:0000000007462881 The malfunction information related to TCS is transferred via the CAN communication line from "ABS actuator EC 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** INFOID:0000000007462882 DTC DETECTION LOGIC D Freeze frame data is not stored in the ECM for this self-diagnosis. DTC No. Trouble diagnosis name DTC detecting condition Possible cause Е · ABS actuator and electric unit (control ECM receives malfunction information from P1211 TCS control unit 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. Н >> GO TO 2. 2.PERFORM DTC CONFIRMATION PROCEDURE Start engine and let it idle for at least 60 seconds. Check 1st trip DTC. Is 1st trip DTC detected? YES >> EC-431, "Diagnosis Procedure" NO >> INSPECTION END Diagnosis Procedure INFOID:0000000007462883 Go to BRC-5, "Work Flow".

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P1212 TCS COMMUNICATION LINE

Description INFOID:000000007462884

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-406, "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 shorted.) 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.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-432, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to BRC-5, "Work Flow".

INFOID:0000000007462886

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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-406</u>, "<u>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 temperature (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 shorted.) 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-9, "Draining"</u> and <u>CO-10, "Refilling"</u>. Also, replace the engine oil. Refer to <u>LU-11, "Draining"</u> and <u>LU-12, "Refilling"</u>.

- 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-18</u>, "<u>FOR NORTH AMERICA</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-433, "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 EC-434, "Diagnosis Procedure".

Component Function Check

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.

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EC-433

INFOID:0000000007462888

< DTC/CIRCUIT DIAGNOSIS >

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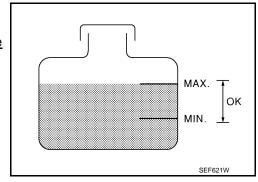
Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Go to EC-434, "Diagnosis Procedure".

NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-434, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform component function check-iii

(I) With CONSULT

- 1. Turn ignition switch ON.
- Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that cooling fan speed varies according to the percentage.

♥Without CONSULT

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-434, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007462889

1. CHECK COOLING FAN OPERATION

(II) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Make sure that cooling fan speed varies according to the percentage.

Without CONSULT

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>".
- Make sure that cooling fan operates.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-525, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-9, "Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose
- Radiator
- Water pump

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-13, "RADIATOR CAP: Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace radiator cap. Refer to CO-32, "VQ37VHR: Exploded View".

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-29, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat. Refer to CO-28, "Exploded View".

6.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-236, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".

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-18, "FOR NORTH AMI ant Mixture Ratio"	ERICA : Anti-Freeze Cool-
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-9, "Inspection"
	4	Radiator cap	Pressure tester	107 kPa (1.1 kg/cm ² , 16 psi) (Limit)	CO-13, "RADIATOR CAP : Inspection"
ON*2	5	Coolant leaks	Visual	No leaks	CO-9, "Inspection"
ON* ²	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-29, "Inspection"
ON* ¹	7	Cooling fan	• CONSULT	Operating	EC-525, "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 reservoir tank	Visual	No overflow during driving and idling	CO-9, "Inspection"
OFF* ⁴	10	Coolant return from reservoir tank to radiator	Visual	Should be initial level in reservoir tank	CO-9, "Inspection"
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-269, "Inspection"
	12	Cylinder block and pistons	Visual	No scuffing on cylinder walls or piston	EM-283, "Inspection"

^{*1:} Turn the ignition switch ON.

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^{*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.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

For more information, refer to CO-7, "Troubleshooting Chart".

>> INSPECTION END

^{*4:} After 60 minutes of cool down time.

[VQ37VHR]

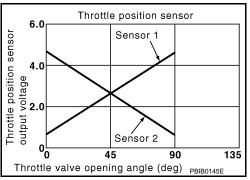
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P1225, P1234 TP SENSOR

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 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
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.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

>> GO TO 2.

- 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-437, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- Remove the intake air duct.

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P1225, P1234 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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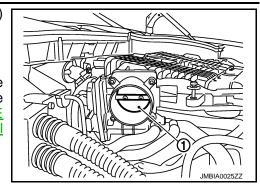
Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-35. "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-438, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007462893

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

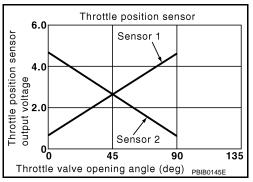
>> END

P1226, P1235 TP SENSOR

Description INFOID:000000007462894

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 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 learning performance (bank 1)	Closed throttle position learning is not performed	Electric throttle control actuator
P1235	Closed throttle position learning 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.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

>> GO TO 2.

- 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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-439, "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.

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P1226, P1235 TP SENSOR

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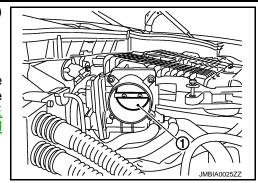
Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-35. "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator.
- 2. Go to EC-440, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007462897

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

< DTC/CIRCUIT DIAGNOSIS >

P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description INFOID:0000000007462898

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:000000007462899

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 EC-448, "DTC Logic" or EC-453, "DTC Logic".

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.
- Turn ignition switch ON.
- 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.
- Start engine and let it idle for 5 seconds. 2.
- Check DTC.

Is DTC detected?

YES >> Go to EC-441, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

${f 1}$.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-43, "Intermittent Incident".

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.

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< DTC/CIRCUIT DIAGNOSIS >

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	ECM							
DTC		+	-	- Condition Voltage (V)		Condition		
	Connector	Terminal	Connector	Terminal				
P1233	F102	F102 52 M107				OFF	Approx. 0	
1 1233	F102 52			Ignition switch	ON	Battery voltage		
P2101	101 F101 3			120	ignition switch	OFF	Approx. 0	
FZIUI F					ON	Battery voltage		

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

3.check throttle control motor relay power supply circuit

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector E7.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM	E/R	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E7	70	F101	25	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.

- Harness connectors E40, F39
- Harness connectors F104, F105 (2WD models)
- Harness connectors F109, F110 (AWD models)
- 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 THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

DTC	IPDM E/R		ECM		Continuity	
ыс	Connector	Terminal	Connector	Terminal	Continuity	
P1233	F7 54	54	F102	52	Existed	
P2101	L/	E/ 54	F101	3	LAISIEU	

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 E40, F39
- 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.

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS >

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?

>> GO TO 8. YES

NO >> Replace 15 A fuse.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

>> Replace IPDM E/R. Refer to PCS-31, "Exploded View". YES

NO >> Repair or replace harness or connectors.

9.check throttle control motor output signal circuit for open or short

- Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- Disconnect ECM harness connector. 3.
- 4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
			5		49	Existed
P1233	2	F27	3	F102	50	Not existed
P1233	2	F21	6		49	Not existed
					50	Existed
	1	1 F6	1	F101	2	Existed
P2101					4	Not existed
	'		2		2	Not existed
			2	2		4

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

- Remove the intake air duct.
- 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, and then perform throttle valve closed position learning. Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-444, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 13.

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12. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunction electric throttle control actuator.
- 2. Go to EC-444, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000007462901

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 th	rottle control actuator	Resistance (Ω)
Bank	Terminals	ixesistance (sz)
1	1 and 2	Approx. 1 - 15 [at 25°C (77°F)]
2	5 and 6	Αρριολ. 1 - 13 [αι 23 Ο (77 1)]

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-444, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007462902

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

P1236, P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P1236, P2118 THROTTLE CONTROL MOTOR

Description INFOID:0000000007462903

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:0000000007462904

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.

- 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.

>> GO TO 2.

2.perform dtc confirmation procedure

- Turn ignition switch ON and wait at least 2 seconds.
- Start engine and let it idle for 5 seconds. 2.
- Check DTC.

Is DTC detected?

YES >> Go to EC-445, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect electric throttle control actuator harness connector.
- Disconnect ECM harness connector. 2.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

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DTC	Electric throttle control actuator			ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
			5		49	Existed
P1236	2	F27	3	F102	50	Not existed
F1230	2	1 21	6		49	Not existed
					50	Existed
	1	1 F6	1	F101	2	Existed
P2118					4	Not existed
			2	1 101	2	Not existed
			2	2	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-446, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace malfunctioning electric throttle control actuator.
- Go to EC-447, "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000007462906

1. 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 th	rottle control actuator	Resistance (Ω)
Bank Terminals		resistance (32)
1	1 and 2	Approx. 1 - 15 [at 25°C (77°F)]
2	5 and 6	Αρριολ. 1 - 13 [αι 23 Ο (11 1)]

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-447, "Special Repair Requirement".

P1236, P2118 THROTTLE CONTROL MOTOR [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Α >> INSPECTION END Special Repair Requirement INFOID:0000000007462907 EC 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement" C >> GO TO 2. 2. PERFORM IDLE AIR VOLUME LEARNING D Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement" >> END Е F Н K L

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P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description INFOID:000000007462908

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

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	
Diese	Electric throttle control	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.		
P1238	actuator (bank 2)	B)	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	
	Electric throttle control actuator (bank 1)	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	- Clectic infottle control actuator	
P2119		B)	Throttle valve opening angle in fail-safe mode is not in specified range.		
		C)	ECM detect the throttle valve is stuck open.		

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.

$2.\mathsf{PERFORM}$ 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.
- Turn ignition switch ON and wait at least 1 second.
- 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-449, "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.

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS >

Check DTC.

Is DTC detected?

>> Go to EC-449, "Diagnosis Procedure". YES

>> INSPECTION END NO

Diagnosis Procedure

EC INFOID:0000000007462910

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1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

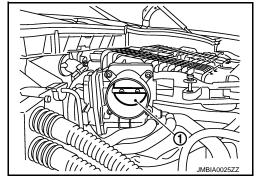
- Turn ignition switch OFF.
- Remove the intake air duct. 2.
- Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".



2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator.
- Go to EC-449, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000000746291

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

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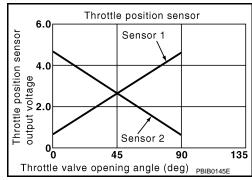
EC-449 Revision: 2013 February 2012 G Sedan

P1239, P2135 TP SENSOR

Description INFOID:000000007462912

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 the throttle valve opening angle properly in response to driving condition via the throttle control motor.



DTC Logic

INFOID:0000000007462913

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-407</u>, "<u>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 shorted.)
P2135	Throttle position sensor (bank 1) circuit range/ performance	and TP sensor 2.	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 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-450, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462914

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

P1239, P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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.

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DTC	Electr	ic throttle cont	rol actuator	Ground	Voltage (V)
ыс	Bank	Connector	Terminal	Ground	voltage (v)
P1239	2	F27	1	Ground	Approx. 5
P2135	1	F6	6	Giodila	Арргох. 3

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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.

3.check throttle position sensor ground circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

	DTC	Electric throttle control actuator			EC	Continuity	
	ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
_	P1239	2	F27	4	F101	48	Existed
	P2135	1	F6	3	1 101	40	LXISIEU

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.

f 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	Electric throttle control actuator			ECM		Continuity
	ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
	P1239	2	F27	2		31	
	F 1239	2	Γ21	3 F101	35	Existed	
_	P2135	1	F6	4	1 101	30	LXISIEU
	P2135 1 F0	10	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.

CHECK THROTTLE POSITION SENSOR

Refer to EC-452, "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.

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EC-452, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462915

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-35, "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 as per the following.

	ECM				
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
	30 [TP sensor 1 (bank 1)]	40		Fully released	More than 0.36
	30 [TF Selisor I (Darik 1)]	40	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
	54 [TF Selisor 2 (Darik 1)]			Fully depressed	More than 0.36
	35 [TP sensor 2 (bank 2)]	48		Fully released	Less than 4.75
	35 [1F 36/130/ 2 (Dalik 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-452, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007462916

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description INFOID:0000000007462917

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:0000000007462918

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.

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

- Turn ignition switch ON and wait at least 2 seconds.
- Start engine and let it idle for 5 seconds.
- Check DTC. 3

Is DTC detected?

YFS >> Go to EC-453, "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

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

Is DTC detected?

YFS >> Go to EC-453, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

${f 1}$.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.

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INFOID:0000000007462919

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 3. Disconnect IPDM E/R harness connector E7.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM	E/R	EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E7	70	F101	25	Existed

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 E40, F39
- Harness connectors F104, F105 (2WD models)
- Harness connectors F109, F110 (AWD models)
- 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.

${f 3.}$ 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		EC	Continuity						
DIC	Connector	Terminal	Connector	Terminal	Continuity					
P1290			F102	52						
P2100	E7	54	<i>5</i> 4	54	54	5.1	54	F101	3	Existed
D2102	P2103		F101	3	Existed					
F2103			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 E40, F39
- 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.

NO >> Replace 15 A fuse.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Exploded View".

NO >> Repair or replace harness or connectors.

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P1550 BATTERY CURRENT SENSOR

Description INFOID:0000000007462920

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-10. "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:0000000007462921

DTC DETECTION LOGIC

If DTC P1550 is displayed with DTC P0643, first perform the trouble diagnosis for P0643. Refer to EC-407, "DTC Logic".

DTC No. Trouble diagnosis name DTC detecting condition Possible cause Harness or connectors The output voltage of the battery current Battery current sensor circuit (Battery current sensor circuit is open P1550 sensor remains within the specified range/performance or shorted.) range while engine is running. · 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.

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

- Start engine and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-455, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection". 2.

Is the inspection result normal?

YES >> GO TO 2.

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NO >> Repair or replace ground connection.

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INFOID:0000000007462922

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2.check battery current sensor power supply circuit-i

- 1. Disconnect battery current sensor harness connector.
- Turn ignition switch ON.

< DTC/CIRCUIT DIAGNOSIS >

Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage (V)
Connector	Terminal	Glound	voltage (v)
E21	1	Ground	Approx. 5

Is the inspection result normal?

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

${f 3.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between battery current sensor harness connector and ECM harness connector.

Batter	Battery current sensor		EC	Continuity	
Conne	ector	Terminal	Connector	Terminal	Continuity
E2	1	2	F102	95	Existed

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

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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

Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E21	3	F102	91	Existed

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.

Harness connectors E40, F39

P1550 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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· 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-457, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace battery negative cable assembly.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

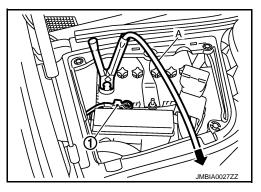
Component Inspection

NENT INSPECTION

1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 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.

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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[VQ37VHR]

P1551, P1552 BATTERY CURRENT SENSOR

Description INFOID:000000007462924

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-10, "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

DTC DETECTION LOGIC

NOTE:

If DTC P1551 or P1552 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-407</u>, "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

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.
- 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 with ignition switch ON

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 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-458, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462926

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace ground connection.

2.check battery current sensor power supply circuit-i

Disconnect battery current sensor harness connector.

- Turn ignition switch ON. 2.
- Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage (V)
Connector	Terminal	Ground	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 E40, F39
- 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

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

Battery current sensor		ECM		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 E40, F39
- 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.

$oldsymbol{6}$.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between battery current sensor harness connector and ECM harness connector.

•	Battery current sensor		EC	Continuity	
,	Connector	Terminal	Connector	Terminal	Continuity
	E21	3	F102	91	Existed

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

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

.DETECT MALFUNCTIONING PART

Check the following.

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P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- Harness connectors E40, F39
- 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-466, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace battery negative cable assembly.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

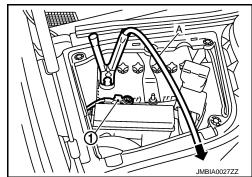
Component Inspection

INFOID:0000000007462927

1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 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.

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.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P1553 BATTERY CURRENT SENSOR

Description INFOID:0000000007462928

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-10, "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

DTC DETECTION LOGIC

NOTE

If DTC P1553 is displayed with DTC P0643, first perform the trouble diagnosis for P0643. Refer to <u>EC-407, "DTC Logic"</u>.

DTC No. Trouble diagnosis name DTC detecting condition Possible cause

Battery current sensor performance The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.

The signal voltage transmitted from the 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.
- 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-461, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46. "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

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NO >> Repair or replace ground connection.

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INFOID:0000000007462930

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[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >

2.check battery current sensor power supply circuit-i

- 1. Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage (V)
Connector	Terminal	Glound	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 E40, F39
- 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

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Batter	Battery current sensor		EC	Continuity	
Conne	ector	Terminal	Connector	Terminal	Continuity
E2	1	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 E40, F39
- 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

Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E21	3	F102	91	Existed

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.

Harness connectors E40, F39

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P1553 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

INFOID:0000000007462931

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· 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-466, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace battery negative cable assembly.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

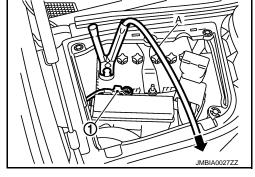
>> INSPECTION END

Component Inspection

1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 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.

	ECM	l	
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 $\underline{\text{PG-3}}$, $\underline{\text{"How to Handle Battery"}}$.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

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[VQ37VHR]

P1554 BATTERY CURRENT SENSOR

Description INFOID:000000007462932

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-10, "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:000000007462933

DTC DETECTION LOGIC

NOTE:

If DTC P1554 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-407, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	Harness or connectors (Battery current sensor circuit is open or shorted.) Battery current sensor

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-464, "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 EC-465, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007462934

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

(P)With CONSULT

- 1. Start engine and let it idle.
- Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT.
- Check "BAT CUR SEN" indication for 10 seconds.
 - "BAT CUR SEN" should be above 2,300 mV at least once.

♥Without CONSULT

Start engine and let it idle.

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P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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

	ECM		
Connector	+	– Voltage	
Connector	Terminal	Terminal	
F102	91 (Battery current sensor signal)	95	Above 2.3 at least once

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Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-465, "Diagnosis Procedure"

INFOID:0000000007462935

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46. "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		
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 E40, F39
- 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

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	ent sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		
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.

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< DTC/CIRCUIT DIAGNOSIS >

- Harness connectors E40, F39
- 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 current sensor		ECM		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.

- Harness connectors E40, F39
- 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-466, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace battery negative cable assembly.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

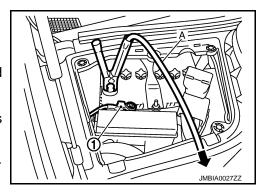
Component Inspection

INFOID:0000000007462936

1. CHECK BATTERY CURRENT SENSOR

- Turn ignition switch OFF.
- 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.

	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".

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

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[VQ37VHR]

P1564 ASCD STEERING SWITCH

Description INFOID:000000007462937

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 EC-96, "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 EC-404, "DTC Logic".

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

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.
- 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.
- 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
- 5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Check DTC.

Is DTC detected?

YES >> Go to EC-468, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462939

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

(II) With CONSULT

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- Turn ignition switch ON.
- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT.
- 3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
WAIN SW	WAIN SWILCH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW	OANOLL SWIGH	Released	OFF
RESUME/ACC SW	RESUME/ACCEL-	Pressed	ON
RESONE/ACC SW	ERATE switch	Released	OFF
SET SW	SET/COAST switch	Pressed	ON
3L1 3W	3L1/COA31 SWIICH	Released	OFF

⋈ Without CONSULT

- 1. Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as per the following.

	ECM					
Connector	+				Condition	Voltage (V)
Connector Terminal		Terminal				
		108	MAIN switch: Pressed	Approx. 0		
			CANCEL switch: Pressed	Approx. 1		
M107	101 (ASCD steering switch signal)		SET/COAST switch: Pressed	Approx. 2		
	(God atoming annum digital)		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.

3.check ascd steering switch ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- 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

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.

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

${f 5.}$ CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch and ECM harness connector.

Combination switch	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.

7. CHECK ASCD STEERING SWITCH

Refer to EC-470, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ASCD steering switch. Refer to ST-17, "Removal and Installation".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462940

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 conditions.

Combination switch		Condition	Resistance (Ω)	
Connector	Terminals	Condition	ivesisiance (22)	
		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 inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to ST-17, "Removal and Installation".

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P1564 ICC STEERING SWITCH

Description INFOID:0000000007462941

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 CCS-16, "System Description" for the ICC function.

DTC Logic INFOID:0000000007462942

DTC DETECTION LOGIC

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-404, "DTC Logic".

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.

- 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.

>> GO TO 2.

2.perform dtc confirmation procedure

- 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. 2.
- Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds. 3.
- Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
- Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 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-471, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ICC STEERING SWITCH CIRCUIT

(P) With CONSULT

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< DTC/CIRCUIT DIAGNOSIS >

- Turn ignition switch ON.
- Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW", "SET SW" and "DIST SW" in "DATA MONITOR" mode with CONSULT.
- 3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
MAIN SW	WAIN SWICH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL 3W	OANOLL SWILLIN	Released	OFF
RESUME/ACC SW	RESUME/ACCEL-	Pressed	ON
RESOME/ACC SW	ERATE switch	Released	OFF
SFT SW	SET/COAST switch	Pressed	ON
SET SW	SET/COAST SWILLI	Released	OFF
DIST SW	DISTANCE switch	Pressed	ON
	DISTANCE SWILLI	Released	OFF

Without CONSULT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as per the following.

ECM				
Connector	+	-	Condition	Voltage (V)
Connector	Connector Terminal Termina			
			MAIN switch: Pressed	Approx. 0
		108	CANCEL switch: Pressed	Approx. 1.3
M407	101		DISTANCE switch: Pressed	Approx. 2.2
WITO7	M107 (ICC steering switch signal)		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.
- 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

P1564 ICC STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

>> 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

Check the continuity between combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector Terminal		Continuity
13	M107	101	Existed

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.

.CHECK ICC STEERING SWITCH

Refer to EC-473, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ICC steering switch. Refer to ST-17, "Removal and Installation".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK ICC STEERING SWITCH

- Turn ignition switch OFF.
- Disconnect combination switch (spiral cable) harness connector M303.
- 3. Check resistance between combination switch harness connector terminals under the following conditions.

Combination switch		Condition	Resistance (Ω)	
Connector	Terminals	Condition	rtesistance (22)	
		MAIN switch: Pressed	Approx. 0	
	M303 13 and 16	CANCEL switch: Pressed	Approx. 310	
M3U3		DISTANCE switch: Pressed	Approx. 740	
IVISUS		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. Refer to ST-17, "Removal and Installation".

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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-404, "DTC Logic"</u>.
- If DTC P1568 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-406</u>, "<u>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

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:

Step 4 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. Turn ignition switch ON.
- 2. Press MAIN switch on ICC steering switch.
- 3. Drive the vehicle at more than 40 km/h (25 MPH).

CAUTION:

Always drive vehicle at a safe speed.

- 4. Press SET/COAST switch.
- 5. Check DTC.

Is DTC detected?

YES >> Go to EC-474, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462946

1. REPLACE ICC SENSOR INTEGRATED UNIT

- 1. Replace ICC sensor integrated unit.
- Perform CCS-11, "ACTION TEST: Special Repair Requirement (Vehicle-To-Vehicle Distance Control Mode)".
- Check DTC of ICC sensor integrated unit. Refer to <u>CCS-35, "Diagnosis Description"</u>.

>> INSPECTION END

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P1572 ASCD BRAKE SWITCH

Description INFOID:0000000007462947

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 EC-96, "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 EC-404, "DTC Logic".

 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	В)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle 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 before conducting the next test.

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

< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Go to EC-476, "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.

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
Driving location	Depress the brake pedal for more than five 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 EC-476, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462949

1. CHECK OVERALL FUNCTION-I

(II) With CONSULT

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- 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
BRAKE SWI	Brake pedal (A/T) Brake pedal and clutch pedal (M/T)	Fully released	ON

W Without CONSULT

- 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				
M107	126	128	Brake pedal (A/T) Brake pedal or clutch pedal (M/T)	Slightly depressed	Approx. 0	
M107	(ASCD 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 \Rightarrow A/T models: GO TO 3. NO-2 \Rightarrow M/T models: GO TO 8.

2.CHECK OVERALL FUNCTION-II

(P) With CONSULT

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	(Condition	Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
BRAKE SWZ	Бтаке рецаг	Fully released	OFF

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Without CONSULT

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

	ECM					
Connector	+	_	C	ondition	Voltage (V)	
Connector	Terminal	Terminal				
M107	122	128	Brake pedal	Slightly depressed	Battery voltage	
IVI I U 7	(Stop lamp switch signal)	120	Diake pedai	Fully released	Approx. 0	

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Is the inspection result normal?

>> GO TO 21. YES NO >> GO TO 16.

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3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- Turn ignition switch ON.
- Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector	Terminal	Giodila	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

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

${f 5.}$ CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- Disconnect ECM harness connector.
- Check the continuity between ASCD brake switch harness connector and ECM harness connector.

Connector Terminal Connector Terminal E109 2 M107 126 Existed	ASCD brake switch			E	Continuity	
E109 2 M107 126 Existed		Connector	Terminal	Connector	Terminal	Continuity
		E109	2	M107	126	Existed

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

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< DTC/CIRCUIT DIAGNOSIS >

- · 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.

7. CHECK ASCD BRAKE SWITCH

Refer to EC-480, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace ASCD brake switch. Refer to <u>BR-18</u>, "Exploded View".

8.CHECK ASCD BRAKE SWITCH CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD clutch switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clu	tch switch	Ground	(Condition	Voltage (V)	
Connector	Terminal	Giodila	Condition		Voltage (V)	
E108	1	Ground	Brake pedal	Slightly depressed	Approx. 0	
E100	Ground	втаке редаг	Fully released	Battery voltage		

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 9.

9. 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 brake switch		Ground	Voltage
Connector	Terminal	Glound	voltage
E109	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 ASCD brake switch and fuse

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

11. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

- Turn ignition switch OFF.
- Check the continuity between ASCD clutch switch harness connector and ASCD brake switch harness connector.

ASCD clu	utch switch	ASCD bra	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E108	1	E109	2	Existed

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

P1572 ASCD BRAKE SWITCH [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Is the inspection result normal? Α YES >> GO TO 12. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 12. CHECK ASCD BRAKE SWITCH EC Refer to EC-480, "Component Inspection (ASCD Brake Switch)". Is the inspection result normal? YES >> GO TO 21. NO >> Replace ASCD brake switch. Refer to BR-18, "Exploded View". 13. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II D Turn ignition switch OFF. Disconnect ECM harness connector. 2. Check the continuity between ASCD clutch switch harness connector and ECM harness connector. Е ASCD clutch switch ECM Continuity Connector **Terminal** Connector **Terminal** F E108 2 M107 126 Existed Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 15. NO >> GO TO 14. $14.\mathsf{detect}$ malfunctioning part Н Check the following. Harness connectors E106, M6 Harness for open or short between ECM and ASCD clutch switch >> Repair open circuit, short to ground or short to power in harness or connectors. 15. CHECK ASCD CLUTCH SWITCH Refer to EC-481, "Component Inspection (ASCD Clutch Switch)". Is the inspection result normal? YES >> GO TO 21. NO >> Replace ASCD clutch switch. Refer to CL-9, "Exploded View". 16.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT Turn ignition switch OFF. 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	Ground	voltage
E119	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
- 10 A 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.

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< DTC/CIRCUIT DIAGNOSIS >

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
E119	2	M107	122	Existed

3. 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) 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-481, "Component Inspection (Stop Lamp Switch)"

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace stop lamp switch. Refer to <u>BR-18</u>. "Exploded View".

21.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000007462950

1. CHECK ASCD BRAKE SWITCH-I

- 1. Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 Brake pedal	Fully released	Existed	
1 4114 2	Brake pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

- Adjust ASCD brake switch installation. Refer to BR-7, "Inspection and Adjustment".
- 2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	1 and 2 Brake pedal	Fully released	Existed
1 and 2	Бтакс редаг	Slightly depressed	Not existed

Is the inspection result normal?

P1572 ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to <u>BR-18</u>, "Exploded View".

Component Inspection (ASCD Clutch Switch)

INFOID:0000000007462951

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1. CHECK ASCD CLUTCH SWITCH-I

- Turn ignition switch OFF.
- 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 pe	Clutch pedal	Fully released	Existed
1 410 2	Ciutcii pedai	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-6, "Inspection and Adjustment".
- 2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
T dild 2	r and 2 Clutch pedar	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch. Refer to CL-9, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000007462952

1. CHECK STOP LAMP SWITCH-I

- 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 Brake pedal	Fully released	Not existed	
i aliu z	Brake pedal	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 BR-7, "Inspection and Adjustment".
- 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	
i and 2	brake pedar	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-18</u>, "Exploded View".

P1572 ICC BRAKE SWITCH

Description INFOID:000000007462953

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 CCS-30, "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 EC-404, "DTC Logic".
- 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 and the ICC brake switch are sent to ECM at the same time.	Harness or connectors (The stop lamp switch circuit is shorted.) Harness or connectors	
P1572	ICC brake switch	В)	ICC brake switch signal is not sent to ECM for extremely long time while the vehicle is being driven	 (The ICC brake switch circuit is shorted.) Stop lamp switch ICC brake switch ICC brake hold relay Incorrect stop lamp switch installation Incorrect ICC 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

- 1. Start engine (VDC switch OFF).
- 2. Press MAIN switch and make sure that CRUISE lamp illuminates.
- 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.

P1572 ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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Is 1st trip DTC detected?

YES >> Go to EC-483, "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 five 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 EC-483, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK OVERALL FUNCTION-I

(II) With CONSULT

- Turn ignition switch ON.
- 2. Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication	
BRAKE SW1	Brake pedal	Slightly depressed	OFF	
DIVARLE OW I	brake pedar	Fully released	ON	

(R) Without CONSULT

- 1. Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

ECM					
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
M107	126	128	Brake pedal	Slightly depressed	Approx. 0
IVITO7	(ICC brake switch signal)	120	Diake pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

(II) With CONSULT

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	Condition		Indication	
BRAKE SW2	Brake pedal	Slightly depressed	ON	
DIVARE OWE	brake pedar	Fully released	OFF	

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< DTC/CIRCUIT DIAGNOSIS >

⋈ Without CONSULT

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	
WITO	(Stop lamp switch signal)	120	Diake pedai	Fully released	Approx. 0	

Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 8.

3.CHECK ICC BRAKE SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ICC brake switch harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between ICC brake switch harness connector and ground.

ICC bra	ke switch	Ground	Voltage
Connector Terminal		Glound	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.
- Disconnect ECM harness connector.
- 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?

YES >> GO TO 7. NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- 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.

P1572 ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

7.CHECK ICC BRAKE SWITCH

Refer to EC-486, "Component Inspection (ICC Brake Switch)".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace ICC brake switch. Refer to EC-58, "Component Parts Location".

8.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- 3. Disconnect ICC brake hold relay harness connector.
- 4. Check the voltage between stop lamp switch harness connector and ground.

Stop lan	np switch	Ground	Voltage
Connector Terminal		Glound	voltage
E110	1	Ground	Battery voltage

Check the voltage between ICC brake hold relay harness connector and ground.

ICC brake	hold relay	Ground	Voltage
Connector Terminal		Glound	voltage
E51	3	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. 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.

10.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- 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

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

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.

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P1572 ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 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.

12. CHECK STOP LAMP SWITCH

Refer to EC-486, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace stop lamp switch. Refer to BR-18, "Exploded View".

13. CHECK ICC BRAKE HOLD RELAY

Refer to EC-487, "Component Inspection (ICC Brake Hold Relay)".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace ICC brake hold relay. Refer to EC-58, "Component Parts Location".

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ICC Brake Switch)

INFOID:0000000007462956

1. CHECK ICC BRAKE SWITCH-I

- 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	(Continuity	
1 and 2	1 and 2 Brake pedal Fully released		Existed
i aliu z Biake peuai		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ICC BRAKE SWITCH-II

- Adjust ICC brake switch installation. Refer to BR-7, "Inspection and Adjustment".
- 2. Check the continuity between ICC brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
	Drake pedar	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake switch. Refer to EC-58, "Component Parts Location".

Component Inspection (Stop Lamp Switch)

INFOID:0000000007462957

1. CHECK STOP LAMP SWITCH-I

- 1. Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector.
- 3. Check the continuity between stop lamp switch terminals under the following conditions.

< DTC/CIRCUIT DIAGNOSIS >

Terminals	Condition		Continuity
1 and 2 Brake pedal	Brake pedal	Fully released	Not existed
1 4110 2	brake pedar	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 BR-7, "Inspection and Adjustment".
- 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
i and z	brake pedar	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-18</u>, "Exploded View".

Component Inspection (ICC Brake Hold Relay)

1. CHECK ICC BRAKE HOLD RELAY

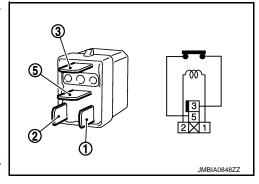
- Turn ignition switch OFF.
- 2. Remove ICC brake hold relay.
- 3. Check the continuity between ICC brake hold relay terminals under the following conditions.

Terminals	Condition	Continuity
3 and 5	12V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake hold relay. Refer to <u>EC-58. "Component Parts Location"</u>.



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P1574 ASCD VEHICLE SPEED SENSOR

Description INFOID.000000007462959

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 ASCD control. Refer to <u>EC-96, "System Description"</u> 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 EC-382, "M/T MODELS: DTC Logic".
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-404, "DTC Logic".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-406, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following 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 (VDC switch OFF).
- Drive the vehicle at more than 40 km/h (25 MPH).

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.

3. Check DTC.

Is DTC detected?

YES >> Go to EC-488, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462961

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-149, "Diagnosis Description".

Is the inspection result normal?

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P1574 ASCD VEHICLE SPEED SENSOR	
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
YES >> GO TO 2. NO >> Perform trouble shooting relevant to DTC indicated.	Δ.
NO $>>$ Perform trouble shooting relevant to DTC indicated. 2.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"	Α
Refer to BRC-27, "CONSULT Function".	
Is the inspection result normal?	EC
YES >> GO TO 3.	
NO >> Repair or replace.	C
3.CHECK DTC WITH "UNIFIED METER AND A/C AMP."	
Refer to MWI-38, "CONSULT Function (METER/M&A)".	D
>> INSPECTION END	
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EC-489 Revision: 2013 February 2012 G Sedan

P1574 ICC VEHICLE SPEED SENSOR

Description INFOID:000000007462962

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 ICC control. Refer to CCS-16, "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 EC-382, "M/T MODELS: DTC Logic".
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-404, "DTC Logic".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-406, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

- 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 (VDC switch OFF).
- Drive the vehicle at more than 40 km/h (25 MPH).

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.

3. Check DTC.

Is DTC detected?

YES >> Go to EC-490, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462964

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-149, "Diagnosis Description".

Is the inspection result normal?

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P1574 ICC VEHICLE SPEED SENSOR		
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
YES >> GO TO 2. NO >> Perform trouble shooting relevant to DTC indicated.		А
2.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"		
Refer to BRC-27, "CONSULT Function".	=	C
Is the inspection result normal? YES >> GO TO 3.		
NO >> Repair or replace.		0
3.CHECK DTC WITH "UNIFIED METER AND A/C AMP."		С
Check combination meter function. Refer to MWI-38, "CONSULT Function (METER/M&A)".		D
>> INSPECTION END		
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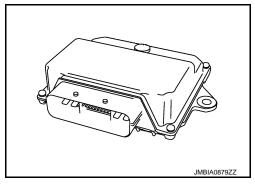
EC-491 Revision: 2013 February 2012 G Sedan

INFOID:0000000007462967

P1606 VVEL CONTROL MODULE

Description INFOID:0000000007462965

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 INFOID:0000000007462966

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 malfunctioning.	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.

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

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

Is DTC detected?

YES >> Go to EC-492, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Erase DTC.
- Perform DTC Confirmation Procedure. See EC-492, "DTC Logic".

Is the DTC P1606 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE VVEL CONTROL MODULE

Replace VVEL control module.

EC-492

P1606 VVEL CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

2. Go to EC-33, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE): Special Repair Requirement".

>> INSPECTION END

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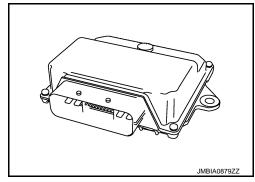
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P1607 VVEL CONTROL MODULE

Description INFOID:000000007462968

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 control module is malfunctioning.	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 at least 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-494, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462970

1. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- Erase DTC.
- 3. Perform DTC Confirmation Procedure. See EC-494, "DTC Logic".

Is the DTC P1607 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2. REPLACE VVEL CONTROL MODULE

1. Replace VVEL control module.

P1607 VVEL CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

2. Go to EC-33, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE): Special Repair Requirement".

>> INSPECTION END

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P1608 VVEL SENSOR POWER SUPPLY

DTC Logic

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 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 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-496, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462972

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK VVEL CONTROL SHAFT POSITION SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect VVEL control shaft position sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between VVEL control shaft position sensor harness connector and ground.

VVEL control shaft position sensor			Ground	Voltage (V)	
Bank	Connector	Terminal	Giodila	voilage (v)	
1	F46	3	Ground		
'	1 40	6		Approx. 5	
2	F47		Ground	Арргох. 3	
	Г47	6			

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

P1608 VVEL SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

3.check vvel control shaft position sensor power supply circuit for open and SHORT

- Turn ignition switch OFF.
- Disconnect VVEL control module harness connector.
- Check the continuity between VVEL control shaft position sensor harness connector and VVEL control module harness connector.

VVEL control shaft position se		on sensor	VVEL control module		Continuity
Bank	Connector	Terminal	Connector	Terminal	Continuity
1	1 F46	3	E15	9	Existed
'		6		22	
2 F47	3	E 13	7	Existed	
	6		20		

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 E40, F39
- 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-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace.

6.REPLACE VVEL CONTROL MODULE

- Replace VVEL control module.
- 2. Go to EC-33, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE): Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace.

f 8.REPLACE VVEL ACTUATOR SUB ASSEMBLY

- Replace VVEL actuator sub assembly.
- Go to EC-497, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

 ${f 1}$.PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

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INFOID:0000000007462973

P1608 VVEL SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Refer to <u>EC-38</u>, "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

P1805 BRAKE SWITCH

Description INFOID:0000000007462974

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.

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DTC Logic

INFOID:0000000007462975

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 extremely long time while the vehicle is being driven.	I Ston Jamp switch circuit is open or sport-

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Fully depress the brake pedal for at least 5 seconds.
- Erase the DTC.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-499, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

INFOID:0000000007462976

1. CHECK STOP LAMP SWITCH CIRCUIT

- Turn ignition switch OFF.
- 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.

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2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- Disconnect stop lamp switch harness connector.
- Check the voltage between stop lamp switch harness connector and ground.

Stop lam	p switch	Ground	Voltage	
Connector Terminal		Ground	vollage	
E110	1	Ground	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)

< DTC/CIRCUIT DIAGNOSIS >

- · 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.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect stop lamp switch harness connector.
- Disconnect ECM harness connector.
- 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	

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.

- Fuse block (J/B) connector 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.

6. CHECK STOP LAMP SWITCH

Refer to EC-500, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace stop lamp switch. Refer to <u>BR-18</u>, "Exploded View".

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000007462977

1. CHECK STOP LAMP SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Condition Conf		Continuity
1 and 2	Brake pedal	Fully released	Not existed		
	brake pedar	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 BR-7, "Inspection and Adjustment".
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Terminals	Condition		Continuity
1 and 2 Brake peda	Brako podal	Fully released	Not existed
	Diake pedai	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-18</u>, "Exploded View".

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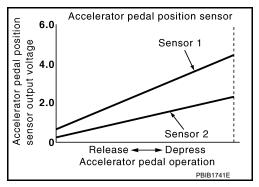
P2122, P2123 APP SENSOR

Description INFOID:000000007462978

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-407</u>, "<u>DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position 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 position 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 before conducting the next test.

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

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-502, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462980

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

P2122, P2123 APP SENSOR [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > YES >> GO TO 2. NO >> Repair or replace ground connection. Α 2.check app sensor 1 power supply circuit Disconnect accelerator pedal position (APP) sensor harness connector. EC Turn ignition switch ON. 2. Check the voltage between APP sensor harness connector and ground. APP sensor Ground Voltage (V) Connector Terminal E112 5 Approx. 5 Ground Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 3. Е 3.DETECT MALFUNCTIONING PART Check the following. F 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 4.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT Turn ignition switch OFF. Disconnect ECM harness connector. 2. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		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.

${f 5.}$ 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.

6.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E112	3	M107	97	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

>> GO TO 7. NO

.DETECT MALFUNCTIONING PART

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< DTC/CIRCUIT DIAGNOSIS >

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.

8. CHECK APP SENSOR

Refer to EC-504, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-504, "Special Repair Requirement".

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007462981

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals as per the following.

ECM					_
Connector	+	-	Condition		Voltage (V)
Connector	Terminal	Terminal			
M107	97 (APP sensor 1)	100	- Accelerator pedal	Fully released	0.45 - 1.0
				Fully depressed	4.2 - 4.8
	98 (APP sensor 2) 104	104	Accelerator pedar	Fully released	0.22 - 0.50
			Fully depressed	2.1 - 2.5	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Go to <u>EC-504</u>, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007462982

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-35, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

P2122, P2123 APP SENSOR [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > $2.\mathsf{perform}$ throttle valve closed position learning Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement". >> GO TO 3. EC 3.perform idle air volume learning Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement". >> END Е F Н Κ

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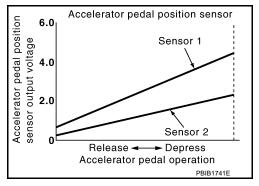
P2127, P2128 APP SENSOR

Description INFOID:000000007462983

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 position sensor 2 circuit low input	An excessively low voltage from the APP sensor 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 position 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.
- 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

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-507, "Diagnosis Procedure".

NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462985

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1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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	Connector Terminal		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

- Turn ignition switch OFF.
- 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 APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

CM	Sensor				
Terminal	Name	Connector	Terminal		
45	Brake booster pressure sensor	E48	1		
46	CKP sensor (POS)	F2	1		
103	APP sensor	E112	6		
107	EVAP control system pressure sensor	B30	3		
	Refrigerant pressure sensor	E77	3		
	Terminal 45 46 103	Terminal Name 45 Brake booster pressure sensor 46 CKP sensor (POS) 103 APP sensor EVAP control system pressure sensor	Terminal Name Connector 45 Brake booster pressure sensor E48 46 CKP sensor (POS) F2 103 APP sensor E112 EVAP control system pressure sensor B30		

Is the inspection result normal?

YES >> GO TO 6.

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< DTC/CIRCUIT DIAGNOSIS >

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

6. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to EC-324, "Component Inspection".)
- Brake booster pressure sensor (Refer to EC-400, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-357, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>HAC-95</u>, "<u>Diagnosis Procedure</u>".)

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning component.

7.CHECK APP SENSOR 2 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	2	M107	104	Existed

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. 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.

9.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

APP s	APP sensor E0		CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
E112	1	M107	98	Existed

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 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

Refer to EC-504, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

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P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

12. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly.
- Go to EC-509, "Special Repair Requirement".

>> INSPECTION END

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected. 2.
- Turn ignition switch ON.
- Check the voltage ECM harness connector terminals as per the following.

ECM						
Connector	+	_	Condition		Voltage (V)	
Connector	Terminal	Terminal				
M107	97 (APP sensor 1)	100	- Accelerator pedal	Fully released	0.45 - 1.0	
				Fully depressed	4.2 - 4.8	
		104	Accelerator pedar	Fully released	0.22 - 0.50	
	98 (APP sensor 2)	sensor 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

- Replace accelerator pedal assembly.
- 2. Go to EC-504, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-35, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement",

>> GO TO 3.

3.perform idle air volume learning

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

[VQ37VHR]

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EC-509

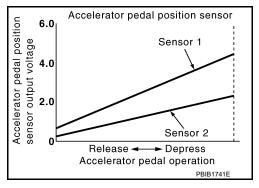
P2138 APP SENSOR

Description INFOID:000000007462988

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-407</u>, "<u>DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position 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

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.
- 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

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-511, "Diagnosis Procedure".

NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Diagnosis Procedure

INFOID:0000000007462990

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- 2. Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP :	sensor	Ground	Voltage (V)	
Connector Terminal		Ground	voitage (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

- Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP	sensor	Ground	Voltage (V)	
Connector Terminal		Ground	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

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- 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 7.

NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

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- Harness for open or short between ECM and accelerator pedal position sensor
 - >> Repair open circuit.

7.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

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 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-324, "Component Inspection".)
- Brake booster pressure sensor (Refer to EC-400, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-357, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>HAC-95</u>, "<u>Diagnosis Procedure</u>".)

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace malfunctioning component.

9. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

APP s	ensor	EC	0		
Connector	Terminal	Connector Termina		Continuity	
F112	4	M107	100	Existed	
LIIZ	2	IVITO7	104	LAISIEU	

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 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

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

APP s	ensor	EC	CM	Continuity		Α
Connector	Terminal	Connector	Terminal	Continuity		
E112	3	M107	97	Existed		EC
	1	WITO7	98	Existed		
2. Also cl	heck harn	ess for sho	ort to grou	nd and sho	ort to power.	
Is the inspe			<u>?</u>			C
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			IING PAR	1		
Check theHarness			16			
				M and acc	elerator pedal position sensor	Е
	_					
	-	•	t, short to	ground or	short to power in harness or connectors.	F
13.CHE						
Refer to E		•	•	<u>ı"</u> .		
Is the inspe			<u>?</u>			G
	> GO TO > GO TO					
14.REPL	ACE ACC	CELERATO	OR PEDAL	ASSEMB	LY	H
		rator pedal				
		Special Re				1
_		TION END		-		
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Refer to G	<u>l-43, "Inte</u>	rmittent Ind	<u>cident"</u> .			
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Compon	ent insp	bection			INFOID:0000000007462991	L
1.CHECK	ACCELE	RATOR P	EDAL PO	SITION SE	NSOR	
	gnition sw					-
			nectors di	sconnecte	d.	N
	gnition swi the voltag		arness cor	nector terr	minals as per the following.	
					,	1
	E	CM				

	ECM				
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
	97 (APP sensor 1)	100		Fully released	0.45 - 1.0
M107	97 (AFF SellSOI I)	100	A coolorator padal	Fully depressed	4.2 - 4.8
IVITO7	98 (APP sensor 2)	104	Accelerator pedal	Fully released	0.22 - 0.50
	96 (APP Serisor 2)			Fully depressed	2.1 - 2.5

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly.
- 2. Go to EC-504, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007462992

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-35, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-35, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

3. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-36, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

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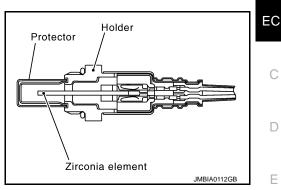
P2A00, P2A03 A/F SENSOR 1

Description INFOID:0000000007462993

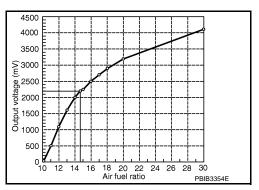
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 INFOID:0000000007462994

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 Heated oxygen sensor 2	
P2A03	Air fuel ratio (A/F) sensor 1 (bank 2) circuit range/performance	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 pressureFuel injectorIntake air leaksExhaust gas leaks	

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.
- 2. Turn ignition switch ON.
- 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

Clear the mixture ratio self-learning value. Refer to EC-39, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

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< DTC/CIRCUIT DIAGNOSIS >

- 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 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
- 8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-516, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007462995

[VQ37VHR]

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2

Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to EM-186, "Removal and Installation".

>> GO TO 3.

3.CHECK FOR EXHAUST GAS LEAK

- Start engine and run it at idle.
- Listen for an exhaust gas leak before the three way catalyst 2.

Is exhaust gas detected?

YES >> Repair or replace.

NO >> GO TO 4.

4.CHECK FOR INTAKE AIR LEAK

- 1. Start engine and run it at idle.
- Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.

NO >> GO TO 5.

${f 5}$.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-39, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement"</u>.
- 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-288, "Diagnosis Procedure"</u> or <u>EC-292, "Diagnosis Procedure"</u>.

NO >> GO TO 6.

6. CHECK HARNESS CONNECTOR

- 1. Turn ignition switch OFF.
- Disconnect A/F sensor 1 harness connector.
- Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 7.

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P2A00, P2A03 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> Repair or replace harness connector.

7.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

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

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DTC		A/F senso	r 1	Ground	Voltage
ыс	Bank	Connector	Terminal	Glound	
P2A00	1	F3	4	Ground	Battery voltage
P2A03	2	F20	4	Glound	Dattery Voltage

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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.

$9.\mathsf{CHECK}$ A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 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	
P2A00	1	F3	1		57		
FZAUU	!	1 13	2	F102	61	Existed	
P2A03	2	F20	1	1 102	65	LAISIEU	
P2A03	2	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	
ыс	Bank	Bank Connector		Olouliu	Continuity	
P2A00	1	F3	1		Not existed	
1 2A00	'	13	2	Ground		
P2A03	2	F20	1	Oround	Not existed	
1 2A03	2 F20		2			

DTC	ECM			Ground	Continuity
DIC	Bank	Connector	Terminal	Giodila	Continuity
P2A00	1		57		Not existed
F 2A00	'	E400	61	Ground	
P2A03	0	F102	65		
FZA03		•	66		

5. Also check harness for short to power.

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< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

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 A/F SENSOR 1 HEATER

Refer to EC-199, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 13.

11. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-268, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace malfunctioning heated oxygen sensor 2.

12. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace.

13.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 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).

Do you have CONSULT?

YES >> GO TO 14. NO >> GO TO 15.

14. CONFIRM A/F ADJUSTMENT DATA

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

Is "0.000" displayed?

YES >> INSPECTION END

NO >> GO TO 15.

15.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to <u>EC-39</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR</u>: Special Repair Requirement".

Do you have CONSULT?

YES >> GO TO 16.

NO >> INSPECTION END

16.CONFIRM A/F ADJUSTMENT DATA

(P)With CONSULT

- 1. Turn ignition switch ON.
- Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT.
- Make sure that "0.000" is displayed on CONSULT screen.

>> INSPECTION END

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ASCD BRAKE SWITCH

Description INFOID:0000000007462996

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 $\underline{\text{EC-96}}$, "System Description" for the ASCD function.

Component Function Check

1. CHECK ASCD BRAKE SWITCH FUNCTION

(I) With CONSULT

- Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- 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
	Brake pedal (A/T) Brake pedal and clutch pedal (M/T)	Fully released	ON

W Without CONSULT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as per the following.

ECM					
Connector + - Terminal Term		_	Condition		Voltage (V)
		Terminal			
M107	M07 126		Brake pedal (A/T) Brake pedal or clutch pedal (M/T)	Slightly depressed	Approx. 0
WTO7	(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-519, "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

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- 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	voitage	
E109	1	Ground	Battery voltage	

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

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. 3)
- · Harness for open or short between ASCD brake switch and fuse
 - >> Repair open circuit or short to ground in harness or connectors.

4.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ASCD brake switch		ECM	
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 6. NO >> GO TO 5.

5. 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.

6. CHECK ASCD BRAKE SWITCH

Refer to EC-522, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace ASCD brake switch. Refer to BR-18. "Exploded View".

7.CHECK ASCD BRAKE SWITCH CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD clutch switch harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between ASCD clutch switch harness connector and ground.

ASCD clu	tch switch	Ground	C	Condition	Voltage (V)	
Connector	Terminal	Giodila	Condition		voitage (v)	
E108	1	Ground	Brake pedal	Slightly depressed	Approx. 0	
L100		Ground	Diake pedai	Fully released	Battery voltage	

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 8.

8. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.

ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ake switch	Ground	Voltage
Connector	nnector Terminal		vollage
E109	1	Ground	Battery voltage

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Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 9.

$\mathbf{9}.$ 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

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

10.check ascd brake switch input signal circuit for open and short

- Turn ignition switch OFF.
- Check the continuity between ASCD clutch switch harness connector and ASCD brake switch harness connector.

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ASCD clutch switch		ASCD brake switch		Continuity
Connector	Terminal	Connector Terminal		Continuity
E108	1	E109	2	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 BRAKE SWITCH

Refer to EC-522, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace ASCD brake switch. Refer to BR-18, "Exploded View".

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between ASCD clutch switch harness connector and ECM harness connector.

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ASCD clut	ASCD clutch switch		CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
E108	2	M107	126	Existed

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 clutch switch

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< DTC/CIRCUIT DIAGNOSIS >

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

14. CHECK ASCD CLUTCH SWITCH

Refer to EC-522, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace ASCD clutch switch. Refer to <u>CL-9</u>, "<u>Exploded View</u>".

15. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000007462999

1. CHECK ASCD BRAKE SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
i and 2		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

- Adjust ASCD brake switch installation. Refer to <u>BR-7</u>, "Inspection and Adjustment".
- 2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
1 and 2	brake pedar	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to <u>BR-18</u>, "Exploded View".

Component Inspection (ASCD Clutch Switch)

INFOID:0000000007463000

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
i alia z	Clutch pedal	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-6, "Inspection and Adjustment".

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ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

2. Check the continuity between ASCD clutch switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD clutch switch. Refer to <u>CL-9</u>, "<u>Exploded View</u>".

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ASCD INDICATOR

Description INFOID:000000007463001

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-96, "System Diagram" for the ASCD function.

Component Function Check

INFOID:0000000007463002

1. CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CON	SPECIFICATION	
CRUISE LAMP	• Ignition switch: ON		$ON \to OFF$
	MAIN switch: ON	ASCD: Operating	ON
SET LAMP	When vehicle speed is be- tween 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-524, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463003

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-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.check intermittent incident

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-112, "Exploded View".

NO >> Repair or replace.

INFOID:0000000007463005

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

1. CHECK COOLING FAN FUNCTION

(I) With CONSULT

- 1. Turn ignition switch ON.
- Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- Make sure that cooling fan speed varies according to the percentage.

W Without CONSULT

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-9</u>, "<u>Diagnosis Description</u>".
- Make sure that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-525, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- Disconnect cooling fan control module harness connector E37.
- Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module harness connector and ground.

Cooling fan o	ontrol module	Ground	Voltage
Connector	Terminal	Oround	vollage
E37	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK COOLING FAN CONTROL MODULE GROUND CIRCUIT

- 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	nnector Terminal		Continuity
E37	1	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.

Revision: 2013 February

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

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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.

IPDM	E/R	Ground	Continuity
Connector	Connector Terminal		Continuity
E5	12	Ground	Existed
E6	41	Giodila	LAISIEU

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 connector.

IPDM E/R		Cooling fan c	Continuity	
Connector	Terminal	Connector Terminal		Continuity
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.

5.CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT

- 1. Reconnect all harness connectors disconnected.
- 2. 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 o	ontrol module	Ground	Voltage	
Connector Terminal		Ground	voltage	
E301 4		Ground	Battery voltage	
E302	E302 6			

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace cooling fan control module. Refer to CO-19, "Exploded View".

6.CHECK COOLING FAN MOTORS -1 AND -2

Refer to EC-527, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace cooling fan motor. Refer to CO-19, "Exploded View".

7. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan relay.
- 3. Turn ignition switch ON.
- Check the voltage between cooling fan relay harness connector and ground.

Cooling fan relay Connector Terminal		Ground	Voltage			
		Giodila				
E17	1	Ground	Battery voltage			
	3	Ciodila	Dattery Voltage			
Is the inspection result normal?						
YES >	> GO TO 9	9.				

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- 10 A fuse (No. 42)
- IPDM E/R harness connector E7
- 50 A 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. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-III

- Turn ignition switch OFF.
- Disconnect IPDM E/R harness connector E6. 2.
- Check the continuity between cooling fan relay harness connector and IPDM E/R harness connector.

Cooling fan relay		IPDM E/R		Continuity
Connector	Terminal	Connector Terminal		Continuity
E17	2	E6	42	Existed

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

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-528, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 11.

>> Replace cooling fan relay. Refer to EC-58, "Component Parts Location". NO

11. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

>> Replace IPDM E/R. Refer to PCS-31, "Exploded View". YES

>> Repair or replace harness connectors. NO

Component Inspection (Cooling Fan Motor)

1. CHECK COOLING FAN MOTOR

Turn ignition switch OFF.

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< DTC/CIRCUIT DIAGNOSIS >

- Disconnect cooling fan control module harness connectors E301, E302.
- Supply cooling fan control module terminals with battery voltage and check operation.

Cool	ing fan contro				
Motor	Connector	Tern	ninal	Operation	
WIOLOI	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. Refer to CO-19, "Exploded View".

Component Inspection (Cooling Fan Relay)

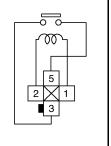
INFOID:0000000007463008

1. CHECK COOLING FAN RELAY

- Turn ignition switch OFF.
- Remove cooling fan relay. 2.
- 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
	No current supply	Not existed





Is the inspection result normal?

YES >> INSPECTION END

NO

>> Replace cooling fan relay. Refer to EC-58, "Component Parts Location".

ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

INFOID:0000000007463010

ELECTRICAL LOAD SIGNAL

Description INFOID:0000000007463009

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

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Component Function Check

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- Turn ignition switch ON.
- 2. Connect CONSULT and select "DATA MONITOR" mode.
- 3. Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition	Indication	
LOAD SIGNAL	Rear window defogger switch	ON	ON
	rteal willdow delogger switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>EC-529</u>, "<u>Diagnosis Procedure</u>".

2.CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
	Lighting switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-529, "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
TILATER TAN 6W	Tieater fair control switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-529, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to <u>EC-529, "Component 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 DEF-3, "Work Flow".

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ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-4, "Work Flow".

>> INSPECTION END

4. CHECK HEATER FAN CONTROL SYSTEM

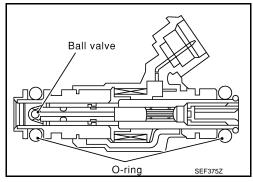
Refer to HAC-4, "Work Flow".

>> INSPECTION END

FUEL INJECTOR

Description INFOID:0000000007463012

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

1. INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

YES >> GO TO 2.

NO >> Go to EC-531, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

(P)With CONSULT

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Make sure that each circuit produces a momentary engine speed drop.

®Without CONSULT

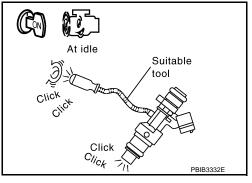
- Start engine.
- Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-531, "Diagnosis Procedure".



Diagnosis Procedure

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect fuel injector harness connector.
- Turn ignition switch ON.
- Check the voltage between fuel injector harness connector and ground.

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Fuel injector			Ground	Voltago	
Cylinder	Connector	Terminal	Ground	Voltage	
1	F121	1			
2	F122	1			
3	F123	1	Ground	Battery voltage	
4	F124	1		Ground Battery V	Ballery Vollage
5	F125	1			
6	F126	1			

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- Harness connectors F10, F120
- IPDM E/R harness connector E7
- 10 A fuse (No. 44)
- Harness for open or short between fuel injector and fuse

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

${f 3.}$ CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F121	2		89	
2	F122	2	F102	85	
3	F123	2		81	Existed
4	F124	2		90	Existed
5	F125	2		86	
6	F126	2		82	

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

Check the following.

- Harness connectors F10, F120
- Harness connectors F104, F105 (AWD models)
- Harness connectors F109, F110 (2WD models)
- Harness for open or short between fuel injector and ECM

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

5. CHECK FUEL INJECTOR

Refer to EC-533, "Component Inspection".

Is the inspection result normal?

FUEL INJECTOR		
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
YES >> GO TO 6. NO >> Replace malfunctioning fuel injector. Refer to EM-189, "Exploded View".		А
6.CHECK INTERMITTENT INCIDENT		
Refer to GI-43, "Intermittent Incident".		EC
Is the inspection result normal? YES >> Replace IPDM E/R. Refer to PCS-31, "Exploded View".		
NO >> Repair open circuit, short to ground or short to power in harness or connectors.		С
Component Inspection	INFOID:0000000007463015	
1. CHECK FUEL INJECTOR		D
Turn ignition switch OFF.		
 Disconnect fuel injector harness connector. Check resistance between fuel injector terminals as follows. 		Е
o. Onesk resistance between ruer injector terminals as rollows.		_
Terminals Resistance (Ω)		_
1 and 2 11.1 - 14.3 [at 10 - 60°C (60 - 140°F)]		F
Is the inspection result normal?		
YES >> INSPECTION END NO >> Replace malfunctioning fuel injector. Refer to EM-189 , "Exploded View".		G
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FUEL PUMP

Description INFOID:000000007463016

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓
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.	
Except as shown above	Stops.	

Component Function Check

INFOID:0000000007463017

1.CHECK FUEL PUMP FUNCTION

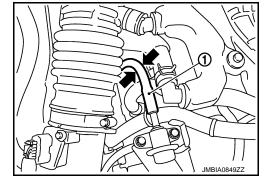
- 1. Turn ignition switch ON.
- Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END

NO >> EC-534, "Diagnosis Procedure".



Diagnosis Procedure

INFOID:0000000007463018

1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

- 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.

ECM		Ground	Voltage
Connector	Terminal	Ground	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

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

IPDM E/R		Ground	Voltage	
Connector	Terminal	Giodila	voltage	
E7	77	Ground	Battery voltage	

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Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 10.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- Harness connectors F104, F105 (2WD models)
- Harness connectors F109, F110 (AWD models)
- Harness for open or short between IPDM E/R and ECM

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

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- 3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 4. Turn ignition switch ON.
- Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

fuel level sensor unit and fuel 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.

${f 5.}$ CHECK 15 A FUSE

- Turn ignition switch OFF.
- Disconnect 15 A fuse (No. 41) from IPDM E/R.
- 3. Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuse.

6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

Disconnect IPDM E/R harness connector E5.

2. 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

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

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7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B9, E117
- IPDM E/R harness connector E5
- Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump"
 - >> Repair open circuit, short to ground or short to power in harness or connectors.

8. CHECK FUEL PUMP GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connecto	r Terminal		
B22	3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

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

9. CHECK FUEL PUMP

Refer to EC-536, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace fuel pump. Refer to FL-5, "Exploded View".

10. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Exploded View".

NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:0000000007463019

1. CHECK FUEL PUMP

- Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 3. Check resistance between "fuel level sensor unit and fuel pump" terminals as follows.

Terminals	Resistance (Ω)
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". Refer to <u>FL-5. "Exploded View"</u>.

ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

INFOID:0000000007463021

ICC BRAKE SWITCH

Description INFOID:0000000007463020

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 CCS-16, "System Description" for the ICC function.

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Component Function Check

1. CHECK ICC BRAKE SWITCH FUNCTION

With CONSULT

- 1. Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF		
DIVARE SWI	brake pedar	Fully released	ON		

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Without CONSULT

- Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as per the following.

ECM					
Connector	+	_	Condition		Voltage (V)
Connector	Terminal	Terminal			
M107	126	128	Brake pedal	Slightly depressed	Approx. 0
WITO	(ICC brake switch signal)	120	Brake pedar	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-537, "Diagnosis Procedure".

INFOID:0000000007463022

Diagnosis Procedure

1. CHECK ICC BRAKE SWITCH POWER SUPPLY 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	Voltage	
Connector	Terminal	Glound	Voltage	
E114	1	Ground	Battery voltage	

Is the inspection result normal?

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

2.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

< DTC/CIRCUIT DIAGNOSIS >

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

${f 3.}$ CHECK ICC BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. 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		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?

YES >> GO TO 5. NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- · 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.

5. CHECK ICC BRAKE SWITCH

Refer to EC-538, "Component Inspection (ICC Brake Switch)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace ICC brake switch. Refer to EC-58, "Component Parts Location".

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ICC Brake Switch)

INFOID:0000000007463023

1. CHECK ICC BRAKE SWITCH-I

- 1. Turn ignition switch OFF.
- 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
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ICC BRAKE SWITCH-II

- Adjust ICC brake switch installation. Refer to <u>BR-7</u>, "Inspection and Adjustment".
- 2. Check the continuity between ICC brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

ICC BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ICC brake switch. Refer to EC-58, "Component Parts Location".

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IGNITION SIGNAL

Description INFOID:000000007463024

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

INFOID:0000000007463025

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

No >> Go to EC-540, "Diagnosis Procedure".

2.CHECK IGNITION SIGNAL FUNCTION

(P)With CONSULT

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 2. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-540, "Diagnosis Procedure".

${f 3.}$ CHECK IGNITION SIGNAL FUNCTION

Without CONSULT

- 1. 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		
	11	M107	128		
F101	12			50mSec/div	
	15				
	16			=	
	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-540, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463026

1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.
- Check the voltage between ECM harness connector terminals as per the following.

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< DTC/CIR	CUIT DIA	GNOSIS	>							[VQ3
	ECM									
Connector	+	_	Vo	oltage						
Commodor	Terminal	Termina	ıl							
M107	125	128	Batter	y voltage						
	GO TO 2	2.	-	rocedure".						
2. CHECK	IGNITION	COIL PC	WER SU	PPLY CIR	CUIT-II					
	nition swith the voltag	ch ON. e betweer	n condens	er harness	connector (and arc	und			
Cond	denser				connector	aria gre	dila.			
Connector	denser Terminal	Ground	Voltag		connector	and gro	varia.			
	1	Ground Ground		ge	Connector a	and gro	varia.			
Connector F8 Is the inspe YES >> NO >>	Terminal 1 ection results GO TO 5 GO TO 3	Ground Ilt normal?	Voltag Battery vo	ge oltage		and gro	dia.			
F8 Is the insperience YES >> NO >> 3.CHECK 1. Turn ig 2. Discon	Terminal 1 ection results GO TO 5 GO TO 5 IGNITION Inition switched	Ground Ilt normal? S. I COIL PO Ich OFF. I E/R harn	Voltag Battery vo	pltage PPLY CIRO ector E7.				er harn	ess connec	tor.
F8 Is the insperience YES >> NO >> 3.CHECK 1. Turn ig 2. Discon	Terminal 1 ection results GO TO S GO TO S IGNITION Inition switted In the continual section in	Ground Ilt normal? S. I COIL PO Ich OFF. I E/R harn	Voltag Battery vo	PPLY CIRO ector E7. E/R harne	CUIT-III			er harn	ess connec	tor.
F8 Is the insperience YES >> NO >> 3. CHECK 1. Turn ig 2. Discon 3. Check	Terminal 1 ection results GO TO S GO TO S IGNITION Inition switted In the continual section in	Ground Ilt normal? S. S. I COIL PC ICH OFF. I E/R harr uity between	Voltag Battery vo	pltage PPLY CIRO ector E7.	CUIT-III			er harn	ess connec	tor.

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

Is the inspection result normal?

>> Go to EC-181, "Diagnosis Procedure".

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E40, F39
- 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

- Turn ignition switch OFF.
- Check the continuity between condenser harness connector and ground.

Cond	enser	Ground	Continuity	
Connector	Connector Terminal		Continuity	
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.

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< DTC/CIRCUIT DIAGNOSIS >

6. CHECK CONDENSER

Refer to EC-544, "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.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

	Ignition coi	Ground	Voltago	
Cylinder	Connector	onnector Terminal		Voltage
1	F11	3		
2	F12	3		
3	F13	3	Ground	Battery voltage
4	F14	3	Giodila	Battery voltage
5	F15	3		
6	F16	3		

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F39
- Harness for open or short between ignition coil and harness connector F39

>> Repair or replace harness or connectors.

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.

	Ignition coi	Ground	Continuity		
Cylinder	Connector	Terminal	Ground	Continuity	
1	F11	2			
2	F12	2	Ground	Existed	
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.

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

10. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between ignition coil harness connector and ECM harness connector.

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CM	EC	Ignition coil		
Terminal	Connector	Terminal	Connector	Cylinder
20		1	F11	1
16		1	F12	2
12	E101	1	F13	3
11	FIUI	1	F14	4
15		1	F15	5
19		1	F16	6
	Terminal 20 16 12 11 15	F101 20 16 12 11 15	Terminal Connector Terminal 1 20 1 16 1 12 1 11 1 15	Connector Terminal Connector Terminal F11 1 20 F12 1 16 F13 1 F101 F14 1 11 F15 1 15

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 connector F104, F105 (2WD models)
- Harness connector F109, F110 (AWD models)
- Harness for open or short between ignition coil and ECM

>> Repair or replace harness or connectors.

12. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-543, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-199, "Exploded View".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

- Turn ignition switch OFF.
- 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	∟λιθρί 0

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-199, "Exploded View".

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Perform the following procedure in a place where with no combustible objects and good ventilation.

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.

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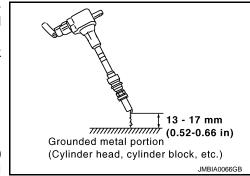
< DTC/CIRCUIT DIAGNOSIS >

Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 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.

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. Refer to EM-199, "Exploded View".

Component Inspection (Condenser)

INFOID:0000000007463028

1. CHECK CONDENSER

- Turn ignition switch OFF.
- Disconnect condenser harness connector.
- 3. Check resistance between condenser terminals as per the following.

Terminals	Resistance (MΩ)
1 and 2	Above 1 [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END NO >> Replace condenser.

MALFUNCTION INDICATOR LAMP

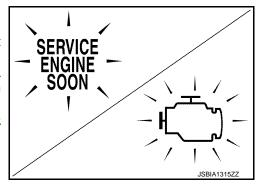
Description

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 <u>EC-160</u>, "<u>DIAGNOSIS DESCRIPTION</u>: <u>Malfunction Indicator Lamp</u> (MIL)".



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-545, "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-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-112, "Exploded View".

NO >> Repair or replace.

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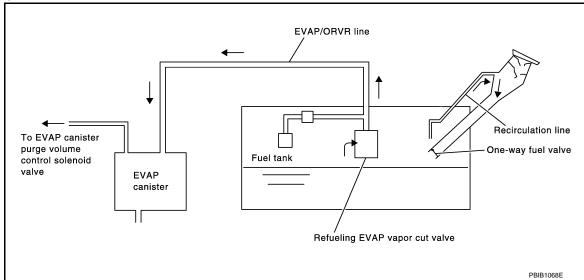
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2012 G Sedan

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Description INFOID:000000007463032



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is 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 work area.
- Always furnish the workshop with a CO₂ fire extinguisher.

CAUTION:

- 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-622, "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.
- · 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

INFOID:0000000007463033

1. CHECK ORVR FUNCTION

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.

Are any symptoms present?

YES >> Go to EC-546, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463034

1.INSPECTION START

Check whether the following symptoms are present.

A: Fuel odor from EVAP canister is strong.

< 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

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- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 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.

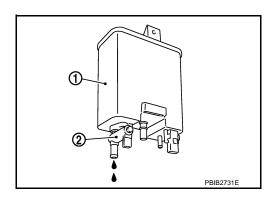
3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister (1).

• 2 : EVAP canister vent 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-549, "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

.CHECK EVAP CANISTER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 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.

8. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister (1).

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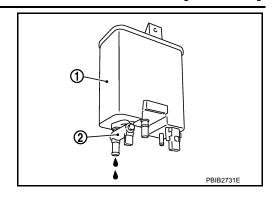
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[VQ37VHR]

• 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-549, "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 >

[VQ37VHR]

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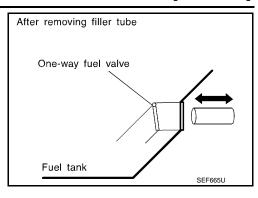
Check one-way fuel valve for operation as follows.When a stick is inserted, the valve should open, when removing stick it should close.

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.



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Component Inspection

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

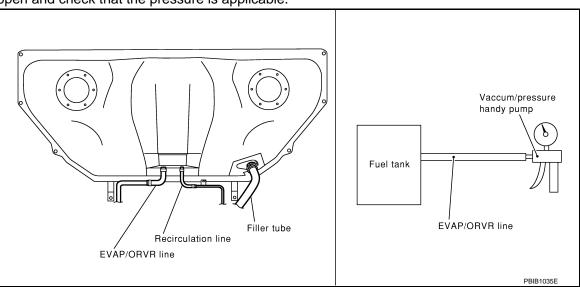
2.CHECK REFUELING EVAP VAPOR CUT VALVE

(I) With CONSULT

- Turn ignition switch OFF.
- Remove fuel tank. Refer to <u>FL-11</u>, "<u>Removal and Installation</u>".
- 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.
- 4. 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 EVAP 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

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

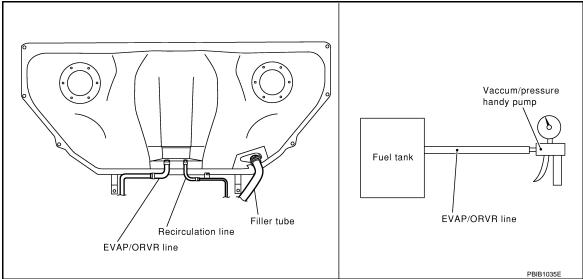
3.check refueling evap vapor cut valve

Without CONSULT

- 1. Turn ignition switch OFF.
- Remove fuel tank. Refer to <u>FL-11</u>, "Removal and Installation".
- 3. Drain fuel from the tank as follows:
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
- 4. 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 EVAP 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

NO >> Replace refueling EVAP vapor cut valve with fuel tank.

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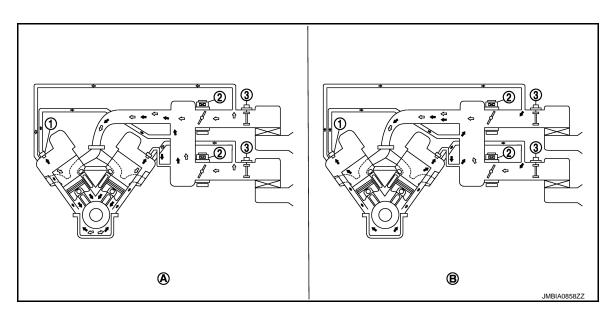
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POSITIVE CRANKCASE VENTILATION

Description INFOID:0000000007463036



- PCV valve
- Normal condition
- ∵ : Fresh air
- =: Blow-by air

- Electric throttle control actuator 2
- В Hi-load condition

Mass air flow sensor

This system returns blow-by gas to the intake manifold.

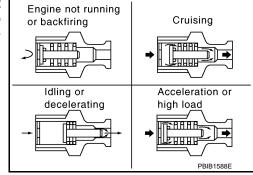
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV

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

1. CHECK PCV VALVE

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POSITIVE CRANKCASE VENTILATION

< DTC/CIRCUIT DIAGNOSIS >

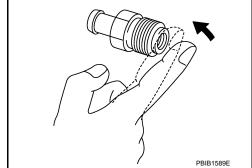
[VQ37VHR]

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

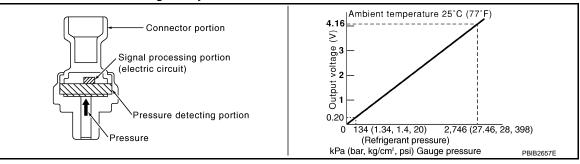
NO >> Replace PCV valve. Refer to EM-199, "Exploded View".



REFRIGERANT PRESSURE SENSOR

Description INFOID:0000000007463038

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

1. CHECK REFRIGERANT PRESSURE SENSOR FUNCTION

- Start engine and warm it up to normal operating temperature.
- Turn A/C switch and blower fan switch ON.
- 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?

YFS >> INSPECTION END

NO >> Go to EC-553, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn A/C switch and blower fan switch OFF.
- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect refrigerant pressure sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pr	essure sensor	Ground	Voltage (V)	
Connector	Connector Terminal		voltage (v)	
E77	3	Ground	Approx. 5	

Is the inspection result normal?

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

EC-553 Revision: 2013 February 2012 G Sedan

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REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

3.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.

4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E77	1	M107	112	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 refrigerant pressure sensor
 - >> Repair open circuit, short to ground or short to power in harness or connectors.

6.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
E77	2	M107	105	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.

- 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-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. refer to HAC-186, "Exploded View".

NO >> Repair or replace.

< DTC/CIRCUIT DIAGNOSIS >

SNOW MODE SWITCH

Description INFOID:0000000007463041

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 accelerate 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

${f 1}$.CHECK SNOW MODE SWITCH FUNCTION

- Turn ignition switch ON.
- Select "SNOW MODE SW" in "DATA MONITOR" mode with CONSULT. 2.
- Check "SNOW MODE SW" indication under the following conditions.

Monitor item Condition		Indication	
SNOW MODE SW	Snow mode switch	ON	ON
	Show mode switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-555, "Diagnosis Procedure".

2.CHECK SNOW MODE INDICATOR FUNCTION

- Turn ignition switch ON.
- Check the snow mode indicator in the snow mode switch under the following condition.

Condition		Snow mode indicator
Snow mode switch	ON	ON
Show mode switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-555, "Diagnosis Procedure".

Diagnosis Procedure

${f 1}$.CHECK SNOW MODE SWITCH OVERALL FUNCTION

Confirm the malfunctioning circuit (snow mode switch or snow mode indicator). Refer to EC-555, "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-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to MWI-4. "Work flow".

3.check snow mode switch power supply circuit

- Turn ignition switch OFF.
- Disconnect snow mode switch harness connector. 2.
- 3.
- Check the voltage between snow mode switch harness connector and ground.

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[VQ37VHR]

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Turn ignition switch ON.

Snow mo	ode switch	Ground	Voltage	
Connector	Terminal	Giodila		
M139	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 E106, M6
- IPDM E/R harness connector E7
- 10 A fuse (No. 43)
- Harness for open or short between snow mode switch and fuse.

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

$5. \mathsf{CHECK}$ snow mode switch input signal circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect "unified meter and A/C amp." harness connector.
- Check the continuity between snow mode switch harness connector and "unified meter and A/C amp." harness connector.

Snow mod	de switch	Unified meter and A/C amp.		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
M139	4	M66	23	Existed	

4. 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 connector.

6.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace ground connection.

7.CHECK SNOW MODE INDICATOR LAMP GROUND CIRCUIT FOR OPEN AND SHORT

Check the continuity between snow mode switch harness connector and ground.

Snow mod	de switch	Ground	Continuity	
Connector	Terminal	Oround		
M139	2	Ground	Existed	

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 8.

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

8. CHECK SNOW MODE SWITCH

Refer to EC-557, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace snow mode switch. Refer to IP-11, "A/T MODELS: Exploded View".

Revision: 2013 February EC-556 2012 G Sedan

SNOW MODE SWITCH [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > 9. CHECK INTERMITTENT INCIDENT Α Refer to GI-43, "Intermittent Incident". >> INSPECTION END EC Component Inspection INFOID:0000000007463044 1. CHECK SNOW MODE SWITCH-I Turn ignition switch OFF. Disconnect snow mode switch harness connector. D Check the continuity between snow mode switch terminals under the following conditions. Terminals Condition Continuity Е ON Existed 1 and 4 Snow mode switch OFF Not Existed F Is the inspection result normal? YES >> GO TO 2. NO >> Replace snow mode switch. Refer to IP-11, "A/T MODELS: Exploded View". 2. CHECK SNOW MODE SWITCH-II Check the continuity between snow mode switch terminals under the following conditions. Н Terminals (Polarity) Continuity Existed 2 (+) - 4 (-) 4 (+) - 2 (-) Not Existed Is the inspection result normal? YES >> INSPECTION END >> Replace snow mode switch. Refer to IP-11, "A/T MODELS: Exploded View". NO K M Ν

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

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 TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

CONSULT MONITOR	r itei	V
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Monitor Item		Condition	Values/Status		
ENG SPEED	Run engine and compare COI	Almost the same speed as the tachometer indication			
MAS A/F SE-B1	See EC-173, "Description".				
MAS A/F SE-B2	See EC-173, "Description".				
B/FUEL SCHDL	See EC-173, "Description".				
A/F ALPHA-B1	See EC-173, "Description".				
A/F ALPHA-B2	See EC-173, "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)	tions are met Engine: After warming up - After keeping engine speed be				
HO2S2 (B2)	tions are met Engine: After warming up - After keeping engine speed be				
HO2S2 MNTR (B1)	tions are met Engine: After warming up - After keeping engine speed be				
HO2S2 MNTR (B2)	Revving engine from idle up to tions are met. Engine: After warming up After keeping engine speed be at idle for 1 minute under no le	$LEAN \longleftrightarrow RICH$			
VHCL SPEED SE	Turn drive wheels and compa dication.	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		
4005L 05N 0*1	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		

Monitor Item		Condition	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 temperature
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temperature
EVAP SYS PRES*3	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 ON	$OFF \to ON \to OFF$
CLSD THL POS	Ignition switch: ON	Accelerator pedal: Fully released	ON
OLOD THE PUS	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF
	Engine: After warming up, idle	Air conditioner switch: OFF	OFF
AIR COND SIG	the engine	Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	Ignition switch: ON	Selector lever: P or N (A/T), Neutral (M/T)	ON
	ignition switch. ON	Selector lever: Except above	OFF
PW/ST SIGNAL	Engine: After warming up, idle	Steering wheel: Not being turned	OFF
	the 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	$ON \to OFF \to ON$
HEATER FAN SW	Engine: After warming up, idle	Heater fan switch: ON	ON
,	the engine	Heater fan switch: OFF	OFF
BOOST VCUM SW	This item is displayed but is not	ot applicable to this model.	
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
	-g	Brake pedal: Slightly depressed	ON
	 Engine: After warming up Selector lever: P or N (A/T), 	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
_	Engine: After warming up	Idle	7° BTDC
IGN TIMING	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	25° - 45° BTDC

Monitor Item		Condition	Values/Status
CAL/LD VALUE	 Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) 	Idle	5% - 35%
ONDED WILDE	Air conditioner switch: OFF No load	2,500 rpm	5% - 35%
	 Engine: After warming up Selector lever: P or N (A/T), 	Idle	2.0 - 6.0 g/s
MASS AIRFLOW	Selector lever: P of N (A/T), Neutral (M/T) Air conditioner switch: OFF No load	2,500 rpm	7.0 - 20.0 g/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	_
	Engine: After warming up	Idle	-5°CA - 5°CA
INT/V TIM (B1)	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0°CA - 30°CA
	Engine: After warming up	Idle	−5°CA - 5°CA
INT/V TIM (B2)	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0°CA - 30°CA
	Engine: After warming up	Idle	0% - 2%
INT/V SOL (B1)	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	2,000 rpm	Approx. 0% - 50%
	Engine: After warming up	Idle	0% - 2%
INT/V SOL (B2)	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	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 (Facing actions of)	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	Air conditioner switch: OFF	OFF
AIR COND RLY	the engine	Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	 For 1 second after turning ignition switch: ON Engine running or cranking Except above 		ON
			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 rp	OFF	

Monitor Item		Condition	Values/Status
	Engine speed: Below 3,600 Engine: After warming up	ON.	
HO2S2 HTR (B2)	Keeping the engine speed to at idle for 1 minute under not a speed to at idle for 1 minute under not a speed to a sp	ON	
	Engine speed: Above 3,600) rpm	OFF
I/P PULLY SPD	Vehicle speed: More than 2	0 km/h (12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and complication.	pare CONSULT value with the speedometer in-	Almost the same speed as the speedometer indication
IDL AAALEADN	E. de Brain	Idle air volume learning has not been performed yet.	YET
IDL A/V LEARN	Engine: Running	Idle air volume learning has already been performed successfully.	CMPLT
SNOW MODE SW	• Ignition quitable ON	Snow mode switch: ON	ON
SNOW MODE SW	Ignition switch: ON	Snow mode switch: OFF	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 illuminated.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	Engine: After warming up, ic (More than 140 seconds aft)		4 - 100%
A/F S1 HTR (B2)	Engine: After warming up, ic (More than 140 seconds aft)		4 - 100%
AC PRESS SEN	Engine: Idle Both A/C switch and blower	1.0 - 4.0 V	
VHCL SPEED SE	Turn drive wheels and complete dication.	Almost the same speed as the speedometer indication	
MAAINI CVA/	a Ignition quitable ON	MAIN switch: Pressed	ON
MAIN SW	Ignition switch: ON	MAIN switch: Released	OFF
CANCEL CV	. Invition suitable ON	CANCEL switch: Pressed	ON
CANCEL SW	Ignition switch: ON	CANCEL switch: Released	OFF
DECLIME/ACC CVA	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Released	OFF
SET SW	• Ignition quitable ON	SET/COAST switch: Pressed	ON
SET SW	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	Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	- Igrillion Switch. ON	Brake pedal: Slightly depressed	ON
DIST SW	Ignition switch: ON	DISTANCE switch: Pressed	ON
אט וטוע טעט וטוע	Ignition switch: ON	DISTANCE switch: Released	OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON \to OFF$
BAT CUR SEN	 Engine speed: Idle Battery: Fully charged*² Selector lever: P or N (A/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 applicable to this model	

Monitor Item		Condition	Values/Status	
BRAKE BST PRES SE	This item is displayed but is n	ot applicable to this model.		
VVEL POSITION SEN- B1	Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF	Idle When revving engine up to 2,000 rpm quickly	Approx. 0.25 - 1.40 V Approx. 0.25 - 4.75 V	
VVEL POSITION SEN-	 No load Engine: After warming up Selector lever: P or N (A/T), Neutral (M/T) 	Idle When reveing engine up to 2,000 rpm	Approx. 0.25 - 1.40 V	
B2	Air conditioner switch: OFF No load	When revving engine up to 2,000 rpm quickly	Approx. 0.25 - 4.75 V	
	Engine: After warming upSelector lever: P or N (A/T),	Idle	Approx. 0 - 20 deg	
VVEL TIM-B1	Neutral (M/T) Air conditioner switch: OFF No load	When revving engine up to 2,000 rpm quickly	Approx. 0 - 90 deg	
	Engine: After warming up Selector lover: D or N (A/T)	Idle	Approx. 0 - 20 deg	
VVEL TIM-B2	 Selector lever: P or N (A/T), Neutral (M/T) Air conditioner switch: OFF No load 	When revving engine up to 2,000 rpm quickly	Approx. 0 - 90 deg	
	• Ignition quitable OFF . ON	VVEL learning has not been performed yet.	YET	
VVEL LEARN	Ignition switch: OFF → ON (After warming up)	VVEL learning has already been performed successfully.	DONE	
VVEL SEN LEARN-B1	VVEL learning has already be	Approx. 0.30 - 0.80 V		
VVEL SEN LEARN-B2	VVEL learning has already be	Approx. 0.30 - 0.80 V		
ALT DUTY	Engine: Idle	0 - 80%		
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%		
ALT DUTY SIG	Power generation voltage var	able control: Operating	ON	
ALI DOTT SIG	Power generation voltage var	iable control: Not operating	OFF	
EVAP LEAK DIAG*3	Ignition switch: ON		Depending on condition of EVAP leak diagnosis	
EVAP DIAG READY*3	Ignition switch: ON (READY)		Depending on ready condition of EVAP leak diagnosis	
	DTC P0139 self-diagnosis (della properties of the properties	INCMP		
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (de successfully.	layed response) has already been performed	CMPLT	
	DTC P0159 self-diagnosis (de	elayed response) has not been performed yet.	INCMP	
HO2 S2 DIAG1 (B2)	DTC P0159 self-diagnosis (de successfully.	CMPLT		
	DTC P0139 self-diagnosis (slow response) has not been performed yet.		INCMP	
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (sle successfully.	CMPLT		
	DTC P0159 self-diagnosis (sle	ow response) has not been performed yet.	INCMP	
HO2 S2 DIAG2 (B2)	DTC P0159 self-diagnosis (sle successfully.	ow response) has already been performed	CMPLT	
A/F SEN1 DIAG2 (B1)	This item is displayed but is n	ot applicable to this model.		
A/F SEN1 DIAG2 (B2)	This item is displayed but is not applicable to this model.			

^{*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.

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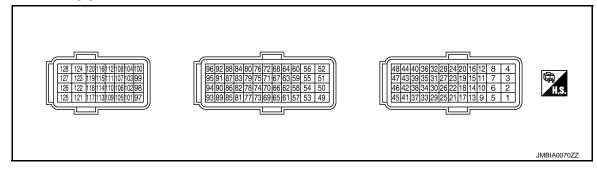
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*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to <u>PG-3</u>, "<u>How to Handle Battery</u>".

*3: Except for Mexico

TERMINAL LAYOUT



PHYSICAL VALUES

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.

	nal No. 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 conditionIdle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★ 50mSec/div 5V/div JMBIA0030GB		
2	128	Throttle control motor	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14 V★ 500μSec/div 5V/div JMBIA0031GB		
(G)	(B)	(Open) (bank 1)		Output	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14 V★ 500μSec/div 5V/div JMBIA0032GB
3 (R)	128 (B)	Throttle control motor power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)		

	nal No. color)	Description		Condition	Value		
+		Signal name	Input/ Output	Condition	(Approx.)		
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 5V/div JMBIA0033GB		
5 (W)* ³ (SB)* ⁴	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 5V/div JMBIA0030GB		
8 (B)	_	ECM ground	_	_	_		
11 (GR) 12 (L) 15 (V)	128	Ignition signal No. 4 Ignition signal No. 3 Ignition signal No. 5	Output	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 0.2 V★ 50mSec/div 2V/div JMBIA0035GB		
16 (G) 19 (SB) 20 (Y)	(B)	Ignition signal No. 2 Ignition signal No. 6 Ignition signal No. 1	Output -	Согра		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	0.1 - 0.4 V★ 50mSec/div 2V/div JMBIA0036GB
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 [Ignition switch: ON] Engine stopped [Engine is running] 	50mSec/div 50mSec/div 5V/div JMBIA0037GB BATTERY VOLTAGE (11 - 14 V)		

	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
18 (W)	128 (B)	Intake valve timing control solenoid valve (bank 1)	Output	[Engine is running]Warm-up conditionEngine speed: 2,000rpm	7 - 12 V★ 5V/div JMBIA0038GB
21	128	EVAP canister purge vol- ume control solenoid	Output	[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)		valve	Supu	[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] [Ignition switch: ON] More than 1 second after turning igni- 	0 - 1.5 V BATTERY VOLTAGE
24 (P)	128 (B)	ECM relay	tion switch ON [Engine is running [Ignition switch: OI • A few seconds a switch OFF	tion switch ON [Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	(11 - 14 V) 0 - 1.5 V
ν.,	(-)	(333		[Ignition switch: OFF] More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
25 (O)* ³ BR)* ⁴	128 (B)	Throttle control motor re- lay	Output	[Ignition switch: ON → OFF]	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON]	0 - 1.0 V
28 (BR)	128 (B)	VVEL actuator motor relay abort signal [VVEL control module]	Output	[Engine is running]Warm-up conditionIdle speed	0 V

Termi	nal No.	Description			Value
+		Signal name	Input/ Output	Condition	Value (Approx.)
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
29 (G)	128 (B)	Intake valve timing control solenoid valve (bank 2)	Output	[Engine is running]Warm-up conditionEngine speed: 2,000rpm	7 - 12 V★ 5V/div JMBIA0038GB
30	40	Throttle position sensor 1	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) (bank 1)	при	 [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 1	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)	(bank 2)		 [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 5V/div JMBIA0037GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
34	40	Throttle position sensor 2		 [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)	(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 2	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)			 [Ignition switch: ON] Engine stopped Selector lever: D (A/T) or 1st (M/T) Accelerator pedal: Fully depressed 	More than 0.36 V

	nal No. color)	Description		O - m alisti - m	Value
+		Signal name	Input/ Output	Condition	(Approx.)
36 (O)	_	Sensor ground [Brake booster pressure sensor]	_	_	_
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)		[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0 V★ 1mSec/div 2V/div JMBIA0042GB
38	96 (P)* ³	Manifold absolute pres-	Input	[Engine is running]Warm-up conditionIdle speed	1.2 V
(O)	(BR)* ⁴	sure (MAP) sensor	mpac	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	1.5 V
39	36	Brake booster pressure	loout	[Engine is running]Warm-up conditionIdle speedBrake pedal: Fully released	1.2 V
(P)	(O)	sensor	Input	[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 sen- sor (POS)]	_	[Ignition switch: ON]	5 V
47 (Y)	_	Sensor ground [Crankshaft position sensor (POS)]	_	_	_
48 (B)	_	Sensor ground [Throttle position sensor (bank 2)]	_	_	_

	nal No. color)	Description		Condition	Value
+		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 5V/div JMBIA0033GB
50	128	Throttle control motor	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14 V★ 500µSec/div 5V/div JMBIA0031GB
(V)	(B)	(Open) (bank 2)		[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14 V★ 500μSec/div 5V/div JMBIA0032GB
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
54 (Y)	_	CAN communication line [VVEL control module]	Input/		(11 - 14 V) —
55 (LG)	_	CAN communication line [VVEL control module]	Input/ output	_	_
57 (L)	128 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2 V
59 (O)* ³	128	Camshaft position sensor	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 2V/div JMBIA0045GB
(L)* ⁴	(B)	(PHASE) (bank 1)	Input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0046GB

	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
60 (G)	128 (B)	Sensor power supply [Camshaft position sensor (PHASE) (bank 1), Manifold absolute pressure (MAP) sensor, Power 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	128	Camshaft position sensor	loout	 [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 2V/div JMBIA0045GB
(L)	(B)	(PHASE) (bank 2)	Input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0046GB
64 (SB)	128 (B)	Sensor power supply [Camshaft position sensor (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

	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
76 (W)	84 (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
77	68	Mass air flow sensor	Input	[Engine is running]Warm-up conditionIdle speed	0.7 - 1.2 V
(SB)	(LG)	(bank 1)	input	[Engine is running]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.
79 (BR)	94 (Y)	Mass air flow sensor (bank 2)	Input	 [Engine is running] Warm-up condition Idle speed [Engine is running] Warm-up condition Engine speed: 2,500 rpm 	0.7 - 1.2 V 1.3 - 1.7 V
80 (O)	84 (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
81 (R) 82 (V) 85 (BR)	128	Fuel injector No. 3 Fuel injector No. 6 Fuel injector No. 2		 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div 10V/div JMBIA0047GB
86 (W) 89 (GR)	(B)	Fuel injector No. 5 Fuel injector No. 1	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div
90 (O)		Fuel injector No. 4			10V/div JMBIA0048GB
84 (B)	_	Sensor ground (Heated oxygen sensor 2, Engine coolant tempera- ture sensor, Engine oil temperature sensor)	_	_	_

ECM

[VQ37VHR]

	nal No. color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
87	96 (P)* ³	Power steering pressure	Output	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5 V	EC
(Y)	(BR)* ⁴	sensor	Output	[Engine is running]Steering wheel: Not being turned	0.4 - 0.8 V	С
91 (SB)	95 (G)	Battery current sensor	Input	 [Engine is running] Battery: Fully charged*² Idle speed 	2.6 - 3.5 V	D
92 (G)	_	Sensor ground [Camshaft position sensor (PHASE) (bank 2)]	_	_	_	E
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)]	_	_	_	F
95 (G)	_	Sensor ground (Battery current sensor)	_	_	_	G
96 (P)* ³ (BR)* ⁴	_	Sensor ground [Camshaft position sensor (PHASE) (bank 1),Manifold absolute pressure (MAP) sensor, Power steering pressure sensor]	_	_	_	Н
97	100	Accelerator pedal position	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.45 - 1.00 V	
(R)	(W)	sensor 1	mput	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.2 - 4.8 V	J
98	104	Accelerator pedal position	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.22 - 0.50 V	K
(P)	(V)	sensor 2	прис	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2.1 - 2.5 V	L
99 (L)	100 (W)	Sensor power supply (Accelerator pedal position sensor 1)	_	[Ignition switch: ON]	5 V	M
100 (W)	_	Sensor ground (Accelerator pedal position sensor 1)	_	_	_	Ν

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	nal No. color)	Description		O an alistican	Value
+		Signal name	Input/ Output	Condition	(Approx.)
				[Ignition switch: ON] • ICC steering switch: OFF	4.3 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
101	108	ICC steering switch		[Ignition switch: ON] • CANCEL switch: Pressed	1.3 V
(SB)	(Y)	(models with ICC system)	Input	[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3.7 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	3 V
				[Ignition switch: ON] • DISTANCE switch: Pressed	2.2 V
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V
		ASCD steering switch (models with ASCD system)	Input	[Ignition switch: ON] • MAIN switch: Pressed	0 V
101 (SB)	108 (Y)			[Ignition switch: ON] • CANCEL switch: Pressed	1 V
,				[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V
102 (LG)	112 (V)	EVAP control system pressure sensor*5	Input	[Ignition switch: ON]	1.8 - 4.8 V
103 (GR)	104 (V)	Sensor power supply (Accelerator pedal position sensor 2)	_	[Ignition switch: ON]	5 V
104 (V)	_	Sensor ground (Accelerator pedal position sensor 2)	_	_	_
105 (L)	112 (V)	Refrigerant pressure sensor	Input	[Engine is running]Warm-up conditionBoth A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0 V
106 (W)	128 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
107 (GR)	112 (V)	Sensor power supply (EVAP control system pressure sensor* ⁵ , Refrig- erant pressure sensor)	_	[Ignition switch: ON]	5 V
108 (Y)	_	Sensor ground (ASCD/ICC steering switch)	_	_	_
109 (G)	128 (B)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N (A/T), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
(3)	(5)			[Ignition switch: ON] • Selector lever: Except above	0 V

	nal No. e color)	Description		Condition	Value	А
+		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	C D
(R)	(B)	nal	Output	[Engine is running] • Engine speed is 2,000 rpm	1 V★ 10mSec/div 2V/div JMBIA0077GB	E
112 (V)	_	Sensor ground (EVAP control system pressure sensor* ⁵ , Refrig- erant pressure sensor)	-		_	G H
113 (P)	_	CAN communication line	Input/ Output	_	_	
114 (L)	_	CAN communication line	Input/ Output	_	_	I
117 (V)	128 (B)	Data link connector	Input/ Output	_	_	I
121 (LG)	128 (B)	EVAP canister vent control valve*5	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	J
122 (P)	128 (B)	Stop lamp switch	Input	[Ignition switch: OFF]Brake pedal: Fully released[Ignition switch: OFF]Brake pedal: Slightly depressed	0 V BATTERY VOLTAGE (11 - 14 V)	K
123 (B) 124 (B)	_	ECM ground	_	_	_	M
125 (R)	128 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
126 (BR)	128 (B)	ICC brake switch (models with ICC system) ASCD brake switch (mod- els with ASCD system)	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed [Ignition switch: ON] • Brake pedal: Fully released	0 V BATTERY VOLTAGE (11 - 14 V)	N O
127 (B) 128 (B)	_	ECM ground	_	_	_	Р

^{★:} 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 <u>PG-3</u>, "<u>How to Handle Battery</u>".

^{*3:} With 2WD models

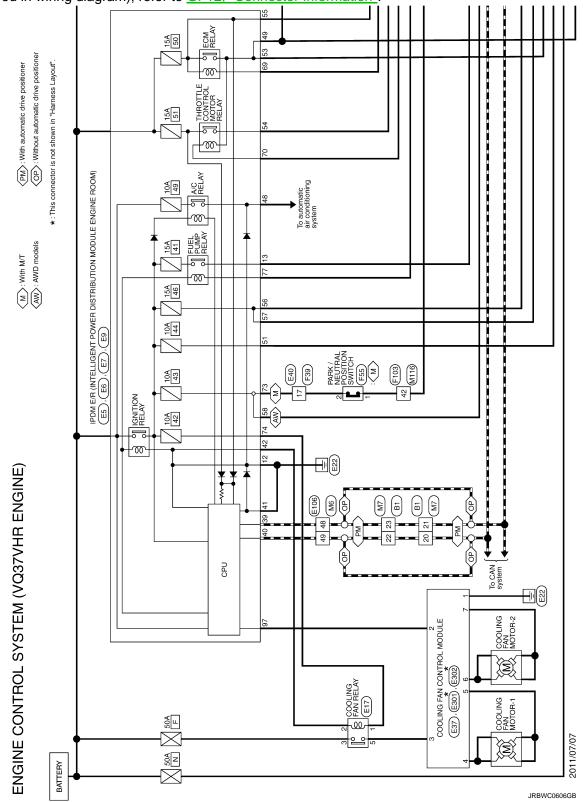
^{*4:} With AWD models

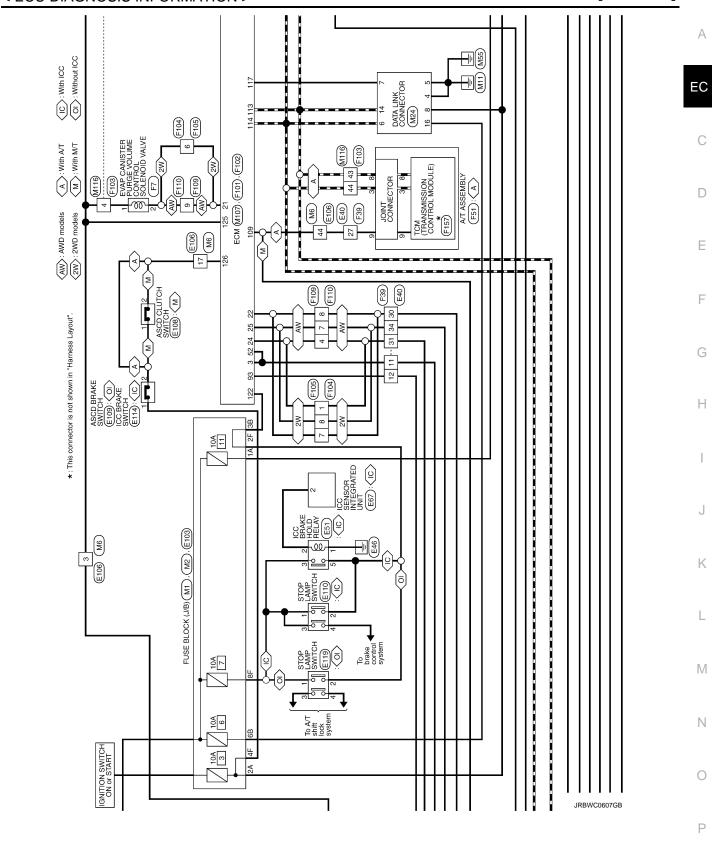
*5: Except for Mexico

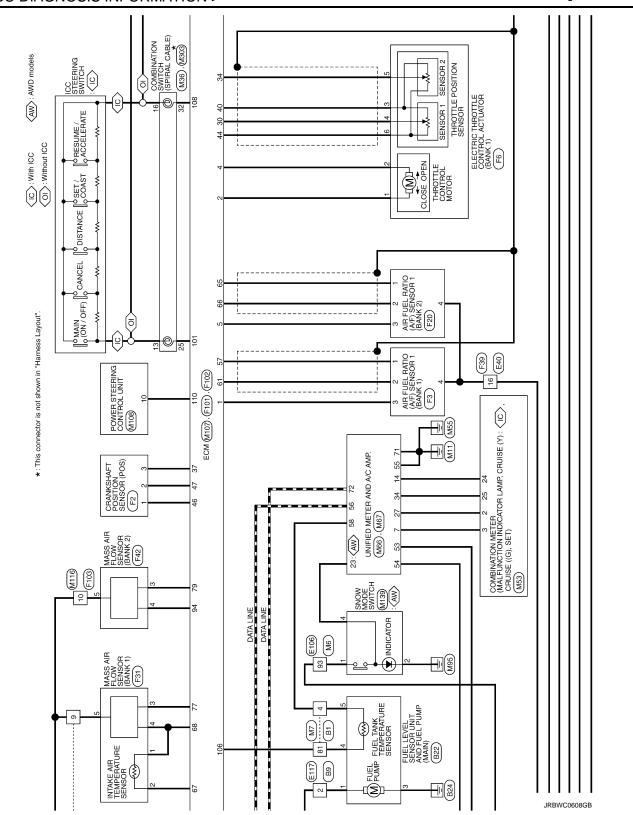
Wiring Diagram - ENGINE CONTROL SYSTEM -

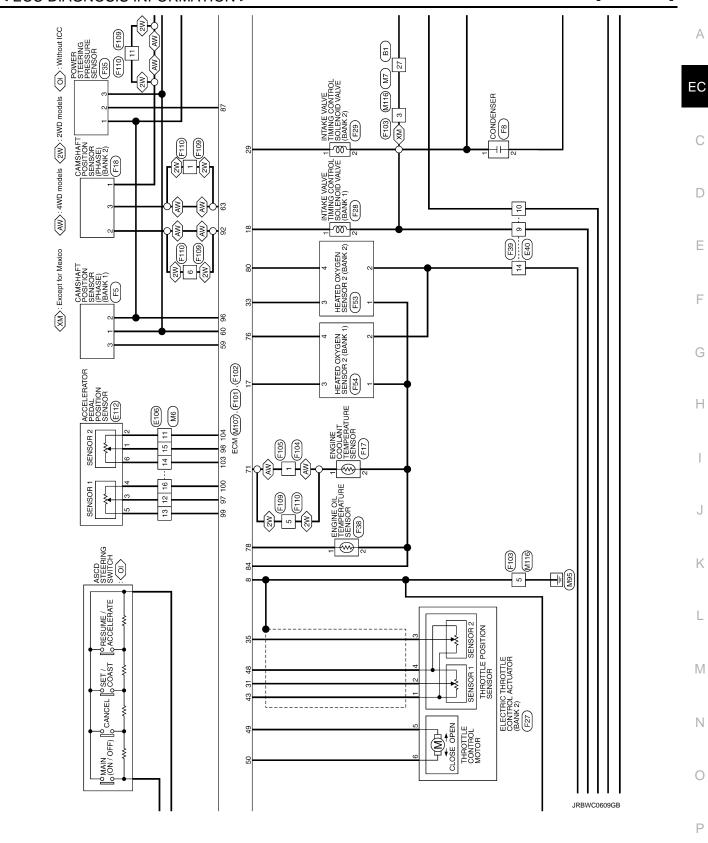
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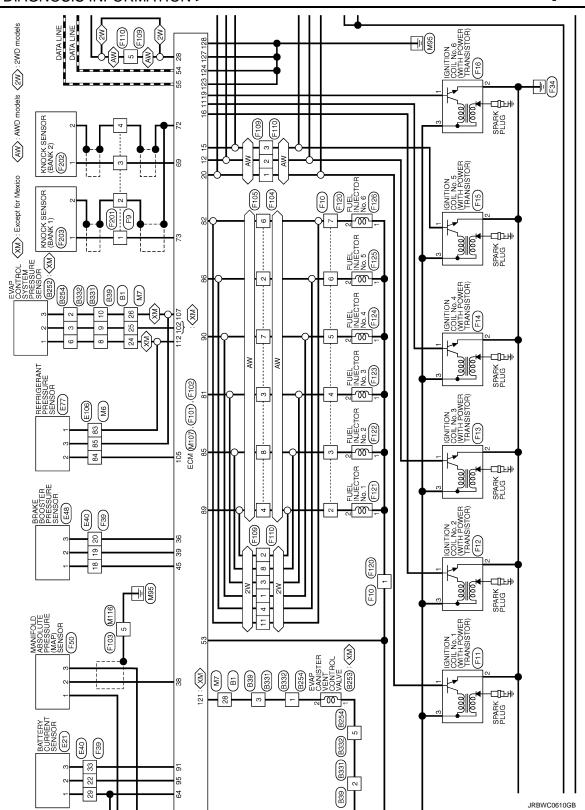
For connector terminal arrangements, harness layouts, and alphabets in a \bigcirc (option abbreviation; if not described in wiring diagram), refer to GI-12, "Connector Information".





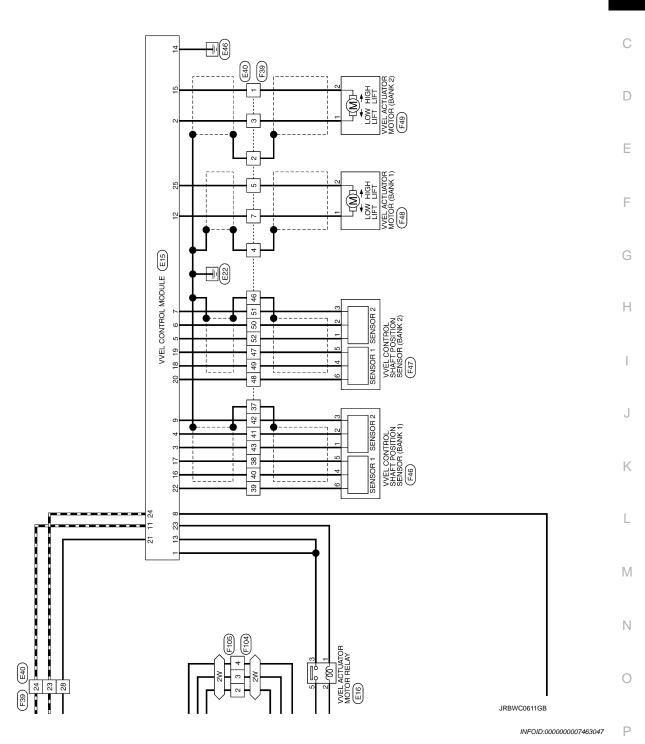






EC

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NON DTC RELATED ITEM

Fail safe

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
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. 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-545</u>

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode							
U1003 U1024	Can communication circuit	VVEL actuator motor relay is turned off, and VVEL value is become at a minimum 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 intake valve timing control solenoid valve and the valve control does not function.							
P0102 P0103 P010C P010D	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm d	ue to the fuel cut.						
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by CONSULT displays the engine coolant temperature							
		Condition	Engine coolant temperature decided (CONSULT display)						
		Just as ignition switch is turned ON or START	40°C (104°F)						
		Approx 4 minutes or more after engine 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 temp operates while engine is running.	perature sensor is activated, the cooling fan						
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 P2135	Throttle position sensor	The ECM controls the electric throttle control actuder for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throdition. Therefore, the acceleration will be poor.							
P0500	Vehicle speed sensor	The cooling fan operates (Highest) while engine is	s running.						
P0524	Engine oil pressure	The signal is not energized to the intake valve timi trol does not function. Engine speed will not rise more than 2,400 rpm d							
P0605	ECM	(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. ECM deactivates ASCD operation.							
	ECM	VVEL actuator motor relay is turned off, and VVE	· ·						
P0607	LOW	Engine speed will not rise more than 3,500 rpm d	ue to the fuel cut.						
P0607 P0643	Sensor power supply	Engine speed will not rise more than 3,500 rpm d ECM stops the electric throttle control actuator co opening (approx. 5 degrees) by the return spring.	ntrol, throttle valve is maintained at a fixed						

< ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine operating condi	ition in fail-safe mode						
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 off, and VVEL value is become at a minimum angle. Engine speed will not rise more than 3,500 rpm due to the fuel cut						
P1090 P1093	VVEL actuator motor		VVEL of normal bank is controlled at VVEL angle of abnormal bank. Engine speed will not rise more than 3,500 rpm due to the fuel cut.						
			VVEL actuator motor relay is turned off, and VVEL value is become at a minimum angle. Engine speed will not rise more than 3,500 rpm due to the fuel cut.						
P1091	VVEL actuator motor relay	VVEL actuator motor relay is turned off, and VV Engine speed will not rise more than 3,500 rpm	_						
P1233 P2101	Electric throttle control function	ECM stops the electric throttle control actuator opening (approx. 5 degrees) by the return sprin							
P1236 P2118	Throttle control motor	ECM stops the electric throttle control actuator opening (approx. 5 degrees) by the return sprin							
P1238 P2119	Electric throttle control actuator	(When electric throttle control actuator does not function:) ECM controls the electric throttle actuator by re position. The engine speed will not rise more th	egulating the throttle opening around the idle						
		(When throttle valve opening angle in fail-safe r ECM controls the electric throttle control actuate grees or less.							
		(When ECM detects the throttle valve is stuck of While the vehicle is being driven, it slows down of stops, the engine stalls. The engine can restart in N or P position, and en	gradually because of fuel cut. After the vehicle						
P1290 P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator opening (approx. 5 degrees) by the return sprin							
P1606	VVEL control module	VVEL actuator motor relay is turned off, and VV Engine speed will not rise more than 3,500 rpm							
P1805	Brake switch	ECM controls the electric throttle control actuator range. Therefore, acceleration will be poor.	or by regulating the throttle opening to a small						
		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:0000000007463048

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
	, ,
1	U0101 U0164 U1001 U1003 CAN communication line
	U1024 VVEL CAN communication line
	P0102 P0103 P010C P010D Mass air flow sensor
	P010A Manifold absolute pressure (MAP) sensor
	P0112 P0113 P0127 Intake air temperature sensor
	P0116 P0117 P0118 P0125 Engine coolant temperature sensor
	P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor P0122 P0123 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor P0122 P0123 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor P0122 P0123 P0
	P0128 Thermostat function P0128 Thermostat function
	P0181 P0182 P0183 Fuel tank temperature sensor P0181 P0182 P0183 Fuel tank temperature sensor
	P0196 P0197 P0198 Engine oil temperature sensor P0196 P0197 P0198 Engine oil temperature sensor
	P0327 P0328 P0332 P0333 Knock sensor P0327 P0328 P0332 P0333 Knock sensor
	P0335 Crankshaft position sensor (POS) P0345 P03
	P0340 P0345 Camshaft position sensor (PHASE) P0400 P04
	P0460 P0461 P0462 P0463 Fuel level sensor P0500 V4 V4 V4
	P0500 Vehicle speed sensor P0555 Published to the sensor representation of the sensor represen
	P0555 Brake booster pressure sensor P0555 Brake booster pressure sensor
	• P0605 P607 ECM
	P0643 Sensor power supply P0700 TOM
	• P0700 TCM
	P0705 Transmission range switch P0850 Post/gaustral position (PND) switch
	P0850 Park/neutral position (PNP) switch P1090 P1003 P1003 NV/EL control shoft position cancer.
	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

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 	A
	 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 	EC
	 P0441 EVAP control system purge flow monitoring P0443 P0444 P0445 EVAP canister purge volume control solenoid valve P0447 P0448 EVAP canister vent control valve P0451 P0452 P0453 EVAP control system pressure sensor P0550 Power steering pressure sensor 	С
	 P0603 ECM power supply P0710 P0717 P0720 P0729 P0730 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 P1087 P1088 VVEL system 	D
	 P1090 P1093 VVEL actuator motor P1091 VVEL actuator motor relay P1217 Engine over temperature (OVERHEAT) P1233 P2101 Electric throttle control function 	Е
	 P1233 P2101 Electric tribitile control function P1236 P2118 Throttle control motor P1290 P2100 P2103 Throttle control motor relay P1805 Brake switch 	F
3	 P0011 P0021 Intake valve timing control P006A P0101 P010B Mass air flow sensor P0106 Manifold absolute pressure (MAP) sensor P0171 P0172 P0174 P0175 Fuel injection system function 	G
	 P0300 - P0306 Misfire P0420 P0430 Three way catalyst function P0456 EVAP control system (VERY SMALL LEAK) P0506 P0507 Idle speed control system 	Н
	 P050A P050E Cold start control P0524 Engine oil pressure P100A P100B VVEL system 	I
	 P1148 P1168 Closed loop control P1211 TCS control unit P1212 TCS communication line P1238 P2119 Electric throttle control actuator 	J
	 P1564 ICC steering switch / ASCD steering switch P1568 ICC command value P1572 ICC brake switch / ASCD brake switch P1574 ICC vehicle speed sensor / ASCD vehicle speed sensor 	K
	1 1014100 volitole aposa action / / 1005 volitole aposa action	

DTC Index

Except for Mexico

×:Applicable —: Not applicable

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DTC*	1						
CONSULT GST*2	ECM*3	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group* ⁴	Reference page
U0101	0101* ⁵	CAN COMM CIRCUIT	_	1	×	В	EC-186
U0164	0164* ⁵	CAN COMM CIRCUIT	_	1	×	В	EC-187
U1001	1001* ⁵	CAN COMM CIRCUIT	_	2 (with ASCD) 1 or 2 (with ICC)	_	_	EC-188
U1003	1003	CAN COMM CIRCUIT	_	2	_	_	EC-189
U1024	1024	VVEL CAN COMM CIRCUIT	_	1	×	В	EC-191
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing* ⁸	_	_

CONSULT COM-3 CONSULT screen terms Code Trip MIL group+4 Page Page	DTC*	1	и	ODT			Permanent DTC	Dufanna
P0021 0021 INT/V TIM CONT-B2		ECM*3			Trip	MIL		
P0031	P0011	0011	INT/V TIM CONT-B1	×	2	×	В	EC-193
P0032 0032 A/F SEN1 HTR (B1)	P0021	0021	INT/V TIM CONT-B2	×	2	×	В	EC-193
P0037	P0031	0031	A/F SEN1 HTR (B1)	_	2	×	В	EC-197
P0038	P0032	0032	A/F SEN1 HTR (B1)	_	2	×	В	EC-197
P0051	P0037	0037	HO2S2 HTR (B1)	_	2	×	В	EC-200
P0052	P0038	0038	HO2S2 HTR (B1)	_	2	×	В	EC-200
P0057	P0051	0051	A/F SEN1 HTR (B2)	_	2	×	В	EC-197
P0058 0058 HO2S2 HTR (B2) — 2	P0052	0052	A/F SEN1 HTR (B2)	_	2	×	В	EC-197
P006A 006A MAP-MAF CORELTION-B1	P0057	0057	HO2S2 HTR (B2)	_	2	×	В	EC-200
P0075	P0058	0058	HO2S2 HTR (B2)	_	2	×	В	EC-200
P0081 0081 INT/V TIM V/CIR-B2	P006A	006A	MAP-MAF CORELTION-B1	_	2	×	В	EC-203
P0101 0101 MAF SEN/CIRCUIT-B1 — 2	P0075	0075	INT/V TIM V/CIR-B1	_	2	×	В	EC-210
P0102 0102 MAF SEN/CIRCUIT-B1 — 1	P0081	0081	INT/V TIM V/CIR-B2	_	2	×	В	EC-210
P0103	P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	В	EC-203
P0106 0106 ABSL PRES SEN/CIRC — 2	P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-213
P010A	P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-213
P010B 010B MAF SEN/CIRCUIT-B2 — 2 × B EC-203 P010C 010C MAF SEN/CIRCUIT-B2 — 1 × B EC-213 P010D 010D MAF SEN/CIRCUIT-B2 — 1 × B EC-213 P0112 0112 IAT SEN/CIRCUIT-B1 — 2 × B EC-228 P0113 0113 IAT SEN/CIRCUIT-B1 — 2 × B EC-228 P0116 0116 ECT SEN/CIRC — 2 × A EC-231 P0117 0117 ECT SEN/CIRC — 1 × B EC-234 P0118 0118 ECT SEN/CIRC — 1 × B EC-234 P0112 0122 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0123 0123 TP SEN 2/CIRC-B1 — 1 × B EC-241 P0127 0127	P0106	0106	ABSL PRES SEN/CIRC	_	2	×	В	EC-219
P010C 010C MAF SEN/CIRCUIT-B2 — 1 × B EC:213 P010D 010D MAF SEN/CIRCUIT-B2 — 1 × B EC:213 P0112 0112 IAT SEN/CIRCUIT-B1 — 2 × B EC:228 P0113 0113 IAT SEN/CIRC — 2 × A EC:231 P0116 0116 ECT SEN/CIRC — 1 × B EC:231 P0117 0117 ECT SEN/CIRC — 1 × B EC:234 P0118 0118 ECT SEN/CIRC — 1 × B EC:234 P0122 0122 TP SEN 2/CIRC-B1 — 1 × B EC:237 P0123 0123 TP SEN 2/CIRC-B1 — 1 × B EC:237 P0125 0125 ECT SENSOR — 2 × B EC:241 P0127 0127 IAT SENSOR-B1<	P010A	010A	ABSL PRES SEN/CIRC	_	2	×	В	EC-224
P010D 010D MAF SEN/CIRCUIT-B2 — 1 × B EC-213 P0112 0112 IAT SEN/CIRCUIT-B1 — 2 × B EC-228 P0113 0113 IAT SEN/CIRCUIT-B1 — 2 × B EC-228 P0116 0116 ECT SEN/CIRC — 1 × B EC-231 P0117 0117 ECT SEN/CIRC — 1 × B EC-234 P0118 0118 ECT SEN/CIRC — 1 × B EC-234 P0122 0122 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0123 0123 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0125 0125 ECT SENSOR — 2 × B EC-237 P0127 0127 IAT SENSOR-B1 — 2 × B EC-244 P0128 0128 THERMSTAT FNC	P010B	010B	MAF SEN/CIRCUIT-B2	_	2	×	В	EC-203
P0112 0112 IAT SEN/CIRCUIT-B1 — 2 × B EC-228 P0113 0113 IAT SEN/CIRCUIT-B1 — 2 × B EC-228 P0116 0116 ECT SEN/CIRC — 2 × A EC-231 P0117 0117 ECT SEN/CIRC — 1 × B EC-234 P0118 0118 ECT SEN/CIRC — 1 × B EC-234 P0120 0122 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0123 0123 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0125 0125 ECT SENSOR — 2 × B EC-237 P0127 0125 ECT SENSOR — 2 × B EC-241 P0127 0127 IAT SENSOR-B1 — 2 × B EC-244 P0128 0128 THERMSTAT FNCTN	P010C	010C	MAF SEN/CIRCUIT-B2	_	1	×	В	EC-213
P0113 0113 IAT SEN/CIRCUIT-B1 — 2 × B EC-228 P0116 0116 ECT SEN/CIRC — 2 × A EC-231 P0117 0117 ECT SEN/CIRC — 1 × B EC-234 P0118 0118 ECT SEN/CIRC — 1 × B EC-234 P0122 0122 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0123 0123 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0125 0125 ECT SENSOR — 2 × B EC-247 P0127 0127 IAT SENSOR — 2 × B EC-241 P0128 0128 THERMSTAT FNCTN — 2 × B EC-244 P0130 0130 A/F SENSOR1 (B1) — 2 × A EC-249 P0131 0131 A/F SENSOR1 (B1)	P010D	010D	MAF SEN/CIRCUIT-B2	_	1	×	В	EC-213
P0116	P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-228
P0117 0117 ECT SEN/CIRC — 1 × B EC-234 P0118 0118 ECT SEN/CIRC — 1 × B EC-234 P0122 0122 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0123 0123 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0125 0125 ECT SENSOR — 2 × B EC-241 P0127 0127 IAT SENSOR-B1 — 2 × B EC-244 P0128 0128 THERMSTAT FNCTN — 2 × B EC-246 P0130 0130 A/F SENSOR1 (B1) — 2 × B EC-249 P0131 0131 A/F SENSOR1 (B1) — 2 × B EC-253 P0132 0132 A/F SENSOR1 (B1) — 2 × B EC-253 P0133 0133 A/F SENSOR1 (B1)	P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-228
P0118 0118 ECT SEN/CIRC — 1 × B EC-234 P0122 0122 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0123 0123 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0125 0125 ECT SENSOR — 2 × B EC-241 P0127 0127 IAT SENSOR-B1 — 2 × B EC-241 P0128 0128 THERMSTAT FNCTN — 2 × B EC-244 P0130 0130 A/F SENSOR1 (B1) — 2 × A EC-249 P0131 0131 A/F SENSOR1 (B1) — 2 × B EC-253 P0132 0132 A/F SENSOR1 (B1) — 2 × A EC-256 P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-269 P0138 0138 HO2S2 (B1) </td <td>P0116</td> <td>0116</td> <td>ECT SEN/CIRC</td> <td>_</td> <td>2</td> <td>×</td> <td>Α</td> <td>EC-231</td>	P0116	0116	ECT SEN/CIRC	_	2	×	Α	EC-231
P0122 0122 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0123 0123 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0125 0125 ECT SENSOR — 2 × B EC-241 P0127 0127 IAT SENSOR-B1 — 2 × B EC-244 P0128 0128 THERMSTAT FNCTN — 2 × B EC-246 P0130 0130 A/F SENSOR1 (B1) — 2 × A EC-249 P0131 0131 A/F SENSOR1 (B1) — 2 × B EC-253 P0132 0132 A/F SENSOR1 (B1) — 2 × A EC-256 P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-259 P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) <td>P0117</td> <td>0117</td> <td>ECT SEN/CIRC</td> <td>_</td> <td>1</td> <td>×</td> <td>В</td> <td>EC-234</td>	P0117	0117	ECT SEN/CIRC	_	1	×	В	EC-234
P0123 0123 TP SEN 2/CIRC-B1 — 1 × B EC-237 P0125 0125 ECT SENSOR — 2 × B EC-241 P0127 0127 IAT SENSOR-B1 — 2 × B EC-244 P0128 0128 THERMSTAT FNCTN — 2 × B EC-246 P0130 0130 A/F SENSOR1 (B1) — 2 × A EC-249 P0131 0131 A/F SENSOR1 (B1) — 2 × B EC-253 P0132 0132 A/F SENSOR1 (B1) — 2 × B EC-256 P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-259 P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1)	P0118	0118	ECT SEN/CIRC	_	1	×	В	EC-234
P0125 0125 ECT SENSOR — 2 × B EC-241 P0127 0127 IAT SENSOR-B1 — 2 × B EC-244 P0128 0128 THERMSTAT FNCTN — 2 × B EC-246 P0130 0130 A/F SENSOR1 (B1) — 2 × A EC-249 P0131 0131 A/F SENSOR1 (B1) — 2 × B EC-253 P0132 0132 A/F SENSOR1 (B1) — 2 × B EC-256 P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-259 P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2)	P0122	0122	TP SEN 2/CIRC-B1	_	1	×	В	EC-237
P0127 0127 IAT SENSOR-B1 — 2 × B EC-244 P0128 0128 THERMSTAT FNCTN — 2 × B EC-246 P0130 0130 A/F SENSOR1 (B1) — 2 × A EC-249 P0131 0131 A/F SENSOR1 (B1) — 2 × B EC-253 P0132 0132 A/F SENSOR1 (B1) — 2 × B EC-256 P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-259 P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-253 P0151 0152 A/F SENSOR1 (B2) <td>P0123</td> <td>0123</td> <td>TP SEN 2/CIRC-B1</td> <td>_</td> <td>1</td> <td>×</td> <td>В</td> <td>EC-237</td>	P0123	0123	TP SEN 2/CIRC-B1	_	1	×	В	EC-237
P0128 0128 THERMSTAT FNCTN — 2 × B EC-246 P0130 0130 A/F SENSOR1 (B1) — 2 × A EC-249 P0131 0131 A/F SENSOR1 (B1) — 2 × B EC-253 P0132 0132 A/F SENSOR1 (B1) — 2 × B EC-256 P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-259 P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-249 P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-256 P0152 0152 A/F SENSOR1 (B2)<	P0125	0125	ECT SENSOR	_	2	×	В	EC-241
P0130 0130 A/F SENSOR1 (B1) — 2 × A EC-249 P0131 0131 A/F SENSOR1 (B1) — 2 × B EC-253 P0132 0132 A/F SENSOR1 (B1) — 2 × B EC-256 P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-259 P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-249 P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-253 P0152 0152 A/F SENSOR1 (B2) — 2 × B EC-256	P0127	0127	IAT SENSOR-B1	_	2	×	В	EC-244
P0131 0131 A/F SENSOR1 (B1) — 2 × B EC-253 P0132 0132 A/F SENSOR1 (B1) — 2 × B EC-256 P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-259 P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-249 P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-253 P0152 0152 A/F SENSOR1 (B2) — 2 × B EC-256	P0128	0128	THERMSTAT FNCTN	_	2	×	В	EC-246
P0132 0132 A/F SENSOR1 (B1) — 2 × B EC-256 P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-259 P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-249 P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-253 P0152 0152 A/F SENSOR1 (B2) — 2 × B EC-256	P0130	0130	A/F SENSOR1 (B1)	_	2	×	Α	EC-249
P0133 0133 A/F SENSOR1 (B1) × 2 × A EC-259 P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-249 P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-253 P0152 0152 A/F SENSOR1 (B2) — 2 × B EC-256	P0131	0131	A/F SENSOR1 (B1)	_	2	×	В	EC-253
P0137 0137 HO2S2 (B1) × 2 × A EC-264 P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-249 P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-253 P0152 0152 A/F SENSOR1 (B2) — 2 × B EC-256	P0132	0132	A/F SENSOR1 (B1)	_	2	×	В	EC-256
P0138 0138 HO2S2 (B1) × 2 × A EC-270 P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-249 P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-253 P0152 0152 A/F SENSOR1 (B2) — 2 × B EC-256	P0133	0133	A/F SENSOR1 (B1)	×	2	×	Α	EC-259
P0139 0139 HO2S2 (B1) × 2 × A EC-278 P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-249 P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-253 P0152 0152 A/F SENSOR1 (B2) — 2 × B EC-256	P0137	0137	HO2S2 (B1)	×	2	×	А	EC-264
P0150 0150 A/F SENSOR1 (B2) — 2 × A EC-249 P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-253 P0152 0152 A/F SENSOR1 (B2) — 2 × B EC-256	P0138	0138	HO2S2 (B1)	×	2	×	А	EC-270
P0151 0151 A/F SENSOR1 (B2) — 2 × B EC-253 P0152 0152 A/F SENSOR1 (B2) — 2 × B EC-256	P0139	0139	HO2S2 (B1)	×	2	×	А	EC-278
P0152	P0150	0150	A/F SENSOR1 (B2)	_	2	×	А	EC-249
` '	P0151	0151	A/F SENSOR1 (B2)	_	2	×	В	EC-253
POLES 0.450 A/5 05N00P4 (P0)	P0152	0152	A/F SENSOR1 (B2)	_	2	×	В	EC-256
P0153 0153 A/F SENSOR1 (B2) × 2 × A <u>EC-259</u>	P0153	0153	A/F SENSOR1 (B2)	×	2	×	А	EC-259

DTC*	1	14	ODT			Permanent DTC	Deferre	
CONSULT GST* ²	ECM*3	Items (CONSULT screen terms)	SRT code	Trip	MIL	group*4	Reference page	A
P0157	0157	HO2S2 (B2)	×	2	×	Α	EC-264	EC
P0158	0158	HO2S2 (B2)	×	2	×	Α	EC-270	
P0159	0159	HO2S2 (B2)	×	2	×	Α	EC-278	=
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	В	EC-287	С
P0172	0172	FUEL SYS-RICH-B1	_	2	×	В	EC-291	-
P0174	0174	FUEL SYS-LEAN-B2	_	2	×	В	EC-287	D
P0175	0175	FUEL SYS-RICH-B2	_	2	×	В	EC-291	
P0181	0181	FTT SENSOR	_	2	×	A and B	EC-295	=
P0182	0182	FTT SEN/CIRCUIT	_	2	×	В	EC-299	Е
P0183	0183	FTT SEN/CIRCUIT	_	2	×	В	EC-299	=
P0196	0196	EOT SENSOR	_	2	×	A and B	EC-302	
P0197	0197	EOT SEN/CIRC	_	2	×	В	EC-306	- F
P0198	0198	EOT SEN/CIRC	_	2	×	В	EC-306	-
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	В	EC-309	G
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	В	EC-309	-
P0227	0227	TP SEN 2/CIRC-B2	_	1	×	В	EC-237	-
P0228	0228	TP SEN 2/CIRC-B2	_	1	×	В	EC-237	- H
P0300	0300	MULTI CYL MISFIRE	_	2	×	В	EC-312	-
P0301	0301	CYL 1 MISFIRE	_	2	×	В	EC-312	-
P0302	0302	CYL 2 MISFIRE	_	2	×	В	EC-312	-
P0303	0303	CYL 3 MISFIRE	_	2	×	В	EC-312	-
P0304	0304	CYL 4 MISFIRE	_	2	×	В	EC-312	J
P0305	0305	CYL 5 MISFIRE	_	2	×	В	EC-312	-
P0306	0306	CYL 6 MISFIRE	_	2	×	В	EC-312	K
P0327	0327	KNOCK SEN/CIRC-B1	_	2	_	_	EC-318	_
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	_	EC-318	=
P0332	0332	KNOCK SEN/CIRC-B2	_	2	_	_	EC-318	L
P0333	0333	KNOCK SEN/CIRC-B2	_	2	_	_	EC-318	-
P0335	0335	CKP SEN/CIRCUIT	_	2	×	В	EC-321	M
P0340	0340	CMP SEN/CIRC-B1	_	2	×	В	EC-325	- IVI
P0345	0345	CMP SEN/CIRC-B2	_	2	×	В	EC-325	=
P0420	0420	TW CATALYST SYS-B1	×	2	×	Α	EC-329	N
P0430	0430	TW CATALYST SYS-B2	×	2	×	Α	EC-329	-
P0441	0441	EVAP PURG FLOW/MON	×	2	×	Α	EC-334	-
P0443	0443	PURG VOLUME CONT/V	_	2	×	Α	EC-339	- 0
P0444	0444	PURG VOLUME CONT/V	_	2	×	В	EC-339	-
P0445	0445	PURG VOLUME CONT/V	_	2	×	В	EC-344	P
P0447	0447	VENT CONTROL VALVE	<u> </u>	2	×	В	EC-347	=
P0448	0448	VENT CONTROL VALVE	_	2	×	В	EC-351	-
P0451	0451	EVAP SYS PRES SEN	<u> </u>	2	×	А	EC-355	=
P0452	0452	EVAP SYS PRES SEN	_	2	×	В	EC-358	-
P0453	0453	EVAP SYS PRES SEN	_	2	×	В	EC-363	=-

DTC*	1	16	ODT			Pormonent DTC	D. (
CONSULT GST* ²	ECM*3	Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group* ⁴	Reference page
P0456	0456	EVAP VERY SML LEAK	×* ⁷	2	×	А	EC-369
P0460	0460	FUEL LEV SEN SLOSH	_	2	×	А	EC-375
P0461	0461	FUEL LEVEL SENSOR	_	2	×	В	EC-377
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	В	EC-379
P0463	0463	FUEL LEVL SEN/CIRC	_	2	×	В	EC-379
P0500	0500	VEH SPEED SEN/CIRC*6	_	2	×	В	EC-382
P0506	0506	ISC SYSTEM	_	2	×	В	EC-385
P0507	0507	ISC SYSTEM	_	2	×	В	EC-387
P050A	050A	COLD START CONTROL	_	2	×	А	EC-387
P050E	050E	COLD START CONTROL	_	2	×	А	EC-387
P0524	0524	ENGINE OIL PRESSURE	_	2	×	В	EC-391
P0550	0550	PW ST P SEN/CIRC	_	2	_	_	EC-394
P0555	0555	BRAKE BSTR PRES SEN/CIRC	_	2	×	В	EC-397
P0603	0603	ECM BACK UP/CIRCUIT	_	2	×	В	EC-402
P0605	0605	ECM	_	1 or 2	× or —	В	EC-404
P0607	0607	ECM	_	1 or 2	× or —	В	EC-406
P0643	0643	SENSOR POWER/CIRC	_	1	×	В	EC-407
P0705	0705	T/M RANGE SWITCH A	_	2	×	В	TM-160
P0710	0710	FLUID TEMP SENSOR A	_	2	×	В	TM-162
P0717	0717	INPUT SPEED SENSOR A	_	2	×	В	TM-163
P0720	0720	OUTPUT SPEED SENSOR*6		2	×	В	<u>TM-165</u>
P0729	0729	6GR INCORRECT RATIO	_	2	×	В	TM-169
P0730	0730	INCORRECT GR RATIO	_	2	×	В	<u>TM-171</u>
P0731	0731	1GR INCORRECT RATIO	_	2	×	В	<u>TM-173</u>
P0732	0732	2GR INCORRECT RATIO	_	2	×	В	<u>TM-175</u>
P0733	0733	3GR INCORRECT RATIO	_	2	×	В	<u>TM-177</u>
P0734	0734	4GR INCORRECT RATIO	_	2	×	В	TM-179
P0735	0735	5GR INCORRECT RATIO	_	2	×	В	TM-181
P0740	0740	TORQUE CONVERTER	_	2	×	В	TM-183
P0744	0744	TORQUE CONVERTER	_	2	×	В	TM-185
P0745	0745	PC SOLENOID A	_	2	×	В	TM-187
P0750	0750	SHIFT SOLENOID A	_	2	×	В	TM-188
P0775	0775	PC SOLENOID B	_	2	×	В	TM-189
P0780	0780	SHIFT	_	1	×	В	TM-190
P0795	0795	PC SOLENOID C	_	2	×	В	TM-192
P0850	0850	P-N POS SW/CIRCUIT	_	2	×	В	EC-410
P100A	100A	VVEL SYSTEM-B1	_	2	×	В	EC-414
P100B	100B	VVEL SYSTEM-B2	_	2	×	В	EC-414
P1087	1087	VVEL SYSTEM-B1	1	1	×	В	EC-418
P1088	1088	VVEL SYSTEM-B2	_	1	×	В	EC-418
P1089	1089	VVEL POS SEN/CIRC-B1		1	×	В	EC-419
P1090	1090	VVEL ACTR MOT-B1	_	1	×	В	EC-423

DTC*	1	14	CDT			Permanent DTC	Defere	Λ
CONSULT GST* ²	ECM*3	Items (CONSULT screen terms)	SRT code	Trip	MIL	group*4	Reference page	Α
P1091	1091	VVEL ACTR MOT PWR	_	1 or 2	×	В	EC-427	EC
P1092	1092	VVEL POS SEN/CIRC-B2	_	1	×	В	EC-419	
P1093	1093	VVEL ACTR MOT-B2	_	1	×	В	EC-423	
P1148	1148	CLOSED LOOP-B1	_	1	×	А	EC-430	С
P1168	1168	CLOSED LOOP-B2	_	1	×	Α	EC-430	
P1211	1211	TCS C/U FUNCTN	_	2	_	_	EC-431	D
P1212	1212	TCS/CIRC	_	2	_	_	EC-432	D
P1217	1217	ENG OVER TEMP	_	1	×	В	EC-433	
P1225	1225	CTP LEARNING-B1	_	2	_	_	EC-437	Е
P1226	1226	CTP LEARNING-B1	_	2	_	_	EC-439	
P1233	1233	ETC FNCTN/CIRC-B2	_	1	×	В	EC-441	_
P1234	1234	CTP LEARNING-B2	_	2	_	_	EC-437	F
P1235	1235	CTP LEARNING-B2	_	2	_	_	EC-439	
P1236	1236	ETC MOT-B2	_	1	×	В	EC-445	G
P1238	1238	ETC ACTR-B2	_	1	×	В	EC-448	
P1239	1239	TP SENSOR-B2	_	1	×	В	EC-450	
P1290	1290	ETC MOT PWR-B2	_	1	×	В	EC-453	Н
P1550	1550	BAT CURRENT SENSOR	_	2	_	_	EC-455	
P1551	1551	BAT CURRENT SENSOR	_	2	_	_	EC-458	1
P1552	1552	BAT CURRENT SENSOR	_	2	_	_	EC-458	
P1553	1553	BAT CURRENT SENSOR	_	2	_	_	EC-461	
P1554	1554	BAT CURRENT SENSOR	_	2	_	_	EC-464	J
P1564	1564	ASCD SW	_	1	_	_	EC-468 (with ASCD) EC-471 (with ICC)	K
P1568	1568	ICC COMMAND VALUE	_	1	_	_	EC-474	
P1572	1572	ASCD BRAKE SW	_	1	_	_	EC-475 (with ASCD) EC-482 (with ICC)	L M
P1574	1574	ASCD VHL SPD SEN	_	1	_	_	EC-488 (with ASCD) EC-490 (with ICC)	N
P1606	1606	VVEL CONTROL MODULE	_	1 or 2	× or —	В	EC-492	
P1607	1607	VVEL CONTROL MODULE	_	1	×	В	EC-494	0
P1608	1608	VVEL SENSOR POWER/CIRC	_	1	×	В	EC-496	0
P1610	1610	LOCK MODE	_	2	_	_	SEC-35	
P1611	1611	ID DISCARD, IMM-ECM	_	2	_	_	SEC-36	Р
P1612	1612	CHAIN OF ECM-IMMU	_	2	_	_	SEC-36	
P1614	1614	CHAIN OF IMMU-KEY	_	2	_	_	SEC-40	
P1615	1615	DIFFERENCE OF KEY	_	2	_	_	SEC-43	
P1730	1730	INTERLOCK	_	2	×	В	<u>TM-197</u>	
P1734	1734	7GR INCORRECT RATIO	_	2	×	В	<u>TM-199</u>	

DTC*	1	Itama	SRT			Permanent DTC	Reference
CONSULT GST* ²	ECM*3	Items (CONSULT screen terms)	code	Trip	MIL	group* ⁴	page
P1805	1805	BRAKE SW/CIRCUIT	_	2	_	_	EC-499
P2100	2100	ETC MOT PWR-B1	_	1	×	В	EC-453
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	В	EC-441
P2103	2103	ETC MOT PWR	_	1	×	В	EC-453
P2118	2118	ETC MOT-B1	_	1	×	В	EC-445
P2119	2119	ETC ACTR-B1	_	1	×	В	EC-448
P2122	2122	APP SEN 1/CIRC	_	1	×	В	EC-502
P2123	2123	APP SEN 1/CIRC	_	1	×	В	EC-502
P2127	2127	APP SEN 2/CIRC	_	1	×	В	EC-506
P2128	2128	APP SEN 2/CIRC		1	×	В	EC-506
P2132	2132	TP SEN 1/CIRC-B2	_	1	×	В	EC-309
P2133	2133	TP SEN 1/CIRC-B2	_	1	×	В	EC-309
P2135	2135	TP SENSOR-B1	_	1	×	В	EC-450
P2138	2138	APP SENSOR	_	1	×	В	EC-510
P2713	2713	PC SOLENOID D		2	×	В	TM-207
P2722	2722	PC SOLENOID E	_	2	×	В	TM-208
P2731	2731	PC SOLENOID F	_	2	×	В	TM-209
P2807	2807	PC SOLENOID G	_	2	×	В	TM-210
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	Α	EC-515
P2A03	2A03	A/F SENSOR1 (B2)	_	2	×	А	EC-515

^{*1: 1}st trip DTC No. is the same as DTC No.

For Mexico

×:Applicable —: Not applicable

DTC*1		Items				Reference
CONSULT GST* ²	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	page
U0101	0101* ⁴	CAN COMM CIRCUIT	_	1	×	EC-186
U0164	0164* ⁴	CAN COMM CIRCUIT	_	1	×	EC-187
U1001	1001* ⁴	CAN COMM CIRCUIT	_	2	_	EC-188
U1003	1003	CAN COMM CIRCUIT	_	2	_	EC-189
U1024	1024	VVEL CAN COMM CIRCUIT	_	1	×	EC-191
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	-	Flashing*6	_
P0011	0011	INT/V TIM CONT-B1	×	2	×	EC-193
P0021	0021	INT/V TIM CONT-B2	×	2	×	EC-193
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	EC-197

^{*2:} This number is prescribed by SAE J2012/ISO 15031-6.

^{*3:} In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

^{*4:} Refer to EC-51. "Description", "PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)".

^{*5:} The troubleshooting for this DTC needs CONSULT.

^{*6:} When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

^{*7:} SRT code will not be set if the self-diagnostic result is NG.

^{*8:} When the ECM is in the mode that displays SRT status, MIL may blink. For the details, refer to "How to Display SRT Status".

DTC	*1					Deferre	1
CONSULT GST* ²	ECM*3	ltems (CONSULT screen terms)	SRT code	Trip	MIL	Reference page	ļ-
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	EC-197	E
P0037	0037	HO2S2 HTR (B1)	_	2	×	EC-200	
P0038	0038	HO2S2 HTR (B1)	_	2	×	EC-200	=
P0051	0051	A/F SEN1 HTR (B2)	_	2	×	EC-197	(
P0052	0052	A/F SEN1 HTR (B2)	_	2	×	EC-197	-
P0057	0057	HO2S2 HTR (B2)	_	2	×	EC-200	
P0058	0058	HO2S2 HTR (B2)	_	2	×	EC-200	
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	EC-210	_
P0081	0081	INT/V TIM V/CIR-B2	_	2	×	EC-210	
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	EC-213	=
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	EC-213	-
P010A	010A	ABSL PRES SEN/CIRC	_	2	×	EC-224	-
P010C	010C	MAF SEN/CIRCUIT-B2	_	1	×	EC-213	-
P010D	010D	MAF SEN/CIRCUIT-B2	_	1	×	EC-213	- (
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	EC-228	-
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	EC-228	-
P0117	0117	ECT SEN/CIRC	_	1	×	EC-234	_
P0118	0118	ECT SEN/CIRC	_	1	×	EC-234	-
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	EC-237	-
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	EC-237	-
P0130	0130	A/F SENSOR1 (B1)	_	2	×	EC-249	=
P0131	0131	A/F SENSOR1 (B1)	_	2	×	EC-253	-
P0132	0132	A/F SENSOR1 (B1)	_	2	×	EC-256	=
P0133	0133	A/F SENSOR1 (B1)	×	2	×	EC-259	-
P0137	0137	HO2S2 (B1)	×	2	×	EC-264	=
P0138	0138	HO2S2 (B1)	×	2	×	EC-270	-
P0139	0139	HO2S2 (B1)	×	2	×	EC-278	-
P0150	0150	A/F SENSOR1 (B2)	_	2	×	EC-249	-
P0151	0151	A/F SENSOR1 (B2)	_	2	×	EC-253	-
P0152	0152	A/F SENSOR1 (B2)	_	2	×	EC-256	_
P0153	0153	A/F SENSOR1 (B2)	×	2	×	EC-259	-
P0157	0157	HO2S2 (B2)	×	2	×	EC-264	_
P0158	0158	HO2S2 (B2)	×	2	×	EC-270	-
P0159	0159	HO2S2 (B2)	×	2	×	EC-278	-
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	EC-287	- (
P0172	0172	FUEL SYS-RICH-B1	_	2	×	EC-291	-
P0174	0174	FUEL SYS-LEAN-B2	_	2	×	EC-287	-
P0175	0175	FUEL SYS-RICH-B2	_	2	×	EC-291	-
P0182	0182	FTT SEN/CIRCUIT	_	2	×	EC-299	-
P0183	0183	FTT SEN/CIRCUIT	_	2	×	EC-299	-
P0197	0197	EOT SEN/CIRC	_	2	×	EC-306	-
P0198	0198	EOT SEN/CIRC	_	2	×	EC-306	-

DTC	C* ¹	Items				Reference
CONSULT GST* ²	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	page
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	EC-197
P0037	0037	HO2S2 HTR (B1)	_	2	×	EC-200
P0038	0038	HO2S2 HTR (B1)	_	2	×	EC-200
P0051	0051	A/F SEN1 HTR (B2)	_	2	×	EC-197
P0052	0052	A/F SEN1 HTR (B2)	_	2	×	EC-197
P0057	0057	HO2S2 HTR (B2)	_	2	×	EC-200
P0058	0058	HO2S2 HTR (B2)	_	2	×	EC-200
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	EC-210
P0081	0081	INT/V TIM V/CIR-B2	_	2	×	EC-210
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	EC-213
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	EC-213
P010A	010A	ABSL PRES SEN/CIRC	_	2	×	EC-224
P010C	010C	MAF SEN/CIRCUIT-B2	_	1	×	EC-213
P010D	010D	MAF SEN/CIRCUIT-B2	_	1	×	EC-213
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	EC-228
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	EC-228
P0117	0117	ECT SEN/CIRC	_	1	×	EC-234
P0118	0118	ECT SEN/CIRC	_	1	×	EC-234
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	EC-237
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	EC-237
P0130	0130	A/F SENSOR1 (B1)	_	2	×	EC-249
P0131	0131	A/F SENSOR1 (B1)	_	2	×	EC-253
P0132	0132	A/F SENSOR1 (B1)	_	2	×	EC-256
P0133	0133	A/F SENSOR1 (B1)	×	2	×	EC-259
P0137	0137	HO2S2 (B1)	×	2	×	EC-264
P0138	0138	HO2S2 (B1)	×	2	×	EC-270
P0139	0139	HO2S2 (B1)	×	2	×	EC-278
P0150	0150	A/F SENSOR1 (B2)	_	2	×	EC-249
P0151	0151	A/F SENSOR1 (B2)	_	2	×	EC-253
P0152	0152	A/F SENSOR1 (B2)	_	2	×	EC-256
P0153	0153	A/F SENSOR1 (B2)	×	2	×	EC-259
P0157	0157	HO2S2 (B2)	×	2	×	EC-264
P0158	0158	HO2S2 (B2)	×	2	×	EC-270
P0159	0159	HO2S2 (B2)	×	2	×	EC-278
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	EC-287
P0172	0172	FUEL SYS-RICH-B1	_	2	×	EC-291
P0174	0174	FUEL SYS-LEAN-B2	_	2	×	EC-287
P0175	0175	FUEL SYS-RICH-B2	_	2	×	EC-291
P0182	0182	FTT SEN/CIRCUIT	_	2	×	EC-299
P0183	0183	FTT SEN/CIRCUIT	_	2	×	EC-299
P0197	0197	EOT SEN/CIRC	_	2	×	EC-306
P0198	0198	EOT SEN/CIRC	_	2	×	EC-306

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DTO	<u>7</u> *1						ı
CONSULT GST*2	ECM*3	ltems (CONSULT screen terms)	SRT code	Trip	MIL	Reference page	А
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	EC-309	EC
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	EC-309	
P0227	0227	TP SEN 2/CIRC-B2	_	1	×	EC-237	•
P0228	0228	TP SEN 2/CIRC-B2	_	1	×	EC-237	С
P0300	0300	MULTI CYL MISFIRE	_	2	×	EC-312	•
P0301	0301	CYL 1 MISFIRE	_	2	×	EC-312	D
P0302	0302	CYL 2 MISFIRE	_	2	×	EC-312	
P0303	0303	CYL 3 MISFIRE	CYL 3 MISFIRE —		×	EC-312	
P0304	0304	CYL 4 MISFIRE	_	2	×	EC-312	Е
P0305	0305	CYL 5 MISFIRE	_	2	×	EC-312	
P0306	0306	CYL 6 MISFIRE	_	2	×	EC-312	F
P0327	0327	KNOCK SEN/CIRC-B1	_	2	_	EC-318	
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	EC-318	
P0332	0332	KNOCK SEN/CIRC-B2	_	2	_	EC-318	G
P0333	0333	KNOCK SEN/CIRC-B2	_	2	_	EC-318	•
P0335	0335	CKP SEN/CIRCUIT	_	2	×	EC-321	Ш
P0340	0340	CMP SEN/CIRC-B1	_	2	×	EC-325	Н
P0345	0345	CMP SEN/CIRC-B2	_	2	×	EC-325	
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-329	
P0430	0430	TW CATALYST SYS-B2	×	2	×	EC-329	
P0444	0444	PURG VOLUME CONT/V	_	2	×	EC-339	
P0445	0445	PURG VOLUME CONT/V	_	2	×	EC-344	J
P0447	0447	VENT CONTROL VALVE	_	2	×	EC-347	
P0452	0452	EVAP SYS PRES SEN	_	2	×	EC-358	K
P0453	0453	EVAP SYS PRES SEN	_	2	×	EC-363	
P0500	0500	VEH SPEED SEN/CIRC*6	_	2	×	EC-382	
P0524	0524	ENGINE OIL PRESSURE	_	2	×	EC-391	L
P0550	0550	PW ST P SEN/CIRC	_	2	_	EC-394	•
P0555	0555	BRAKE BSTR PRES SEN/CIRC	_	2	×	EC-397	M
P0603	0603	ECM BACK UP/CIRCUIT	_	2	×	EC-402	
P0605	0605	ECM	_	1 or 2	× or —	EC-404	
P0607	0607	ECM	_	1 or 2	× or —	EC-406	Ν
P0643	0643	SENSOR POWER/CIRC	_	1	×	EC-407	
P0705	0705	T/M RANGE SWITCH A	_	2	×	<u>TM-160</u>	0
P0710	0710	FLUID TEMP SENSOR A	_	2	×	<u>TM-162</u>	
P0717	0717	INPUT SPEED SENSOR A	_	2	×	<u>TM-163</u>	
P0720	0720	OUTPUT SPEED SENSOR*5	_	2	×	<u>TM-165</u>	Р
P0729	0729	6GR INCORRECT RATIO	_	2	×	TM-169	
P0730	0730	INCORRECT GR RATIO	_	2	×	<u>TM-171</u>	•
P0731	0731	1GR INCORRECT RATIO	_	2	×	<u>TM-173</u>	•
P0732	0732	2GR INCORRECT RATIO	_	2	×	<u>TM-175</u>	•
P0733	0733	3GR INCORRECT RATIO		2	×	<u>TM-177</u>	
		*			•	•	

DTC	C* ¹	Items				Reference
CONSULT GST* ²	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	page
P0734	0734	4GR INCORRECT RATIO	_	2	×	<u>TM-179</u>
P0735	0735	5GR INCORRECT RATIO	_	2	×	<u>TM-181</u>
P0740	0740	TORQUE CONVERTER	_	2	×	TM-183
P0744	0744	TORQUE CONVERTER	_	2	×	<u>TM-185</u>
P0745	0745	PC SOLENOID A	_	2	×	<u>TM-187</u>
P0750	0750	SHIFT SOLENOID A	_	2	×	<u>TM-188</u>
P0775	0775	PC SOLENOID B	_	2	×	<u>TM-189</u>
P0780	0780	SHIFT	_	1	×	<u>TM-190</u>
P0795	0795	PC SOLENOID C	_	2	×	<u>TM-192</u>
P0850	0850	P-N POS SW/CIRCUIT	_	2	×	EC-410
P100A	100A	VVEL SYSTEM-B1	_	2	×	EC-414
P100B	100B	VVEL SYSTEM-B2	_	2	×	EC-414
P1087	1087	VVEL SYSTEM-B1	_	1	×	EC-418
P1088	1088	VVEL SYSTEM-B2	_	1	×	EC-418
P1089	1089	VVEL POS SEN/CIRC-B1	_	1	×	EC-419
P1090	1090	VVEL ACTR MOT-B1	_	1	×	EC-423
P1091	1091	VVEL ACTR MOT PWR	_	1 or 2	×	EC-427
P1092	1092	VVEL POS SEN/CIRC-B2	_	1	×	EC-419
P1093	1093	VVEL ACTR MOT-B2	_	1	×	EC-423
P1211	1211	TCS C/U FUNCTN	_	2	_	EC-431
P1212	1212	TCS/CIRC	_	2	_	EC-432
P1217	1217	ENG OVER TEMP	_	1	×	EC-433
P1225	1225	CTP LEARNING-B1	_	2	_	EC-437
P1226	1226	CTP LEARNING-B1	_	2	_	EC-439
P1233	1233	ETC FNCTN/CIRC-B2	_	1	×	EC-441
P1234	1234	CTP LEARNING-B2	_	2	_	EC-437
P1235	1235	CTP LEARNING-B2	_	2	_	EC-439
P1236	1236	ETC MOT-B2	_	1	×	EC-445
P1238	1238	ETC ACTR-B2	_	1	×	EC-448
P1239	1239	TP SENSOR-B2	_	1	×	EC-450
P1290	1290	ETC MOT PWR-B2	_	1	×	EC-453
P1550	1550	BAT CURRENT SENSOR	_	2	_	EC-455
P1551	1551	BAT CURRENT SENSOR	_	2	_	EC-458
P1552	1552	BAT CURRENT SENSOR	_	2	_	EC-458
P1553	1553	BAT CURRENT SENSOR	_	2	_	EC-461
P1554	1554	BAT CURRENT SENSOR	_	2	_	EC-464
P1564	1564	ASCD SW	_	1	_	EC-468
P1572	1572	ASCD BRAKE SW	_	1	_	EC-475
P1574	1574	ASCD VHL SPD SEN	_	1	_	EC-488
P1606	1606	VVEL CONTROL MODULE	_	1 or 2	× or —	EC-492
P1607	1607	VVEL CONTROL MODULE	_	1	×	EC-494
P1608	1608	VVEL SENSOR POWER/CIRC	_	1	×	EC-496

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DTO	C* ¹					D (٨
CONSULT GST* ²	ECM*3	Items (CONSULT screen terms)	SRT code	Trip	MIL	Reference page	Α
P1610	1610	LOCK MODE	_	2	_	<u>SEC-35</u>	EC
P1611	1611	ID DISCARD, IMM-ECM	_	2	_	SEC-36	
P1612	1612	CHAIN OF ECM-IMMU	_	2	_	SEC-36	-
P1614	1614	CHAIN OF IMMU-KEY	_	2	_	SEC-40	С
P1615	1615	DIFFERENCE OF KEY	_	2	_	SEC-43	-
P1730	1730	INTERLOCK	_	2	×	TM-197	D
P1734	1734	7GR INCORRECT RATIO	_	2	×	<u>TM-199</u>	
P1805	1805	BRAKE SW/CIRCUIT	_	2	_	EC-499	-
P2100	2100	ETC MOT PWR-B1	_	1	×	EC-453	Е
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	EC-441	-
P2103	2103	ETC MOT PWR	_	1	×	EC-453	F
P2118	2118	ETC MOT-B1	_	1	×	EC-445	
P2119	2119	ETC ACTR-B1	_	1	×	EC-448	-
P2122	2122	APP SEN 1/CIRC	_	1	×	EC-502	G
P2123	2123	APP SEN 1/CIRC	_	1	×	EC-502	-
P2127	2127	APP SEN 2/CIRC	_	1	×	EC-506	ы
P2128	2128	APP SEN 2/CIRC	_	1	×	EC-506	Н
P2132	2132	TP SEN 1/CIRC-B2	_	1	×	EC-309	-
P2133	2133	TP SEN 1/CIRC-B2	_	1	×	EC-309	
P2135	2135	TP SENSOR-B1	_	1	×	EC-450	-
P2138	2138	APP SENSOR	_	1	×	EC-510	
P2713	2713	PC SOLENOID D	_	2	×	TM-207	J
P2722	2722	PC SOLENOID E	_	2	×	TM-208	-
P2731	2731	PC SOLENOID F	_	2	×	TM-209	K
P2807	2807	PC SOLENOID G	_	2	×	<u>TM-210</u>	
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	EC-515	=
P2A03	2A03	A/F SENSOR1 (B2)	_	2	×	EC-515	L

^{*1: 1}st trip DTC No. is the same as DTC No.

Test Value and Test Limit

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

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. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

^{*2:} This number is prescribed by SAE J2012/ISO 15031-6.

^{*3:} In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

^{*4:} The troubleshooting for this DTC needs CONSULT.

^{*5:} When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

^{*6:} When the ECM is in the mode that displays SRT status, MIL may blink. For the details, refer to "How to Display SRT Status".

Item	OBD- MID	Self-diagnostic test item	DTC	li	e and Test mit display) Unit and Scaling	Description
			P0131	83H	ID 0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	овн	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			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
			P0130	8BH	0BH	Difference in sensor output voltage
	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
HO2S			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P0138	07H	0СН	Minimum sensor output voltage for test cycle
		Heated oxygen sensor 2	P0137	08H	0CH	Maximum sensor output voltage for test cycle
	02H	(Bank 1)	P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0139	82H	11H	Rear O2 sensor delay response diagnosis
			P0143	07H	0СН	Minimum sensor output voltage for test cycle
	03H	Heated oxygen sensor 3 (Bank 1)	P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

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Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description
	MID			TID	Unitand Scaling ID	
			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
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			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
		Air fuel ratio (A/F) sensor 1 (Bank 2)	P0150	8BH	0BH	Difference in sensor output voltage
05	05H		P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
HO2S			P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015C	92H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015D	93H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P0158	07H	0СН	Minimum sensor output voltage for test cycle
	25	Heated oxygen sensor 2	P0157	08H	0СН	Maximum sensor output voltage for test cycle
	06H	(Bank 2)	P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis
			P0163	07H	0CH	Minimum sensor output voltage for test cycle
	07H	Heated oxygen sensor 3 (Bank2)	P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
		P0165	81H	0CH	Difference in sensor output voltage	

					e and Test	
	OBD-	0.16.15	570		mit display)	5
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
			P0420	80H	01H	O2 storage index
	21H	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust index value
	2111	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst
LYST			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 voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
		EGR function	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		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)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	35H	VVT Monitor (Bank1)	P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100A	84H	10H	VEL slow response diagnosis
VVT			P1090	85H	10H	VEL servo system diagnosis
SYSTEM			P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	36H	VVT Monitor (Bank2)	P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100B	84H	10H	VEL slow response diagnosis
			P1093	85H	10H	VEL servo system diagnosis

	000			li	e and Test mit display)	
Item	OBD- MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	звн	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
EVAP			P0456	80H	05H	Leak area index (for more than 0.02 inch)
SYSTEM	3СН	EVAP control system leak (Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
O2 SEN- SOR	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage
			P0411	80H	01H	Secondary air injection system incorrect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
SEC- OND- ARY AIR	71H	Secondary air system	P2448	83H	01H	Secondary air injection system high airflow
Auxi Auix			Bank1: P2440 Bank2: P2442	84H	01H	Secondary air injection system switching valve stuck open
			P2440	85H	01H	Secondary air injection system switching valve stuck open
			P2444	86H	01H	Secondary air injection system pump stuck on
			P0171 or P0172	80H	2FH	Long term fuel trim
	81H	Fuel injection system function (Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped
FUEL			P117A	82H	03H	Cylinder A/F imbalance monitoring
SYSTEM			P0174 or P0175	80H	2FH	Long term fuel trim
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

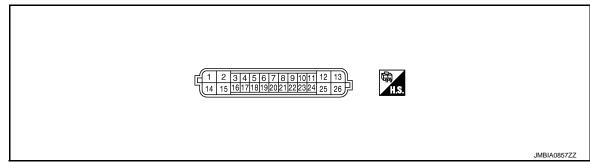
	OBD-	Self-diagnostic test item		li	e and Test mit display)	
Item	MID		DTC	TID	Unitand Scaling ID	Description
			P0301	80H	24H	Misfiring counter at 1000 revolution o the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution o the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution o the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution o the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution o the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution o the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution o the multiple cylinders
MISFIRE	A1H		P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
WIGI IKE	AIII	Multiple cylinder misfires	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 o 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

ECUD	AGNU	SIS INFORMATION >				[VQ3/VHK]
	OBD-			li	e and Test mit display)	
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
	A2H	No. 1 cylinder misfire	P0301	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	АЗН	No. 2 cylinder misfire	P0302	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
		,	P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	0ВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
405155			P0304	0CH	24H	Misfire counts for last/current driving cycles
MISFIRE	A6H	A6H No. 5 cylinder misfire	P0305	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 cylinder misfire	P0306	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 cylinder misfire	P0307	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 cylinder misfire	P0308	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
7.01		-	P0308	0CH	24H	Misfire counts for last/current driving cycles

VVEL CONTROL MODULE

Reference Value

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.

Term	inal No.	Description			Value
+		Signal name	Input/ Output	Condition	(Approx.)
1 (W)	14 (B/W)	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 conditionIdle speed	0 - 14 V★ 100µSec/div 5V/div JMBIA0854ZZ
(L/B)	(B/W)	(High lift) (bank 2)	Japan	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100μSec/div 5V/div JMBIA0855ZZ
3	4	VVEL control shaft posi-		[Engine is running] • Warm-up condition • Idle speed	Approx.0.25 - 1.40 V
(G)	(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 position sensor 2 (bank 1)]	_	_	_

VVEL CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

Terminal No.		Description			Value	^
+		Signal name	Input/ Output	Condition	(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	С
6 (B)	_	Sensor ground [VVEL control shaft position sensor 2 (bank 2)]	_	_	_	D
7 (SB)	6 (B)	Sensor power supply [VVEL control shaft posi- tion sensor 2 (bank 2)]	_	[Ignition switch: ON]	5 V	Е
8 (BG)	14 (B/W)	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 position sensor 2 (bank 1)]	_	[Ignition switch: ON]	5 V	G
11 (GR)	_	CAN communication line [ECM]	Input/ Output	_	_	_
12 (G)	14 (B/W)	VVEL actuator motor (High lift) (bank 1)	Output	[Engine is running]Warm-up conditionIdle speed	0 - 14 V★ 100μSec/div 5V/div JMBIA0854ZZ	H
(6)	(B/W)	(Figh lift) (bank 1)		[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100μSec/div 5V/div JMBIA0855ZZ	K L
13 (Y)	14 (B/W)	VVEL actuator motor power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	M
14 (B/W)	_	_	_	[Engine is running] • Idle speed	_	- N

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< ECU DIAGNOSIS INFORMATION >

Term	inal No.	Description			Value					
+		Signal name	Input/ Output	Condition	Value (Approx.)					
15	14			[Engine is running]Warm-up conditionIdle speed	0 - 14 V★ 100μSec/div 5V/div JMBIA0854ZZ					
(L/Y)	(B/W)	VVEL actuator motor (Low lift) (bank 2)	Output	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100μSec/div 5V/div JMBIA0855ZZ					
40	47) ([Engine is running]Warm-up conditionIdle speed	3.50 - 4.75 V					
16 (R)	17 (L)	VVEL control shaft position sensor 1 (bank 1)	Input	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0.25 - 4.75 V					
17 (L)	_	Sensor ground [VVEL control shaft position sensor 1 (bank 1)]	_	_	_					
18	19	VVEL control shaft posi-	Input	[Engine is running]Warm-up conditionIdle 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 position sensor 1 (bank 2)]	_	_	_					
20 (BR)	19 (W)	Sensor power supply [VVEL control shaft position sensor 1 (bank 2)]	_	[Ignition switch: ON]	5 V					
21 (V)	14 (B/W)	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/W)	VVEL control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)					
24 (L)	_	CAN communication line	Input/ Output	[Ignition switch: ON]	0 - 1.0 V					

VVEL CONTROL MODULE

< ECU DIAGNOSIS INFORMATION >

[VQ37VHR]

Terminal No.		Description			Value					
+		Signal name	Input/ Output	Condition	value (Approx.)					
25	14	` ()IIfDLIT		[Engine is running]Warm-up conditionIdle speed	0 - 14 V★ 100μSec/div 5V/div JMBIA0854ZZ					
(BR)	(B/W)		Сагра	[Engine is running]Warm-up conditionWhen revving engine up to 2,000 rpm quickly	0 - 14 V★ 100μSec/div 5V/div JMBIA0855ZZ					

 \bigstar : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

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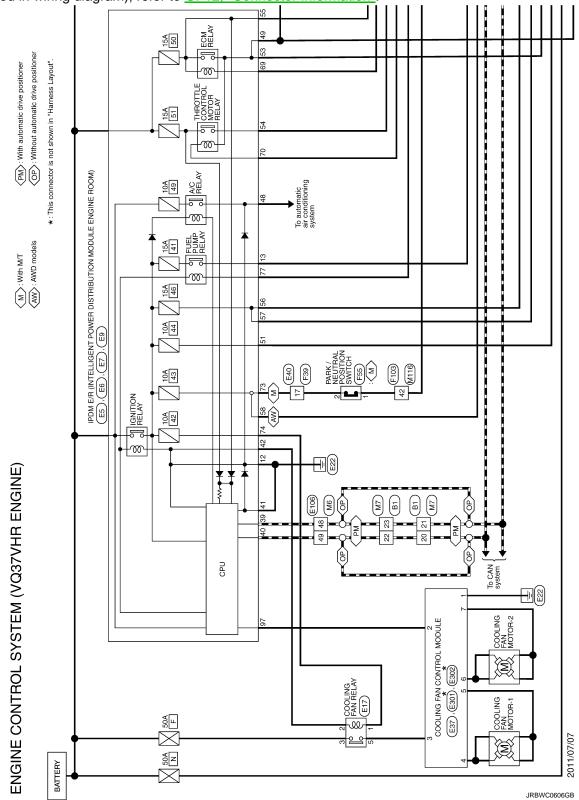
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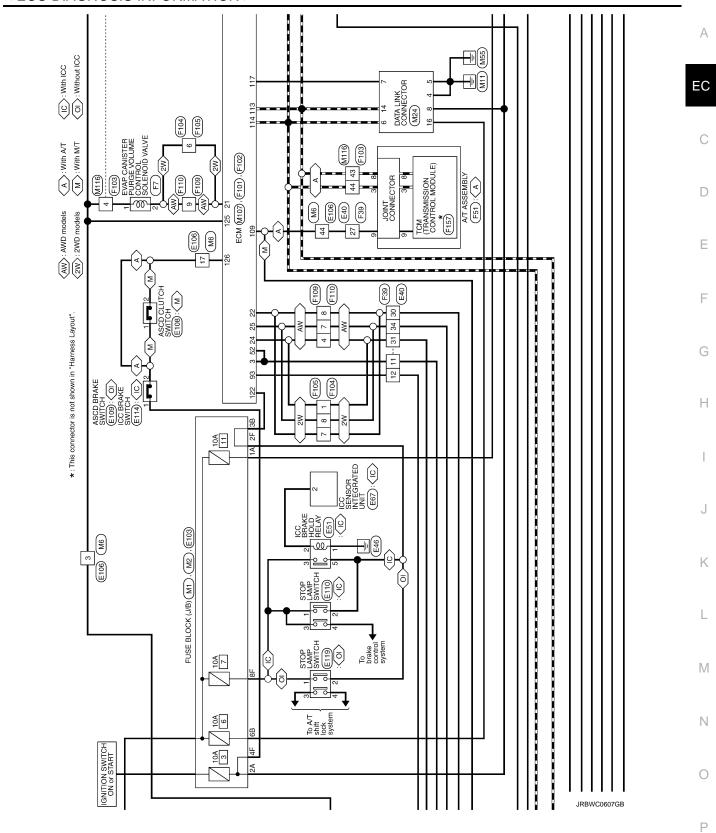
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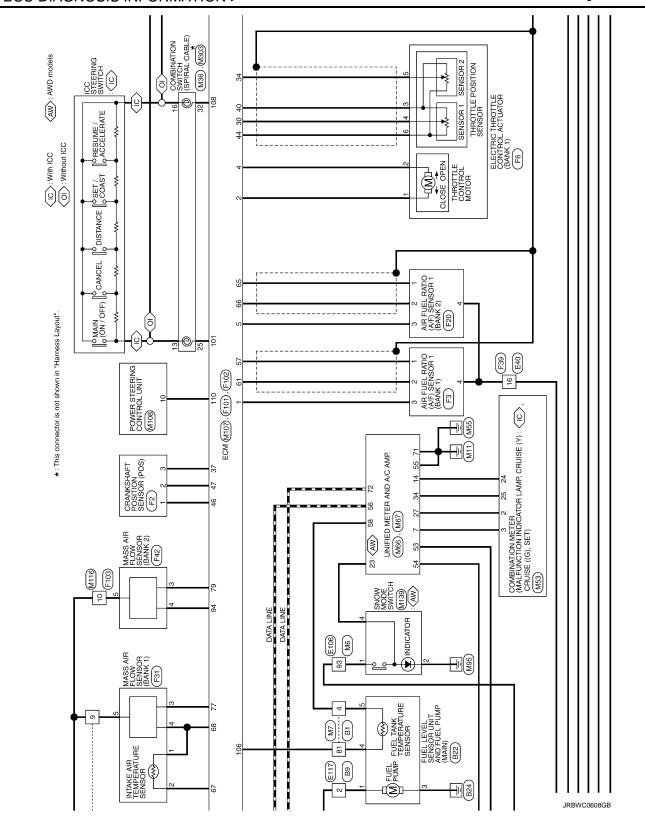
Wiring Diagram - ENGINE CONTROL SYSTEM -

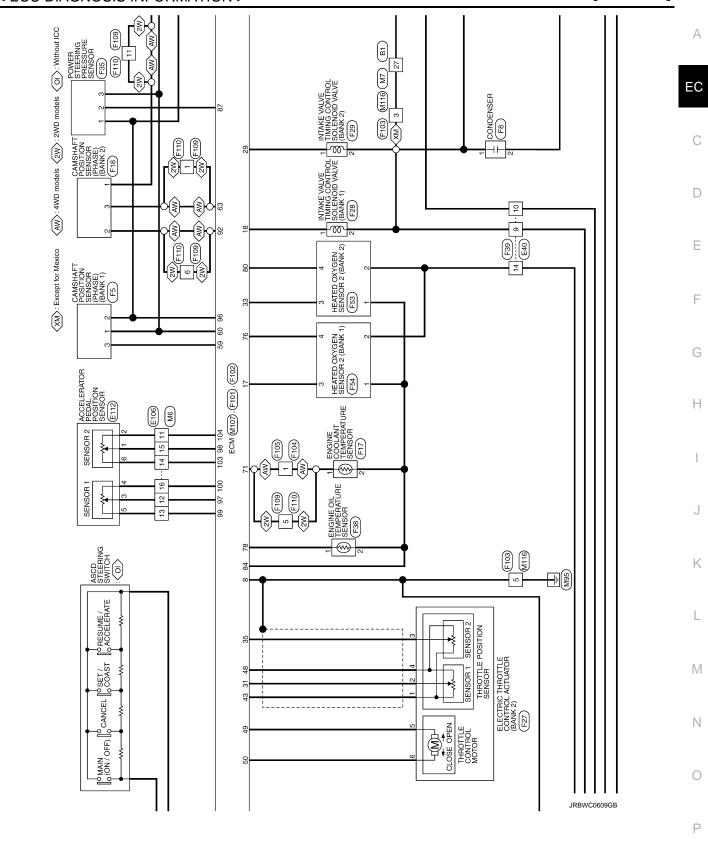
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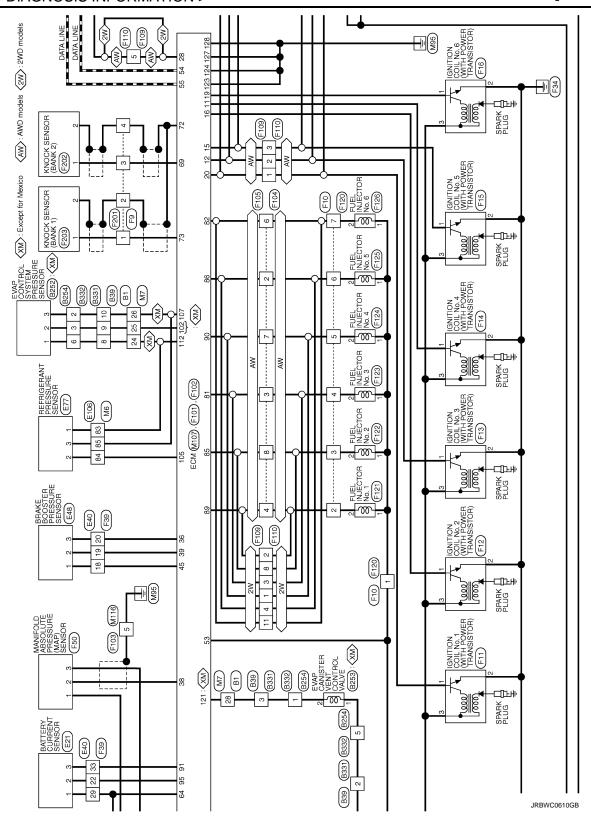
For connector terminal arrangements, harness layouts, and alphabets in a \bigcirc (option abbreviation; if not described in wiring diagram), refer to GI-12, "Connector Information".



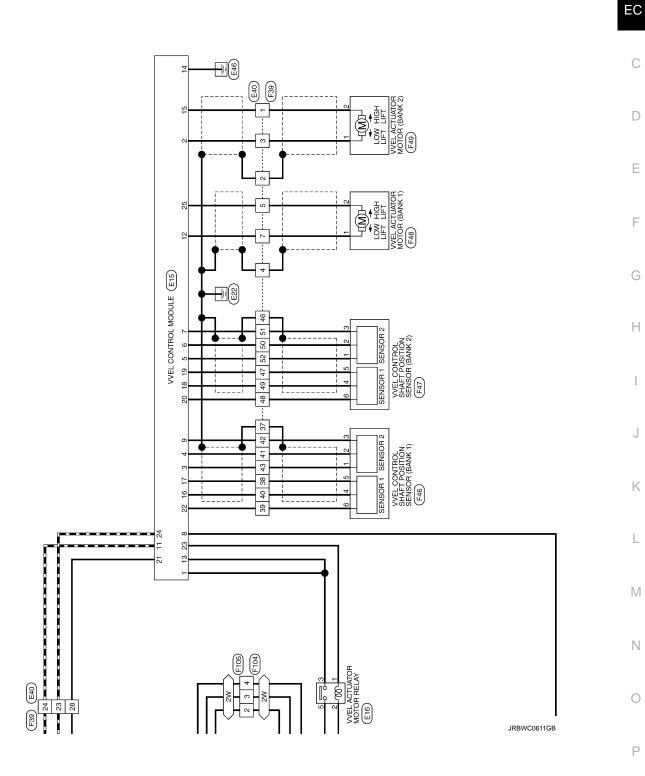








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SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/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	y symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-534
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-622
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-531
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-116
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-551
	Incorrect idle speed adjustment						1	1	1	1		1			EC-29
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-441, EC-448
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-29
	Ignition circuit	1	1	2	2	2		2	2			2			EC-540
Main pov	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-181
Mass air	r flow sensor circuit	1			2										EC-203, EC-213
Engine o	coolant temperature sensor circuit	1					3			3					EC-231, EC-234
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			EC-249, EC-253, EC-256, EC-259, EC-515
Throttle position sensor circuit							2			2					EC-237, EC-309, EC-437, EC-439, EC-450
Accelerator pedal position sensor circuit				3	2	1									EC-502, EC-506, EC-510
Knock se	ensor circuit			2								3			EC-318

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VQ37VHR]

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	SYMPTOM													
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/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 symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА	
Engine oil temperature sensor			4		1						3			EC-302, EC-306
Crankshaft position sensor (POS) circuit	2	2												EC-321
Camshaft position sensor (PHASE) circuit	3	2												EC-325
Vehicle speed signal circuit		2	3		3						3			EC-382
Power steering pressure sensor circuit		2					3	3						EC-394
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-402, EC-404
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-193
Manifold absolute pressure (MAP) sensor											3			EC-224
Brake booster pressure sensor											3			EC-397
VVEL control module	3		4	4	3									EC-492, EC-494
VVEL actuator motor	3		4	4	3									EC-423
VVEL actuator motor relay	3		4	4	3									EC-427
VVEL actuator shaft position sensor	3		4	4	3									EC-419
PNP signal circuit			3		3		3	3			3			EC-410
Refrigerant pressure sensor circuit		2				3			3		4			EC-553
Electrical load signal circuit							3							EC-529
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-4
ABS actuator and electric unit (control unit)			4											BRC-5

^{1 - 6:} The numbers refer to the order of inspection. (continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

Revision: 2013 February EC-611 2012 G Sedan

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Var Valv		HARD/NO START/RESTART (EXCP. HA)	VE STALL	HESITATION/SURGING/FLAT SPOT	DETONATION	POWER/POOR ACCELERATION				щ	PERATURE HIGH	IPTION	NOI	CHARGE)	
Fuel Fuel Fuel Vap Valv Pool		Ŧ	ENGINE	HESITATION	SPARK KNOCK/DETONATION	LACK OF POWER/PC	HIGH IDLE/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 CHA	Reference page
Var Valv	tom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Van Val	iel tank	5													<u>FL-13</u>
Valv	Fuel piping		+	5	5	5		5	5			5			FL-4
Poo	por lock		5											,	<u> </u>
LUV	or fuel (Heavy weight gasoline, by octane)	5		5	5	5		5	5			5		,	
Air Air	r duct														EM-180
Air	r cleaner													,	EM-180
(Ma	r leakage from air duct lass air flow sensor — electric rottle control actuator)		5	5		5		5	5			5			<u>EM-180</u>
Ele	ectric throttle control actuator	5			5		5			5				•	EM-181
	r leakage from intake manifold/ ollector/Gasket													·	<u>EM-185</u>
Cranking Bat	attery														PG-117
Ger	enerator circuit	1	1	1		1		1	1					1	<u>CHG-24,</u> <u>CHG-25</u>
	arter circuit	3										1			<u>STR-2</u> , <u>STR-5</u>
Sig	gnal plate	6												,	EM-283
PN	NP signal circuit	4													<u>TM-10</u> , <u>TM-160</u>
-	/linder head	5	5	5	5	5		5	5		4	5	•		EM-269
-	/linder head gasket										4		3		<u> </u>
	rlinder block ston												4		
	ston ring												4		
	oton mig	6	6	6	6	6		6	6			6			EM-283
		3	ļ						-			_			
Cra	onnecting rod earing	-													

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VQ37VHR]

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		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/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	НА	
Valve	Timing chain														EM-217
mecha- nism	Camshaft	5	5	5	5	5						5			EM-256
	Intake valve timing control							5 5	5						EM-217
	Intake valve												3		EM 200
	Exhaust valve												3		<u>EM-269</u>
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EX-4, EX-6
	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-14,</u> <u>LU-21</u>
	Oil level (Low)/Filthy oil														<u>LU-9</u>
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-13</u> , <u>CO-13</u>
	Thermostat									5					CO-29
	Water pump	5	5	5	5	5		5	5		4	_			CO-27
	Water gallery		5	5	5	5		5	5		4	5			CO-33
	Cooling fan														<u>CO-20</u>
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-9</u>
IVIS (INFII NATS)	NITI Vehicle Immobilizer System —	1	1												SEC-5

^{1 - 6:} The numbers refer to the order of inspection.

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NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS > [VQ37VHR]

NORMAL OPERATING CONDITION

Description INFOID:000000007463054

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-67.</u> "System Description".

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-305, "Component Inspection".

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:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never 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

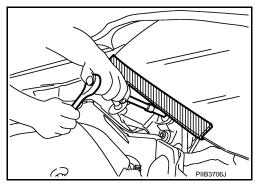
WARNING:

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the
 ignition ON or engine running, never 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

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



Precautions For Xenon Headlamp Service

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.
- 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.

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(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.

CALITION:

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

INFOID:0000000007463058

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.

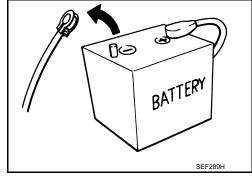
CAUTION:

- 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-107</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.

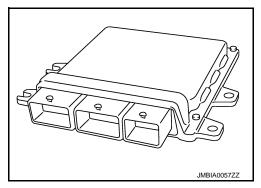
General Precautions

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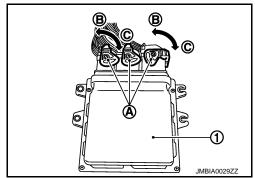
- Always use a 12 volt battery as power source.
- Never attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.



- 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 cleaned 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



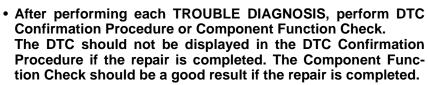
- When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.
- 1 : ECM
- C: Loosen

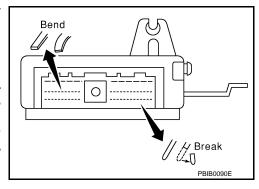


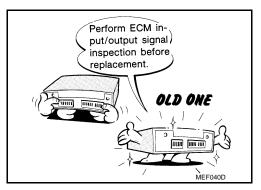
 When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends or break).
 Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

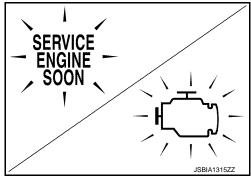
Securely connect ECM harness connectors.
 A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.

- 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 <u>EC-558</u>, "<u>Reference Value</u>".
- 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).









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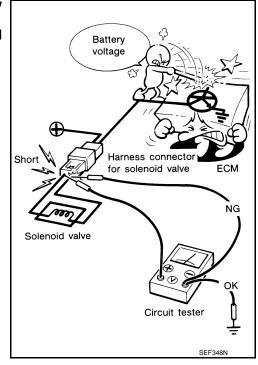
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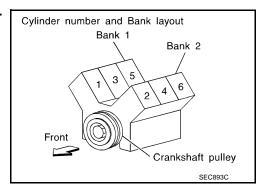
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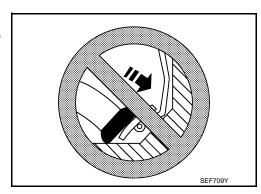
 When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
 Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



- B1 indicates bank 1, B2 indicates bank 2 as shown in the figure.
- Never operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



- · Never depress accelerator pedal when starting.
- · Immediately after starting, never rev up engine unnecessarily.
- Never rev up engine just prior to shutdown.

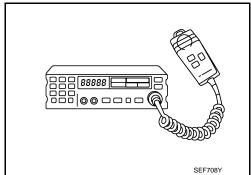


PRECAUTIONS

< PRECAUTION > [VQ37VHR]

 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.



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< PREPARATION > [VQ37VHR]

PREPARATION

PREPARATION

Special Service Tools

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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:0000000007463061

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 i.e.: (MLR-8382)	S-NT704	Checks fuel tank vacuum relief valve opening pressure
Socket wrench	19 mm (0.75 in) More than 32 mm (1.26 in) S-NT705	Removes and installs engine coolant temperature sensor

PREPARATION

< PREPARATION > [VQ37VHR]

Tool name (Kent-Moore No.)		Description	
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	Mating surface shave cylinder	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with antiseize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor	E
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specifica-		Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.	-
tion MIL-A-907)	S-N1779		

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PERIODIC MAINTENANCE

FUEL PRESSURE

Inspection INFOID:000000007463062

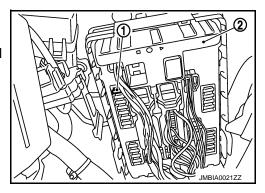
FUEL PRESSURE RELEASE

(P) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
- 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

- 1. Remove fuel pump fuse (1) located in IPDM E/R (2).
- Start engine.
- 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:

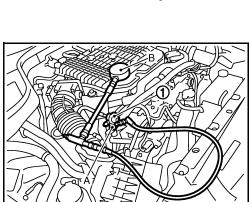
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel
 pressure cannot be completely released because V36 models do not have fuel return system.
- Use Fuel Pressure Gauge Kit (J-44321) to check fuel pressure.
- 1. Release fuel pressure to zero.
- 2. Install 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.
- 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.



EVAP LEAK CHECK

Inspection INFOID:0000000007463063

CAUTION:

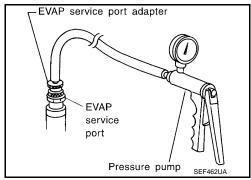
- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

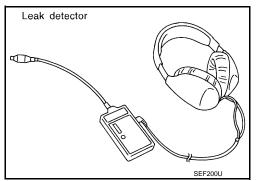
NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

(II) WITH CONSULT

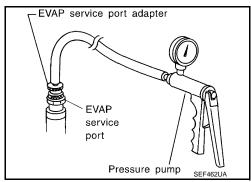
- 1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. 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 EC-116, "System Diagram".





® WITHOUT CONSULT

- 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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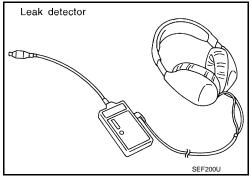
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EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

[VQ37VHR]

5. Locate the leak using a leak detector. Refer to EC-116, "System Diagram".



SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[VQ37VHR]

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SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Transmission	Condition	Specification
A/T	No load* (in P or N position)	$650\pm50~\mathrm{rpm}$
M/T	No load* (in Neutral position)	650 ± 50 rpm

^{*:} Under the following conditions

- · A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- · Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000007463065

Transmission	Condition	Specification
A/T	No load* (in P or N position)	10 ± 5° BTDC
M/T	No load* (in Neutral position)	10 ± 5° BTDC

^{*:} 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

INFOID:0000000007463066

Condition	Specification (Using CONSULT or GST)		
At idle	5 – 35 %		
At 2,500 rpm	5 – 35 %		

Mass Air Flow Sensor

INFOID:0000000007463067

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.7 – 1.2 V*
Mass air flow (Using CONSULT or GST)	2.0 – 6.0 g/s at idle* 7.0 – 20.0 g/s at 2,500 rpm*

^{*:} Engine is warmed up to normal operating temperature and running under no load.

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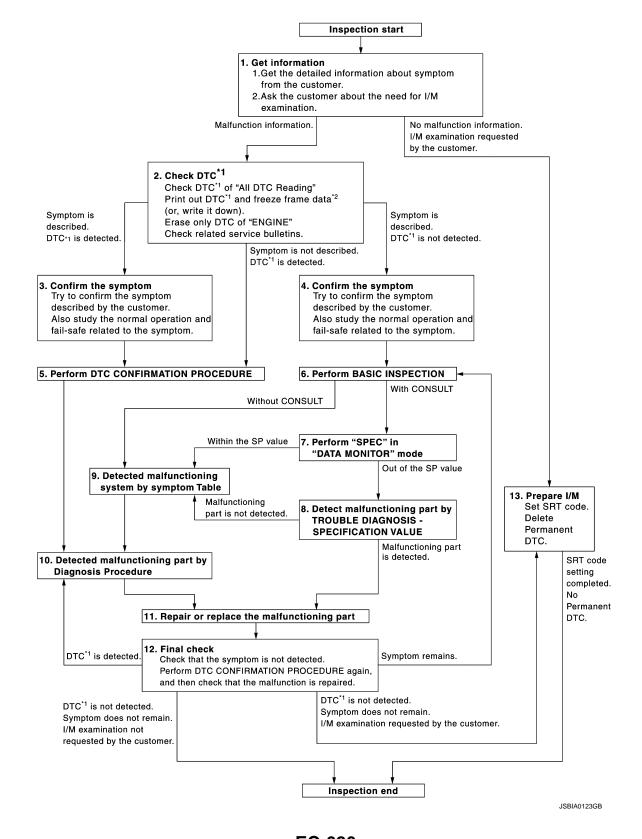
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BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

OVERALL SEQUENCE



< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

*1: Include 1st trip DTC.

*2: Include 1st trip freeze frame data.

DETAILED FLOW

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 EC-629, "Diagnostic Work Sheet".)
- Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.

No Malfunction information, but a request for I/M examination>>GO TO 13.

2.CHECK DTC

- Check DTC of "All DTC Reading".
- Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT or GST.)
- Erase only DTC of "ENGINE".
 - (X) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-752, "CONSULT Function".
 - Nithout CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-748, "On Board Diagnosis Function".
- Turn ignition switch OFF.
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-1153, "Symptom Table".)
- 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 EC-1157, "Description" and EC-1138, "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 EC-1157, "Description" and EC-1138, "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 6.

${f 5}$.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 EC-1140, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

Freeze frame data is useful if the DTC is not detected.

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< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

 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 GI-43, "Intermittent Incident".

6. PERFORM BASIC INSPECTION

Perform EC-631, "BASIC INSPECTION: Special Repair Requirement".

Do you have CONSULT?

YES >> GO TO 7. NO >> GO TO 9.

7. PERFORM SPEC IN DATA MONITOR MODE

(P)With CONSULT

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 "SPEC" in "DATA MONITOR" mode of "ENGINE". Refer to EC-761, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9. NO >> GO TO 8.

f 8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-762, "Diagnosis Procedure".

Is a malfunctioning part detected?

YES >> GO TO 11. NO >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to <u>EC-1153</u>, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

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 GI-46. "Circuit Inspection".

Is a malfunctioning part detected?

YES >> GO TO 11.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT. Refer to <u>EC-1116</u>, "<u>Reference Value</u>".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

- 1. Repair or replace the malfunctioning part.
- Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- Check DTC. If DTC is displayed, erase it.
 - (R) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-752, "CONSULT Function".
 - Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-748, "On Board Diagnosis Function".

>> GO TO 12.

< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

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.

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.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.

YES-2 >> Symptom remains: GO TO 6.

NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (R) With CONSULT: Refer to "How to Read DTC and 1st Trip DTC" in EC-752, "CONSULT Function", W Without CONSULT: Refer to "How to Read Self-diagnostic Results" in EC-748, "On Board Diagnosis Function").

NO-2 >> I/M examination, requested from the customer: GO TO 13.

13. PREPARE FOR I/M EXAMINATION

- Set SRT codes. Refer to EC-641, "Description".
- 2. Erase permanent DTCs. Refer to EC-647, "Description".

>> INSPECTION END.

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 come on steady or blink and 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.

KEY POINTS

WHAT Vehicle & engine model WHEN Date, Frequencies WHERE Road conditions HOW Operating conditions, Weather conditions, **Symptoms**

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< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

WORKSHEET SAMPLE

Customer name MR/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.				
	☐ Startability	☐ Impossible to start ☐ No combust ☐ Partial combustion affected by th ☐ Partial combustion NOT affected ☐ Possible but hard to start ☐ Other	nrottle position I by throttle position			
Symptoms	□ Idling	☐ No fast idle ☐ Unstable ☐ H☐ Others [ligh idle □ Low idle]			
Stumble Surge Knock Lack of power Driveability Stumble Surge Knock Lack of power Driveability Stumble Surge Knock Driveability Stumble Surge Intake backfire Others []						
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While dece ☐ Just after stopping ☐ While loadi	lerating			
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime				
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes				
Weather cond	litions	☐ Not affected				
	Weather	☐ Fine ☐ Raining ☐ Snowing	☐ Others []			
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐] Cold ☐ Humid °F			
		☐ Cold ☐ During warm-up ☐ /	After warm-up			
Engine conditions		Engine speed0 2,000	4,000 6,000 8,000 rpm			
Road conditions		☐ In town ☐ In suburbs ☐ Hig	hway			
Driving conditions		☐ While accelerating ☐ While cruis ☐ While decelerating ☐ While turning	S			
		Vehicle speed 0 10 20	30 40 50 60 MPH			
Malfunction in	dicator lamp	☐ Turned on ☐ Not turned on				

MTBL0017

< BASIC INSPECTION >

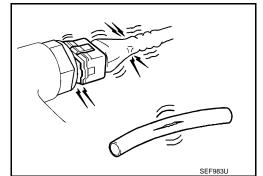
INSPECTION AND ADJUSTMENT BASIC INSPECTION

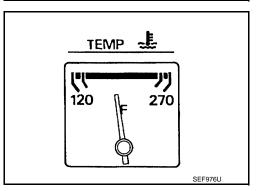
BASIC INSPECTION: Special Repair Requirement

INFOID:0000000007463070

1.INSPECTION START

- 1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for 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.
- Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.

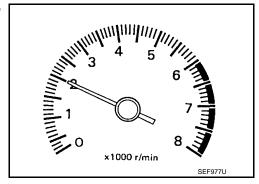




- 5. Run engine at about 2,000 rpm for about 2 minutes under no load.
- 6. Check that no DTC is displayed with CONSULT or GST.

Is any DTC 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 TARGET IDLE SPEED

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

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< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

2. 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.

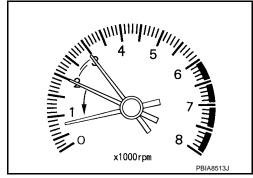
3. Check idle speed.

For procedure, refer to <u>EC-635</u>. "IDLE <u>SPEED</u>: <u>Special Repair</u> Requirement".

For specification, refer to EC-1168, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 4.



4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- 1. Stop engine.
- 2. Perform <u>EC-637</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-638, "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 TARGET IDLE SPEED AGAIN

- Start engine and warm it up to normal operating temperature.
- 2. Check idle speed.

For procedure, refer to EC-635, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-1168, "Idle Speed".

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 EC-911, "Component Inspection".
- Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-905, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 9.

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

9. CHECK ECM FUNCTION

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
- 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to EC-634, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

Check ignition timing with a timing light.

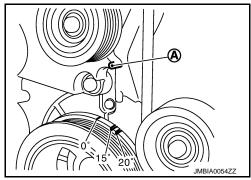
A :Timing indicator

For procedure, refer to EC-636, "IGNITION TIMING: Special Repair Requirement".

For specification, refer to EC-1168, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 19. NO >> GO TO 11.



11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

- Stop engine.
- 2. Perform EC-637, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 12.

12.perform throttle valve closed position learning

Perform EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 13.

13.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-638, "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 TARGET IDLE SPEED AGAIN

- Start engine and warm it up to normal operating temperature.
- 2. Check idle speed.

For procedure, refer to EC-635, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-1168, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

- Run engine at idle.
- Check ignition timing with a timing light.

A :Timing indicator

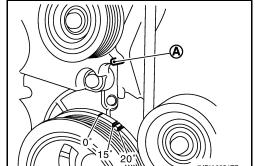
For procedure, refer to EC-636, "IGNITION TIMING: Special Repair Requirement".

For specification, refer to EC-1168, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 16.



16.check timing chain installation

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

Is the inspection result normal?

YES >> GO TO 17.

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

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< BASIC INSPECTION >

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-911, "Component Inspection"</u>.
- Check crankshaft position sensor (POS) and circuit. Refer to EC-905. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 18.

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

18. CHECK ECM FUNCTION

- 1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
- 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to EC-634, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to <u>EC-634</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM)

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Description

INFOID:0000000007463071

When replacing ECM, the following procedure must be performed. (For details, refer to <u>EC-634</u>, "ADDI-TIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".)

PROGRAMMING OPERATION

NOTE

After replacing with a blank ECM, programming is required to write ECM information. Be sure to follow the procedure to perform the programming.

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

1. CHECK ECM PART NUMBER

Check ECM part number to see whether it is blank ECM or not.

NOTE:

- Part number of blank ECM is 23703 xxxxx.
- Check the part number when ordering ECM or with the one included in the label on the container box.

Is the ECM a blank ECM?

YES >> GO TO 2.

NO >> GO TO 4.

$2.\mathsf{save}$ ecm part number

Read out the part number from the old ECM and save the number, following the programming instructions. Refer to "CONSULT Operation Manual".

NOTE:

- The ECM part number is saved in CONSULT.
- Even when ECM part number is not saved in CONSULT, go to 3.

>> GO TO 3.

3. PERFORM ECM PROGRAMMING

< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

After replacing ECM, perform the ECM programming. Refer to "CONSULT Operation Manual".
NOTE: • During programming, maintain the following conditions:
- Ignition switch: ON
Electric load: OFFBrake pedal: Not depressed
- Battery voltage: 12 – 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in
"Data monitor" of CONSULT.)
>> GO TO 5.
4.REPLACE ECM
Replace ECM.
>> GO TO 5.
5. PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS
Refer to SEC-8, "ECM RE-COMMUNICATING FUNCTION: Special Repair Requirement".
>> GO TO 6.
6.PERFORM VIN REGISTRATION
Refer to EC-636, "VIN REGISTRATION: Special Repair Requirement".
>> GO TO 7.
7. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING
Refer to EC-637, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".
>> GO TO 8.
8.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING
Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
>> GO TO 9
9. PERFORM IDLE AIR VOLUME LEARNING
Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".
Neier to <u>LC-030, TDLL AIN VOLONIL LLANNING : Special Nepall Nequirement</u> .
>> GO TO 10.
10. PERFORM EXHAUST VALVE TIMING CONTROL LEARNING
Refer to EC-639, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".
>> END IDLE SPEED
IDLE SPEED : Description
This describes how to check the idle speed. For the actual procedure, follow the instructions in "BASIC INSPECTION".
IDLE SPEED : Special Repair Requirement
1.CHECK IDLE SPEED

< BASIC INSPECTION >

(P)With CONSULT

Check idle speed in "DATA MONITOR" mode with CONSULT.

With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING: Description

INFOID:0000000007463075

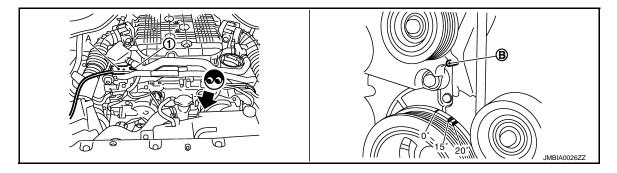
This describes how to check the ignition timing. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IGNITION TIMING: Special Repair Requirement

INFOID:0000000007463076

1. CHECK IGNITION TIMING

1. Attach timing light to loop wire as shown.



- Loop wire
- A. Timing light

- B. Timing indicator
- 2. Check ignition timing.

>> INSPECTION END

VIN REGISTRATION

VIN REGISTRATION: Description

INFOID:0000000007801472

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

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

VIN REGISTRATION: Special Repair Requirement

INFOID:0000000007801473

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-24, "Information About Identification or Model Code".

>> GO TO 2.

2. PERFORM VIN REGISTRATION

(I) With CONSULT

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

>> END

< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING: Description INFOID.000000007463079

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 harness connector of accelerator pedal position sensor or ECM is disconnected.

EC

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ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement INFOID:0000000007463080

1.START

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- Check that accelerator pedal is fully released.
- Turn ignition switch ON and wait at least 2 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and wait at least 2 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.

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>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING: Description

INFOID:0000000007463081

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 or electric throttle control actuator is cleaned.

THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement

INFOID:0000000007463082

1.START

WITH CONSULT

- 1. Turn ignition switch ON.
- 2. Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode.
- 3. Follow the instructions on the CONSULT display.
- 4. Turn ignition switch OFF and wait at least 10 seconds.

Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

WITHOUT CONSULT

1. Start the engine.

NOTE:

Coolant temperature is less than 25°C (77°F) before engine starts.

2. Warm up the engine.

NOTE:

Warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" of CONSULT reaches more than 65°C (149°F).

Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

INFOID:0000000007463083

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>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING: Description

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 any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

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< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

IDLE AIR VOLUME LEARNING: Special Repair Requirement

INFOID:0000000007463084

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)
- Selector lever: P or N
- · Electric load switch: OFF

(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
- With CONSULT: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9 V.
- Without CONSULT: Drive vehicle for 10 minutes.

Will CONSULT be used?

YES >> GO TO 2.

NO >> GO TO 3.

2.PERFORM IDLE AIR VOLUME LEARNING

(I) With CONSULT

- 1. Perform Accelerator Pedal Released Position Learning. Refer to EC-637, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".
- 2. Perform Throttle Valve Closed Position Learning. <u>EC-637</u>. "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 3. Start engine and warm it up to normal operating temperature.
- 4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- 5. Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 4.

NO >> GO TO 5.

3.PERFORM IDLE AIR VOLUME LEARNING

®Without CONSULT

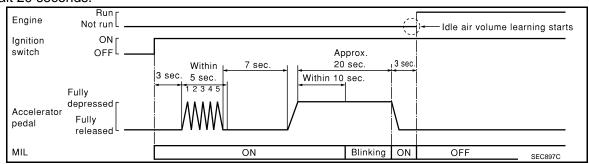
NOTE:

- 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.
- Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-637</u>, "ACCELERATOR PEDAL <u>RELEASED POSITION LEARNING</u>: <u>Special Repair Requirement"</u>.
- 2. Perform Throttle Valve Closed Position Learning. <u>EC-637</u>, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 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 and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
- Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
- 9. Start engine and let it idle.

[VQ25HR FOR USA AND CANADA]

< BASIC INSPECTION >

10. Wait 20 seconds.



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>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and check that idle speed and ignition timing are within the specifications. Refer to EC-1168, "Idle Speed" and EC-1168, "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-761</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 all over again:

- · Engine stalls.
- Erroneous idle.

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>> INSPECTION END

EXHAUST VALVE TIMING CONTROL LEARNING

EXHAUST VALVE TIMING CONTROL LEARNING: Description

INFOID:0000000007463085

Exhaust Valve Timing Control Learning is a function of ECM to learn the characteristic of exhaust valve timing control magnet retarder by comparing the target angle of exhaust camshaft with the actual retarded angle of exhaust camshaft.

It must be performed each time as follows;

- Exhaust valve timing control magnet retarder is disconnected or replaced
- ECM is replaced
- Changing oil to low kinematic viscosity from high it.

EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement

INFOID:0000000007463086

1.START

(P)With CONSULT

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

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< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

- Set selector lever to N position and confirm that following electrical or mechanical loads are not applied.
- Headlamp switch is OFF
- Air conditioner switch is OFF
- Rear defogger switch is OFF
- Steering wheel is in the straight-ahead position, etc.
- Select "EXH V/T CONTROL LEARN" in "WORK SUPPORT" mode with CONSULT.
- Touch "START" and wait 20 seconds.
- 5. Keep the engine speed between 2,200 and 4,000 rpm.
- 6. Check that "CMPLT" is displayed on CONSULT screen.

Learning completed : CMPLT Learning not yet : YET

®Without CONSULT

- 1. Disconnect the negative battery terminal and wait at least 10 minutes.
- 2. Reconnect the negative battery terminal.
- Start engine and warm it up to normal operating temperature.
- Set selector lever to N position and confirm that following electrical or mechanical loads are not applied.
- Headlamp switch is OFF
- Air conditioner switch is OFF
- Rear defogger switch is OFF
- Steering wheel is in the straight-ahead position, etc.
- 5. Keep the engine speed between 2,200 and 4,000 rpm at 20 seconds.

>> END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Description

INFOID:0000000007463087

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:0000000007463088

1.START

(P)With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
- Clear mixture ratio self-learning value by touching "CLEAR".

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF.
- 3. Disconnect mass air flow sensor (bank 1) harness connector.
- 4. Restart engine and let it idle for at least 5 seconds.
- 5. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
- 6. Select Service \$03 with GST. Check DTC P0102 is detected.
- 7. Select Service \$04 with GST to erase the DTC P0102.

>> END

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HOW TO SET SRT CODE

Description INFOID:0000000007463089

OUTLINE

In order to set all SRTs, the self-diagnoses as in the "SRT ITEM" table must have been performed at least once. Each diagnosis may require actual driving for a long period of time under various conditions.

SRT ITEM

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

SRT item*1 (CONSULT indication)	Performance Priority ^{*2}	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
EGR/VVT SYSTEM	3	Intake value timing control function	P0011, P0021

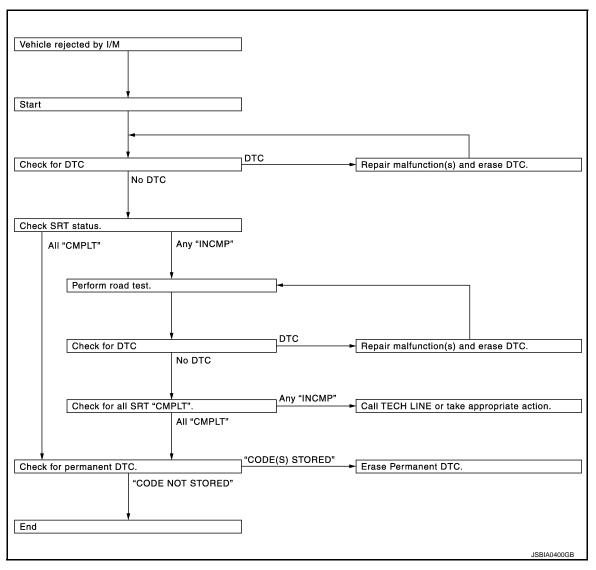
^{*1:} Though displayed on the CONSULT screen, "HO2S HTR" is not SRT item.

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, referring to the following flowchart.

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^{*2:} If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

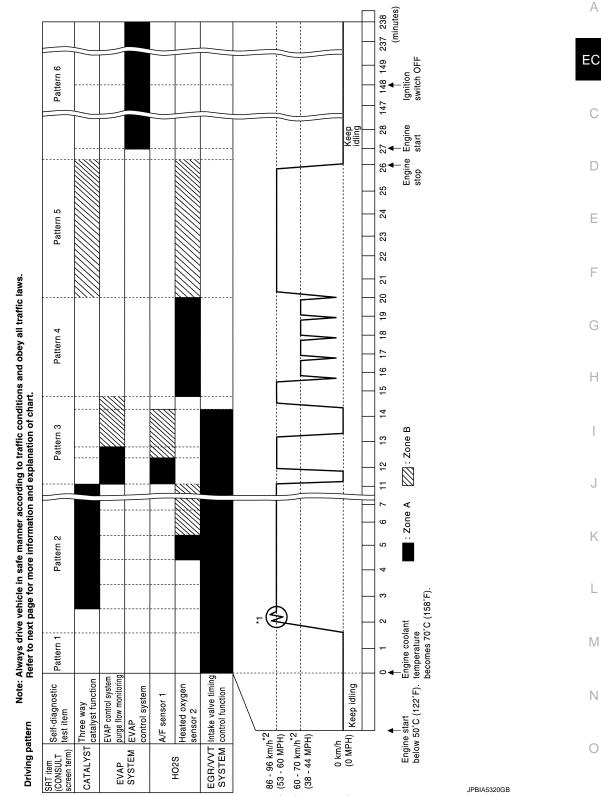


SRT Set Driving Pattern

INFOID:0000000007463090

CAUTION:

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



^{*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.

The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

^{• &}quot;Zone A" is the fastest time where required for the diagnosis under normal conditions*. If the diagnosis is not completed within "Zone A", the diagnosis can still be performed within "Zone B".

HOW TO SET SRT CODE

[VQ25HR FOR USA AND CANADA]

< BASIC INSPECTION >

- *: Normal conditions
- Sea level
- Flat road
- Ambient air temperature: 20 30°C (68 86°F)

NOTE:

Diagnosis is performed as quickly as possible under normal conditions. However, under other conditions, diagnosis may also be performed. [For example: ambient air temperature other than $20 - 30^{\circ}$ C ($68 - 86^{\circ}$ F)]

Work Procedure

1. CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-1142, "DTC Index".

NO >> GO TO 2.

2.CHECK SRT STATUS

(P)With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

®Without CONSULT

Perform "SRT status" mode with EC-748, "On Board Diagnosis Function".

⊕With GST

Select Service \$01 with GST.

Is SRT code(s) set?

YES >> GO TO 12.

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 4.

3.DTC CONFIRMATION PROCEDURE

- Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT.
- For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to EC-641, "Description".
- Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-1142</u>, "DTC Index".

NO >> GO TO 11.

4.PERFORM ROAD TEST

- Check the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-641, "Description"</u>.
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to <u>EC-642, "SRT Set Driving Pattern"</u>.

In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5. PATTERN 1

- Check the vehicle condition;
- Engine coolant temperature is –10 to 35°C (14 to 95°F).
- Fuel tank temperature is more than 0°C (32°F).
- 2. Start the engine.
- 3. Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)

NOTE:

ECM terminal voltage is follows;

- Engine coolant temperature
- -10 to 35°C (14 to 95°F): 3.0 4.3 V
- 70°(158°F): Less than 4.1 V
- Fuel tank temperature: Less than 1.4 V

Refer to EC-1116, "Reference Value".

>> GO TO 6.

6. PATTERN 2

- Drive the vehicle. And 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.

NOTE:

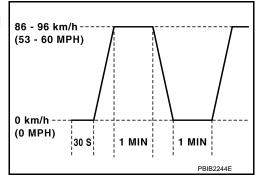
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7. PATTERN 3

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

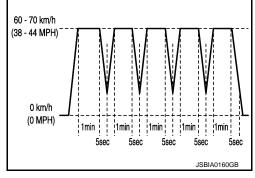
>> GO TO 8.



8. PATTERN 4

- Operate vehicle, following the driving pattern shown in the figure.
- Drive the vehicle in a proper gear at 60 km/h (38 MPH) and maintain the speed.
- Release the accelerator pedal fully at least 5 seconds.
- Repeat the above two steps at least 5 times.

>> GO TO 9.



9. PATTERN 5

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 10.

10.PATTERN 6

 Cool down the engine so that the engine coolant temperature lowers between 15 – 35°C (59 – 95°F). **CAUTION:**

Never turn the ignition switch ON while cooling down the engine.

 Engine coolant temperature at engine start is between 15 – 35°C (59 – 95°F) and has lowered 45°C (113°F) or more since the latest engine stop.

>> GO TO 11.

11. CHECK SRT STATUS

With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

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HOW TO SET SRT CODE

< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

Perform "SRT status" mode with EC-748, "On Board Diagnosis Function".

@With GST

Select Service \$01 with GST.

Is SRT(s) set?

YES >> GO TO 12.

NO >> Call TECH LINE or take appropriate action.

12. CHECK PERMANENT DTC

NOTE:

Permanent DTC cannot be checked with a tool other than CONSULT or GST.

(P)With CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

With GST

Select Service \$0A with GST.

Is permanent DTC(s) detected?

YES >> Go to EC-647, "Description".

NO >> END

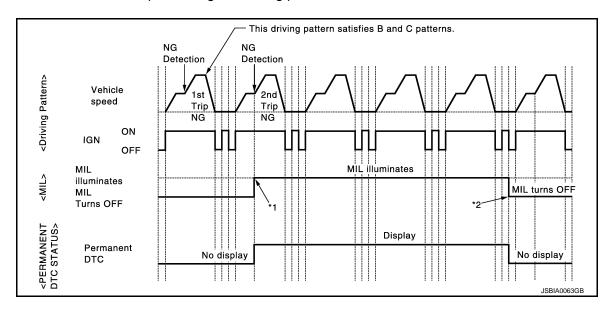
HOW TO ERASE PERMANENT DTC

Description INFOID:000000007463092

OUTLINE

When a DTC is stored in ECM

When a DTC is stored in ECM and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a raw.



^{*1:} When the same malfunction is detected in two consecutive trips, MIL will illuminate.

 MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

The erasing method depends on a permanent DTC stored in ECM. Refer to the following table.

NOTE:

If the applicable permanent DTC includes multiple groups, perform the procedure of Group B first. If the permanent DTC is not erased, perform the procedure of Group A.

×: Applicable —: Not applicable

Crown*	Perform "DTC CONFIRMATION PROCEDURE"	Driving pattern		
Group	for applicable DTCs.	OTCs. B		
A	×	_	_	
В	_	×	×	

^{*:} For group, refer to EC-1142, "DTC Index".

PERMANENT DTC ITEM

For permanent DTC items, MIL turns ON. Refer to EC-1142, "DTC Index".

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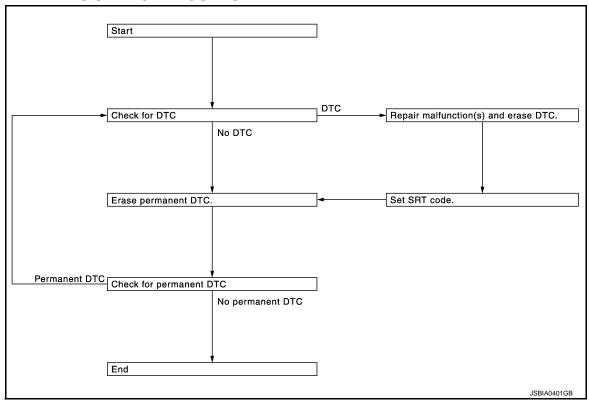
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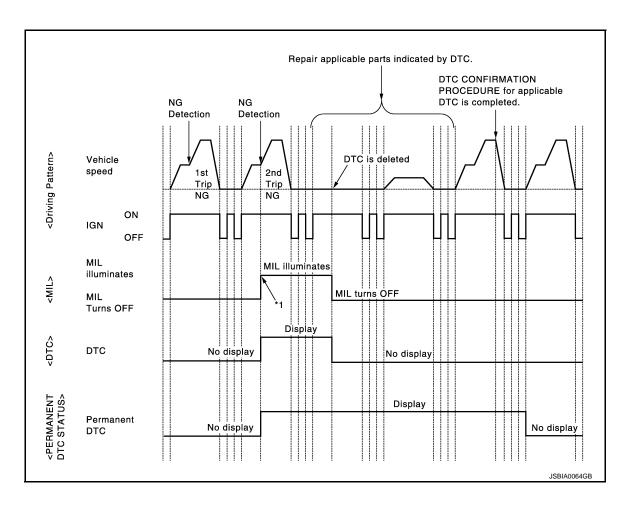
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PERMANENT DTC SERVICE PROCEDURE



Work Procedure (Group A)

INFOID:0000000007463093



HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

*1: When the same malfunction is de-

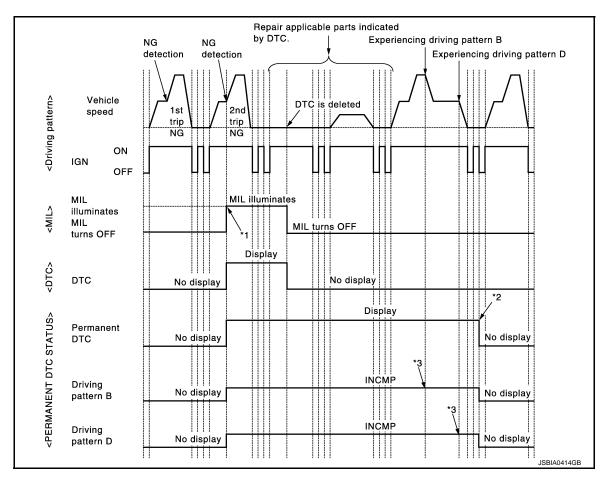
[VQ25HR FOR USA AND CANADA]

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tected in two consecutive trips, MIL will illuminate.	,,
1.CHECK DTC	EC
Check DTC. Is any DTC detected? YES >> Repair malfunction(s) and erase DTC. Refer to EC-752, "CONSULT Function" or EC-748, "On Board Diagnosis Function". NO >> GO TO 2.	C
2.CHECK PERMANENT DTC	
 With CONSULT 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. Turn ignition switch ON. 	Е
5. Select "PERMANENT DTC STATUS" mode with CONSULT.	F
 With GST 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. Turn ignition switch ON. 	G
4. Turn ignition switch ON.5. Select Service \$0A with GST.Is any permanent DTC detected?	Н
YES >> GO TO 3. NO >> END 3.PERFORM DTC CONFIRMATION PROCEDURE	I
Perform "DTC CONFIRMATION PROCEDURE" for DTCs which are the same as permanent DTCs stored in ECM. Refer to EC-1142, "DTC Index".	J
>> GO TO 4. 4.CHECK PERMANENT DTC	K
 With CONSULT 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. 	L
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Select "PERMANENT DTC STATUS" mode with CONSULT. With GST 	M
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. 	N
5. Select Service \$0A with GST. Is any permanent DTC detected? YES >> GO TO 1.	0
NO >> END	Р

Work Procedure (Group B)

INFOID:0000000007463094



- *1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.
- *2: After experiencing driving pattern B and D, permanent DTC is erased.
- Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing driving pattern B or D.

NOTE:

Drive the vehicle according to only driving patterns indicating "INCMP" in driving patterns B and D on the "PERMANENT DTC STATUS" screen.

1. CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-752</u>, "CONSULT Function" or <u>EC-748</u>, "On <u>Board Diagnosis Function"</u>.

NO >> GO TO 2.

2.CHECK PERMANENT DTC

(P)With CONSULT

- 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. Turn ignition switch ON.
- Select "PERMANENT DTC STATUS" mode with CONSULT.

With GST

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

HOW TO ERASE PERMANENT DTC [VQ25HR FOR USA AND CANADA] < BASIC INSPECTION > Turn ignition switch ON. Select Service \$0A with GST. Α Is any permanent DTC detected? YES >> GO TO 3. NO >> END EC 3.drive driving pattern b **CAUTION:** Always drive at a safe speed. Never erase self-diagnosis results. If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset. D (P)With CONSULT Start engine and warm it up to normal operating temperature. Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT to drive the vehicle according to driving pattern B. Refer to EC-752, "CONSULT Function", EC-746, "DIAGNOSIS DESCRIPTION: Driving Pattern". F 1. Start engine and warm it up to normal operating temperature. Drive the vehicle according to driving pattern B. Refer to EC-746, "DIAGNOSIS DESCRIPTION: Driving Pattern". >> GO TO 4. 4. CHECK PERMANENT DTC (II) With CONSULT 1. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON. Select "PERMANENT DTC STATUS" mode with CONSULT. 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. Turn ignition switch ON. Select Service \$0A with GST. Is any permanent DTC detected? YFS >> GO TO 5. NO >> END ${f 5}$. DRIVE DRIVING PATTERN D M

CAUTION:

- Always drive at a safe speed.
- Never erase self-diagnosis results.
- If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.
- Drive the vehicle according to driving pattern D. Refer to <u>EC-746, "DIAGNOSIS DESCRIPTION: Driving Pattern"</u>.

>> GO TO 6.

6.CHECK PERMANENT DTC

With CONSULT

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

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2012 G Sedan

HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

[VQ25HR FOR USA AND CANADA]

Select "PERMANENT DTC STATUS" mode with CONSULT.

- With GST1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON.
- 5. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1.

NO >> END

SYSTEM DESCRIPTION

ENGINE CONTROL SYSTEM

System Diagram

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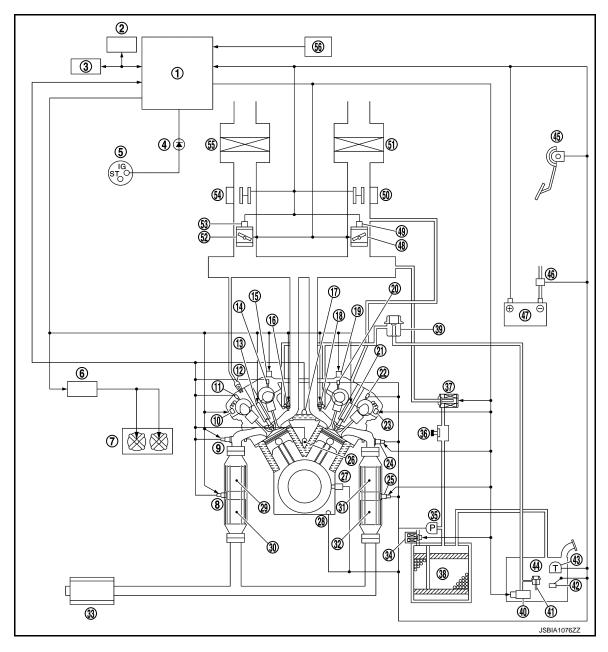
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- 1. ECM
- 4. MIL
- 7. Cooling fan
- Exhaust valve timing control magnet 11.
 retarder (bank 1)
- 13. Spark plug
- 16. Fuel injector
- 19. Intake valve timing control solenoid valve (bank 2)

- 2. Data link connector
- 5. Ignition switch
- 8. Heated oxygen sensor 2 (bank 1)
- Exhaust valve timing control position sensor (bank 1)
- Camshaft position sensor (PHASE) (bank 1)
- 17. Engine coolant temperature sensor
- 20. Camshaft position sensor (PHASE) (bank 2)

- 3. CAN communication
- 6. Cooling fan control module
- 9. A/F sensor 1 (bank 1)
- 12. PCV valve
- 15. Intake valve timing control solenoid valve (bank 1)
- 18. Fuel injector
- 21. Spark plug

ENGINE CONTROL SYSTEM

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

22.	Exhaust valve timing control position sensor (bank 2)	23.	Exhaust valve timing control magnet retarder (bank 2)	24.	A/F sensor 1 (bank 2)
25.	Heated oxygen sensor 2 (bank 2)	26.	Knock sensor	27.	Crankshaft position sensor (POS)
28.	Engine oil temperature sensor	29.	Three way catalyst 1	30.	Three way catalyst 2
31.	Three way catalyst 1	32.	Three way catalyst 2	33.	Muffler
34.	EVAP canister vent control valve	35.	EVAP control system pressure sensor	36.	EVAP service port
37.	EVAP canister purge volume control solenoid valve	38.	EVAP canister	39.	Fuel damper
40.	Fuel pump	41.	Fuel pressure regulator	42.	Fuel level sensor
43.	Fuel tank temperature sensor	44.	Fuel tank	45.	Accelerator pedal position sensor
46.	Battery current sensor	47.	Battery	48.	Electric throttle control actuator (bank 2)
49.	Throttle position sensor (bank 2)	50.	Mass air flow sensor (with intake air temperature sensor) (bank 2)	51.	Air cleaner (bank 2)
52.	Electric throttle control actuator (bank 1)	53.	Throttle position sensor (bank 1)	54.	Mass air flow sensor (with intake air temperature sensor) (bank 1)
55.	Air cleaner (bank 1)	56.	PNP signal		

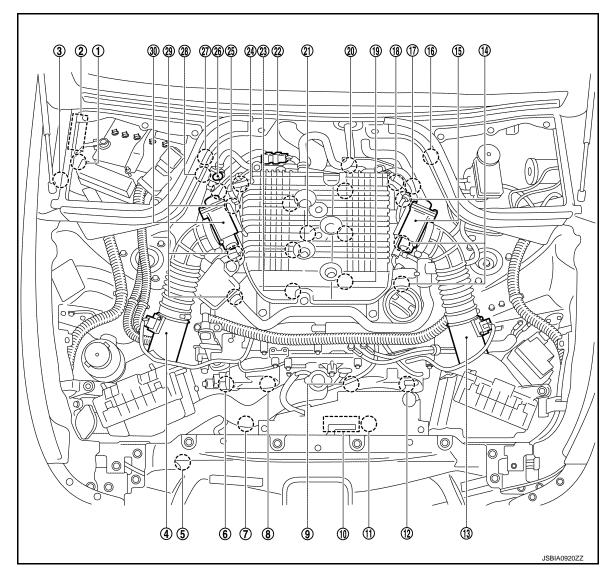
System Description

INFOID:0000000007463096

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

Component Parts Location

INFOID:0000000007463097



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- Cooling fan motor-1
- Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- Engine coolant temperature sensor 20.
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- 3. Cooling fan relay
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Exhaust valve timing control magnet retarder (bank 2)
- Electric throttle control actuator 15. (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- (bank 1)

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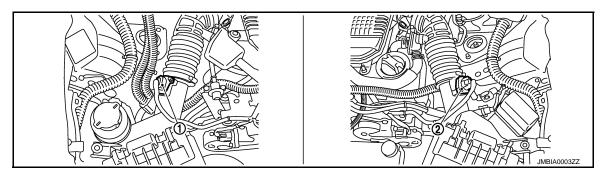
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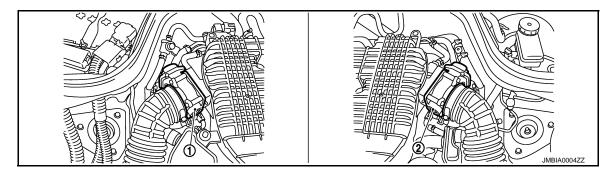
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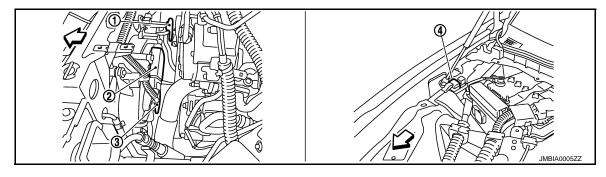
30. Electric throttle control actuator



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



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



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

Cooling fan relay

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 : Vehicle front

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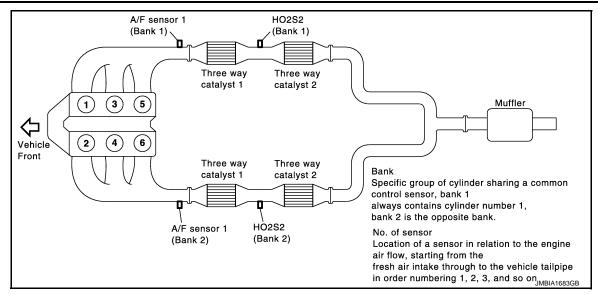
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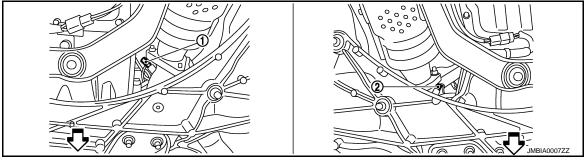
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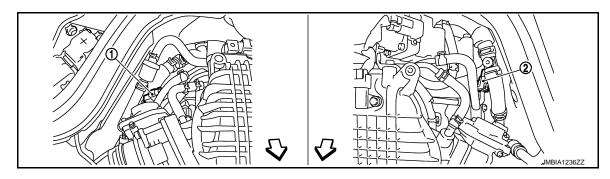
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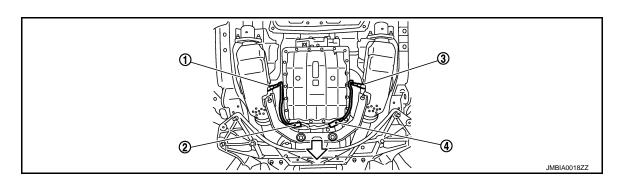


- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

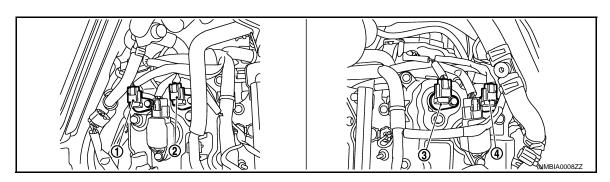


- A/F sensor 1 (bank 1) harness connector
- A/F sensor 1 (bank 2) harness connector

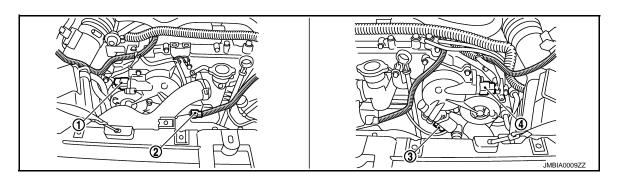
∀ : Vehicle front



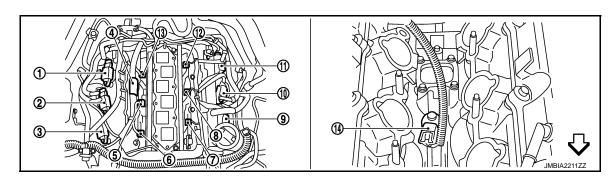
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- 4. Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

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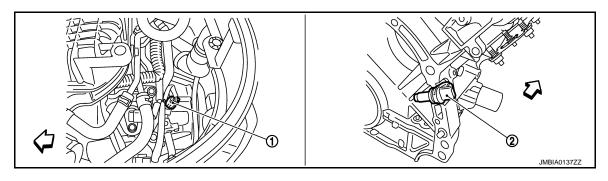
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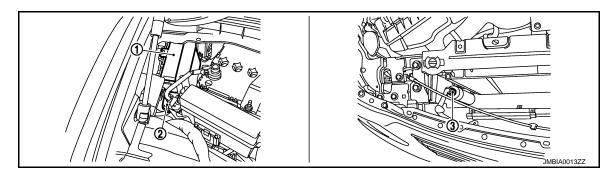
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- 13. Fuel injector No. 5
- 14. Knock sensor

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 : Vehicle front

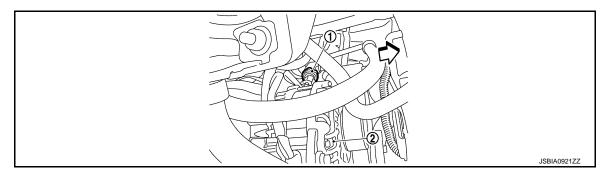


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀ : Vehicle front



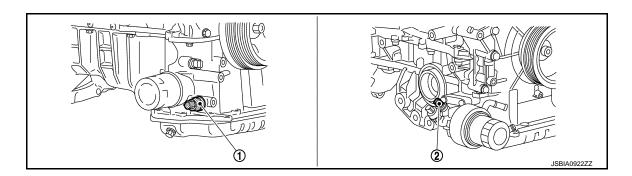
1. IPDM E/R

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

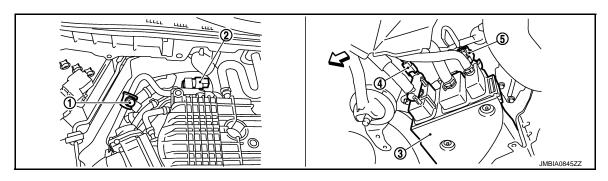


- 1. Power steering pressure sensor
- 2. Alternator

∀ : Vehicle front

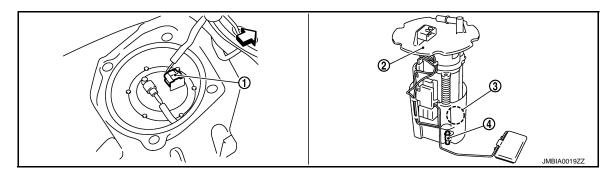


- 1. Engine oil temperature sensor (2WD 2. models)
- Engine oil temperature sensor (AWD models)

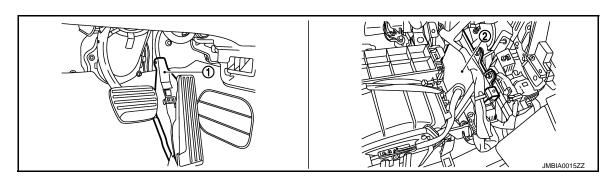


- EVAP service port
- EVAP canister purge volume control 3. **EVAP** canister solenoid valve
- EVAP canister vent control valve
 - EVAP control system pressure sen-

⟨□: Vehicle front



- harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- Fuel tank temperature sensor
- ∀
 □: Vehicle front



- Accelerator pedal position sensor
- ECM

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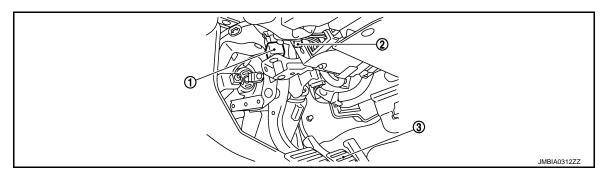
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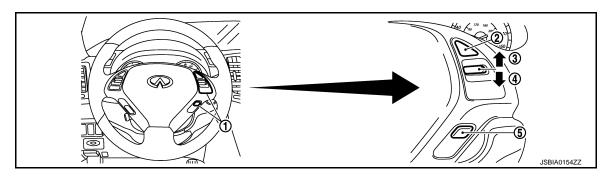
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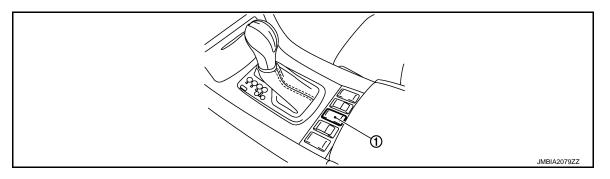


- Stop lamp switch
- 2. ASCD brake switch
- Brake pedal



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

3. RESUME/ACCELERATE switch



1. Snow mode switch

Component Description

INFOID:0000000007463098

Component	Reference
A/F sensor 1	EC-829, "Description"
A/F sensor 1 heater	EC-782, "Description"
Accelerator pedal position sensor	EC-1063, "Description"
ASCD brake switch	EC-1051, "Description"
ASCD steering switch	EC-1048, "Description"
Battery current sensor	EC-1031, "Description"
Camshaft position sensor (PHASE)	EC-907, "Description"
Crankshaft position sensor (POS)	EC-902, "Description"
Cooling fan control module	EC-1085, "Description"
Cooling fan motor	EC-1085, "Description"

ENGINE CONTROL SYSTEM

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

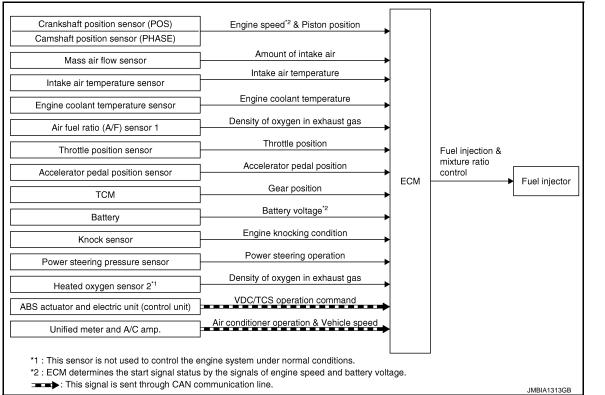
Component	Reference
Electric throttle control actuator	EC-1024, "Description"
Engine coolant temperature sensor	EC-814, "Description"
Engine oil temperature sensor	EC-883, "Description"
EVAP canister purge volume control solenoid valve	EC-929. "Description"
EVAP canister vent control valve	EC-937, "Description"
EVAP control system pressure sensor	EC-945, "Description"
Exhaust valve timing control magnet retarder	EC-791, "Description"
Exhaust valve timing control position sensor	EC-1001, "Description"
Fuel injector	EC-1091, "Description"
Fuel level sensor	EC-973, "Description"
Fuel pump	EC-1094, "Description"
Fuel tank temperature sensor	EC-875, "Description"
Heated oxygen sensor 2	EC-846, "Description"
Heated oxygen sensor 2 heater	EC-785, "Description"
Ignition coil with power transistor	EC-1097, "Description"
Intake air temperature sensor	EC-808, "Description"
Intake valve timing control solenoid valve	EC-788, "Description"
Knock sensor	EC-900, "Description"
Mass air flow sensor	EC-794, "Description"
PCV valve	EC-1109. "Description"
Power steering pressure sensor	EC-987, "Description"
Refrigerant pressure sensor	EC-1111, "Description"
Snow mode switch	EC-1113, "Description"
Stop lamp switch	EC-1060, "Description"
Throttle control motor	EC-1021, "Description"
Throttle control motor relay	EC-1029, "Description"
Throttle position sensor	EC-817, "Description"

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MULTIPORT FUEL INJECTION SYSTEM

System Diagram



System Description

INFOID:0000000007463100

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)				
Camshaft position sensor (PHASE)	Engine speed*3 & 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	Fuel injection & mixture ratio control	Fuel injector	
Accelerator pedal position sensor	Accelerator pedal position			
ТСМ	Gear position			
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)	VDC/TCS operation command*2			
Unified meter and A/C amp.	Air conditioner operation & Vehicle speed*2			

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

^{*2:} This signal is sent to the ECM through CAN communication line.

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

MULTIPORT FUEL INJECTION SYSTEM

[VQ25HR FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

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.

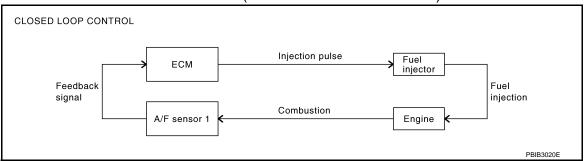
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- · Hot-engine operation
- When selector lever is changed from N to D
- 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 drivability and emission control. The three way catalyst 1 can then 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 EC-829, "Description". 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 control 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
- 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 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.

MULTIPORT FUEL INJECTION SYSTEM

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

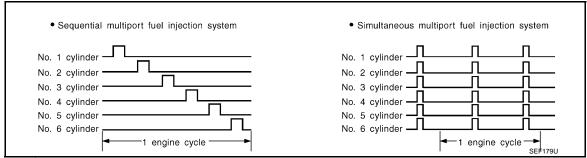
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"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 long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



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.

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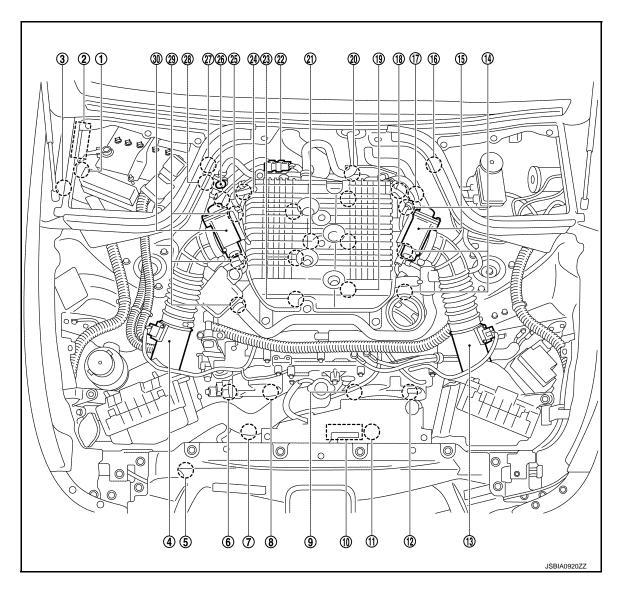
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Component Parts Location

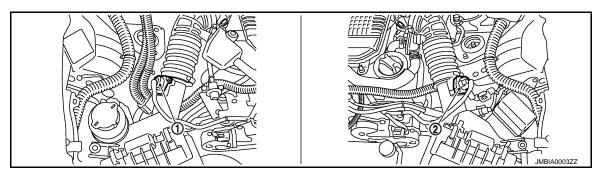
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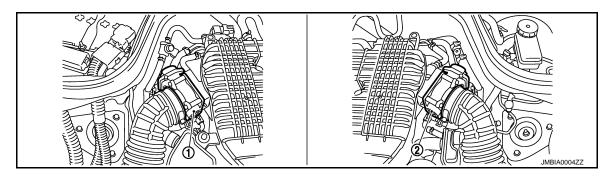
- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

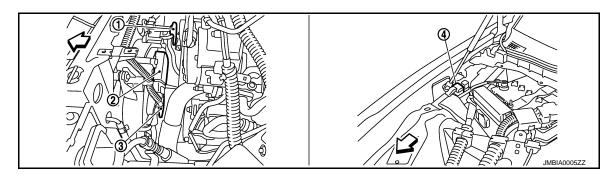
- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)



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



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



- 1. Cooling fan motor-2
- 4. Cooling fan relay
- ∀ : Vehicle front

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

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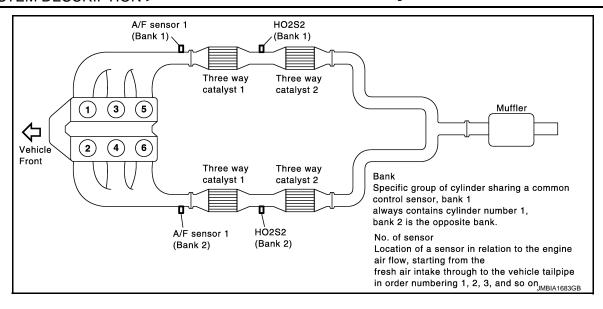
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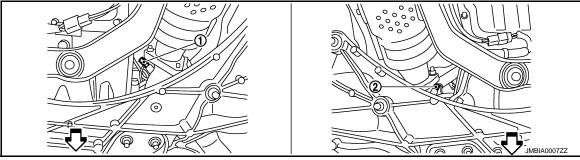
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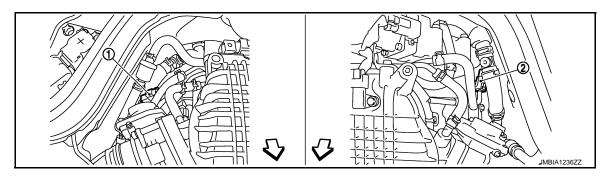
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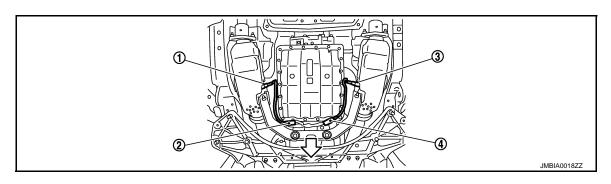
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front

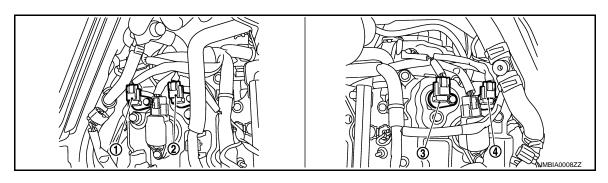


- A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

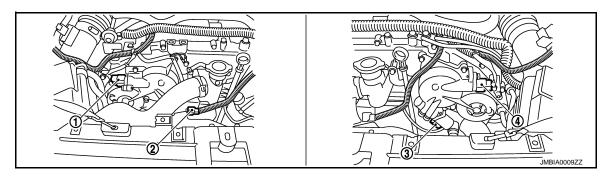
⟨□: Vehicle front



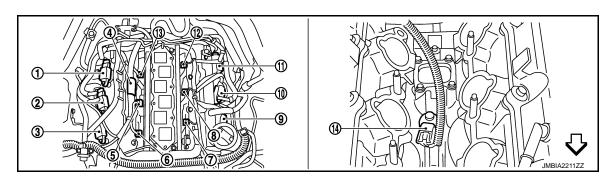
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ⟨□: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet 4. retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- Fuel injector No. 2 7.
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- Ignition coil No. 6 (with power tran-11. sistor)
- Ignition coil No. 1 (with power tran-3. sistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)

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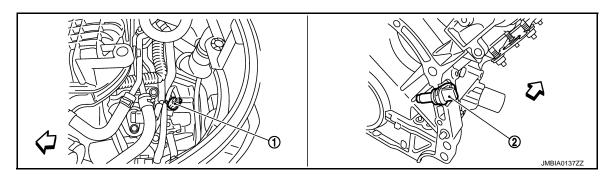
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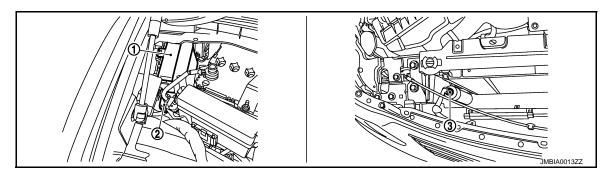
12. Fuel injector No. 6

- 13. Fuel injector No. 5
- 14. Knock sensor

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 : Vehicle front

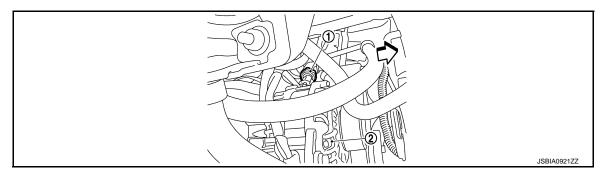


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀: Vehicle front



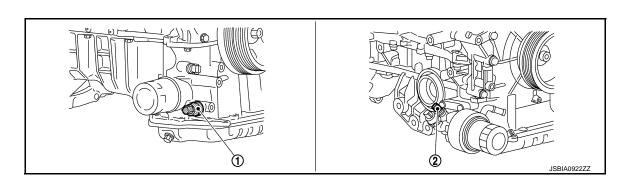
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

∀
 : Vehicle front



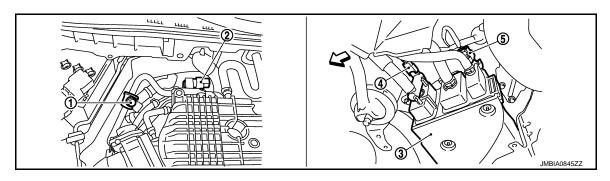
MULTIPORT FUEL INJECTION SYSTEM

[VQ25HR FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

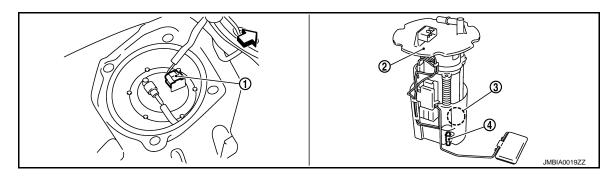
Engine oil temperature sensor (2WD 2. models)

Engine oil temperature sensor (AWD models)

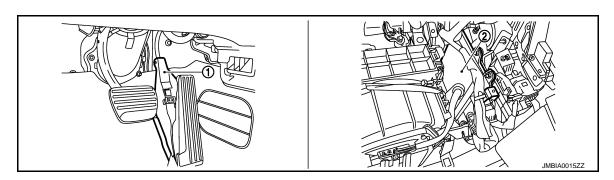


- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- EVAP control system pressure sensor

⟨□: Vehicle front



- 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
- ∀ : Vehicle front



1. Accelerator pedal position sensor 2. ECM

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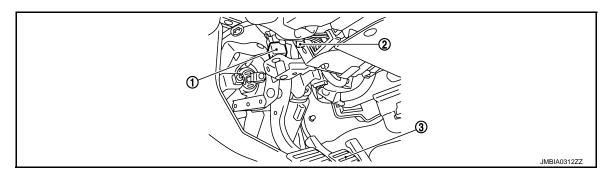
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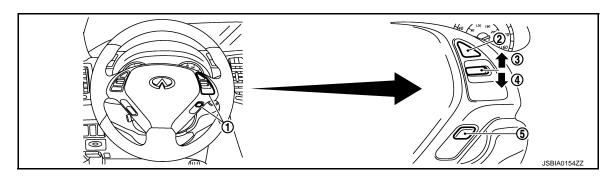
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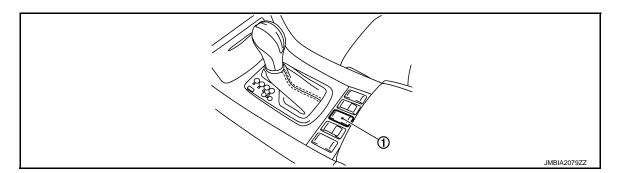


- 1. Stop lamp switch
- 2. ASCD brake switch
- 3. Brake pedal



- 1. ASCD steering switch
- 2. CANCEL switch
- 3. RESUME/ACCELERATE switch

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



1. Snow mode switch

Component Description

INFOID:0000000007463102

Component	Reference
A/F sensor 1	EC-829, "Description"
Accelerator pedal position sensor	EC-1063, "Description"
Camshaft position sensor (PHASE)	EC-907, "Description"
Crankshaft position sensor (POS)	EC-902, "Description"
Engine coolant temperature sensor	EC-821, "Description"
Fuel injector	EC-1091, "Description"
Heated oxygen sensor 2	EC-846, "Description"
Intake air temperature sensor	EC-824, "Description"
Knock sensor	EC-900, "Description"
Mass air flow sensor	EC-794, "Description"

MULTIPORT FUEL INJECTION SYSTEM

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

Component	Reference
Power steering pressure sensor	EC-987, "Description"
Throttle position sensor	EC-890, "Description"

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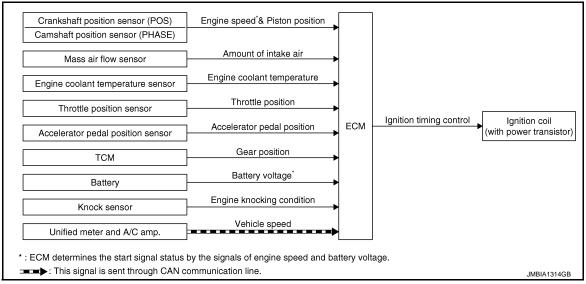
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ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000007463103



System Description

INFOID:0000000007463104

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	F		
Camshaft position sensor (PHASE)	Engine speed*2 & Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position	Ignition timing	Ignition coil (with power tran-
Accelerator pedal position sensor	Accelerator pedal position	control	sistor)
TCM	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 through CAN communication line.

SYSTEM DESCRIPTION

Firing 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

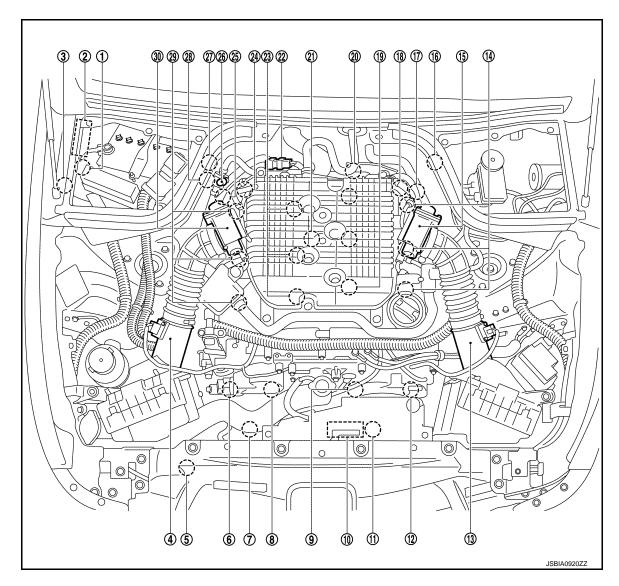
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not

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

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:0000000007463105



- 1. Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- 2. IPDM E/R
- Refrigerant pressure sensor
- 8. Intake valve timing control solenoid valve (bank 1)
- Cooling fan motor-1
- Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- Cooling fan relay 3.
- Exhaust valve timing control magnet 6. retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- (bank 1)

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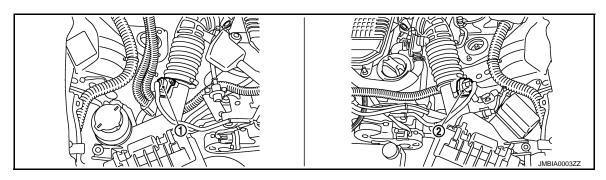
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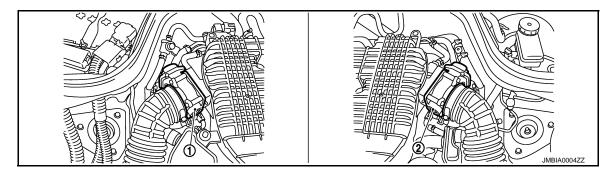
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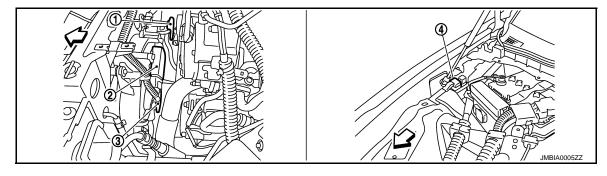
30. Electric throttle control actuator



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



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



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

Cooling fan relay

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 : Vehicle front

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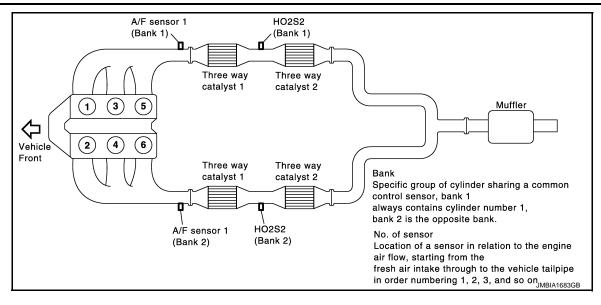
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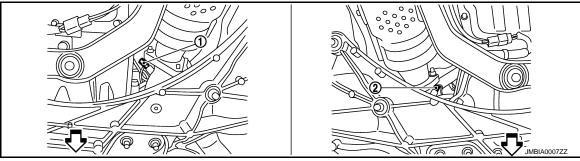
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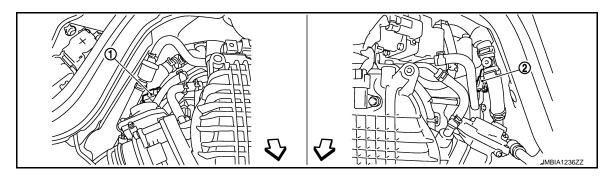
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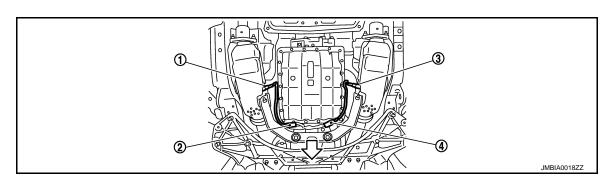


- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

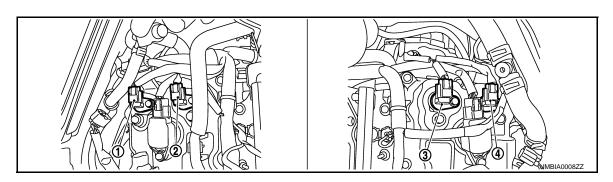


- A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

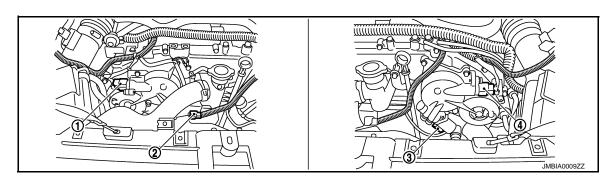
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 □: Vehicle front



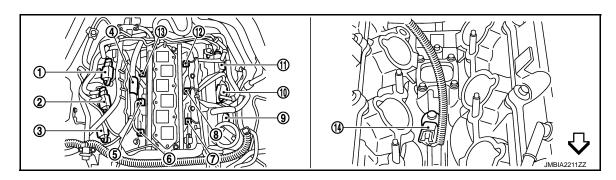
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- 4. Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

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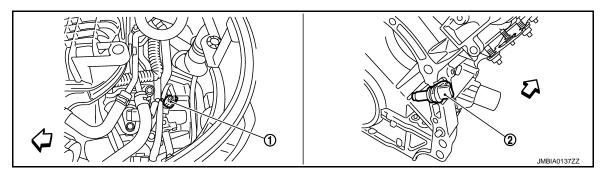
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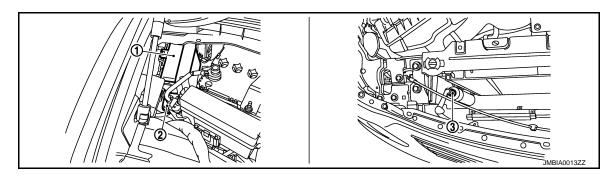
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- 13. Fuel injector No. 5
- 14. Knock sensor

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 : Vehicle front

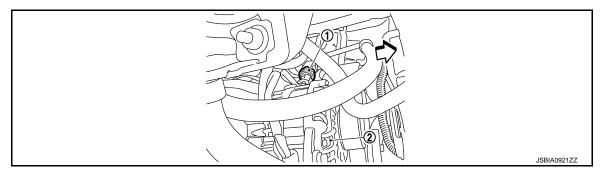


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀: Vehicle front



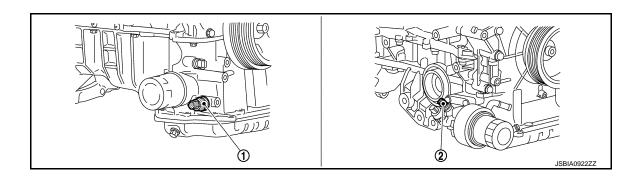
1. IPDM E/R

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

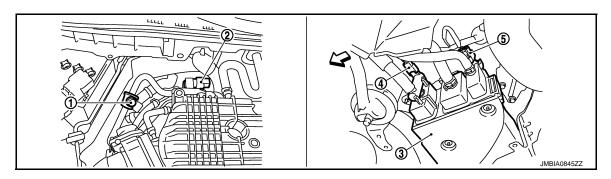


- 1. Power steering pressure sensor
- 2. Alternator

∀ : Vehicle front

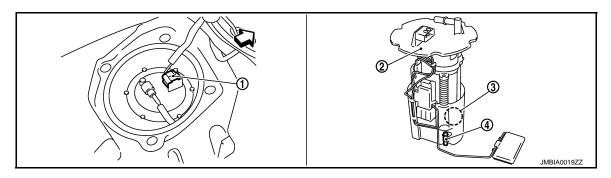


- 1. Engine oil temperature sensor (2WD 2. models)
- Engine oil temperature sensor (AWD models)

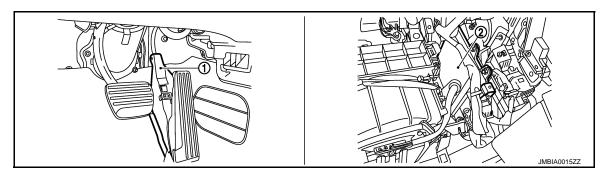


- EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- EVAP canister vent control valve
- EVAP control system pressure sen-

⟨□: Vehicle front



- harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- Fuel tank temperature sensor
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 □: Vehicle front



- Accelerator pedal position sensor
- ECM

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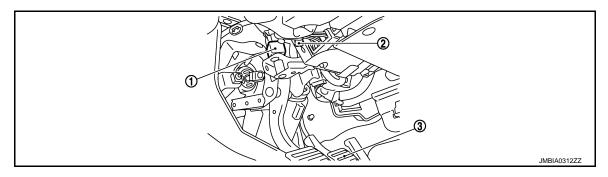
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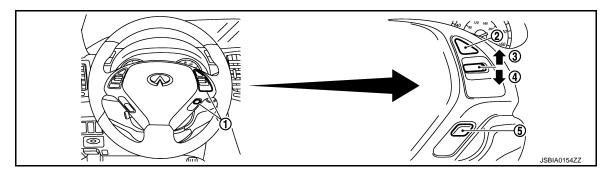
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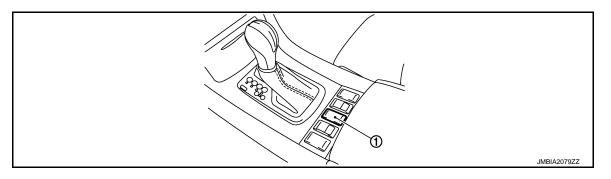
Stop lamp switch

- 2. ASCD brake switch
- 3. Brake pedal



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

3. RESUME/ACCELERATE switch



1. Snow mode switch

Component Description

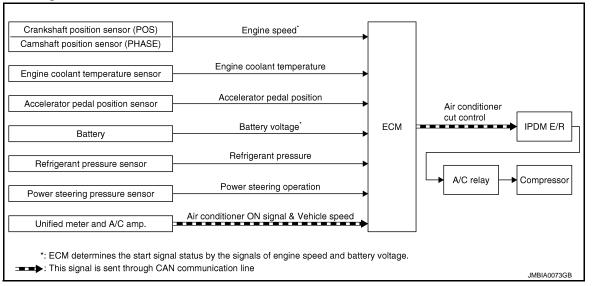
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Component	Reference
Accelerator pedal position sensor	EC-1063, "Description"
Camshaft position sensor (PHASE)	EC-907, "Description"
Crankshaft position sensor (POS)	EC-902, "Description"
Engine coolant temperature sensor	EC-814, "Description"
Knock sensor	EC-900, "Description"
Mass air flow sensor	EC-794, "Description"
Throttle position sensor	EC-817, "Description"

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000007463107



System Description

INFOID:0000000007463108

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	F			
Camshaft position sensor (PHASE)	Engine speed* ²			
Engine coolant temperature sensor	Engine coolant temperature		IPDM E/R	
Accelerator pedal position sensor	Accelerator pedal position	Air conditioner cut control	↓ A/C relay ↓ Compressor	
Battery	Battery voltage*2			
Refrigerant pressure sensor	Refrigerant pressure			
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 through CAN communication line.

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

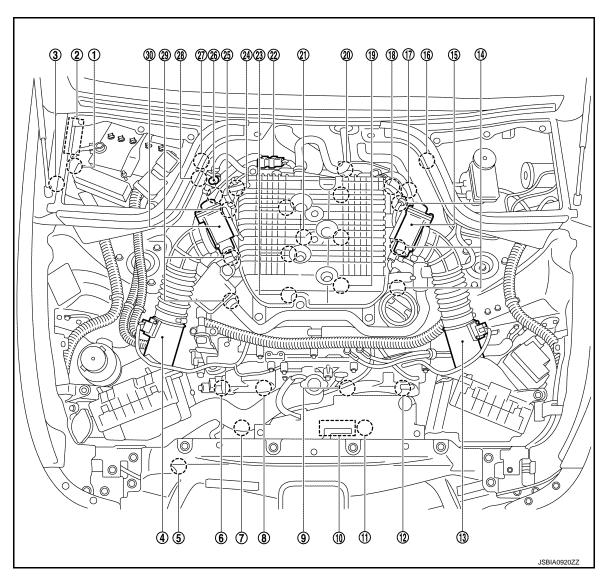
Under the following conditions, the air conditioner is turned off.

- · 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.

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

Component Parts Location

INFOID:0000000007463109



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- Cooling fan motor-1
- Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- Engine coolant temperature sensor 20.
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- 3. Cooling fan relay
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Exhaust valve timing control magnet retarder (bank 2)
- Electric throttle control actuator 15. (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- (bank 1)

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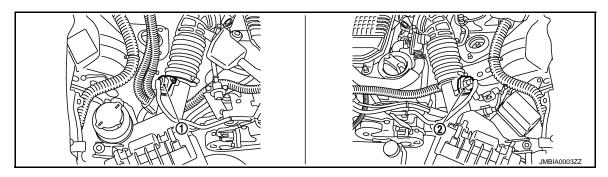
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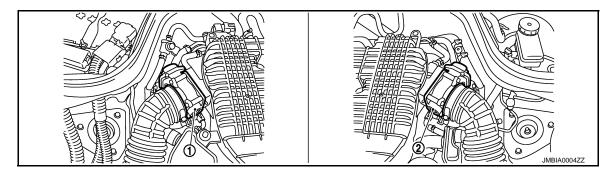
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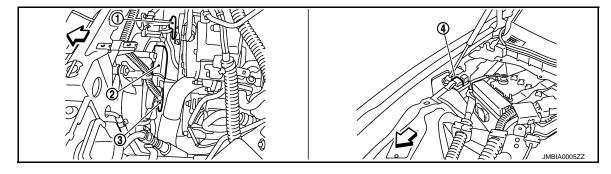
30. Electric throttle control actuator



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



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



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

Cooling fan relay

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 : Vehicle front

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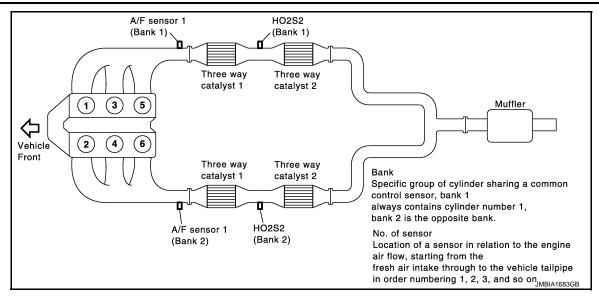
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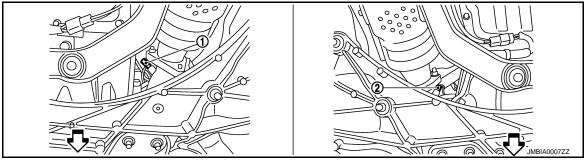
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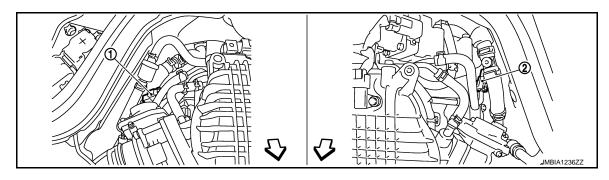
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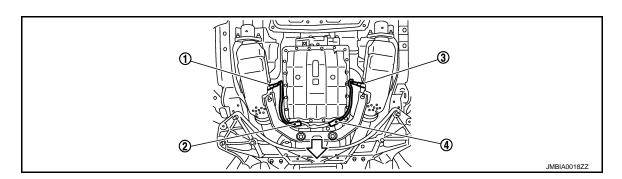
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front

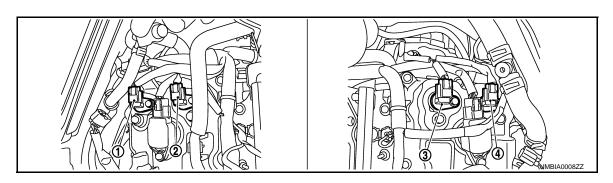


- 1. A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

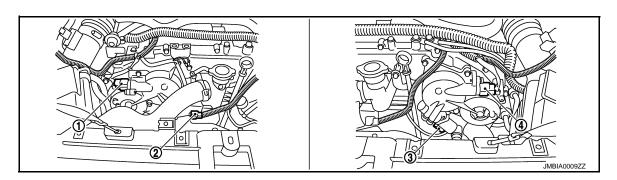
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 □: Vehicle front



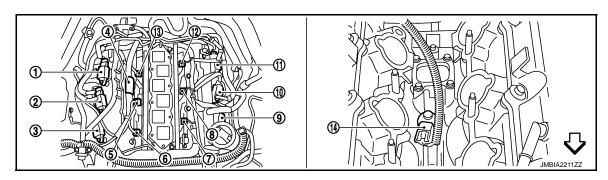
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- 4. Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

AIR CONDITIONING CUT CONTROL

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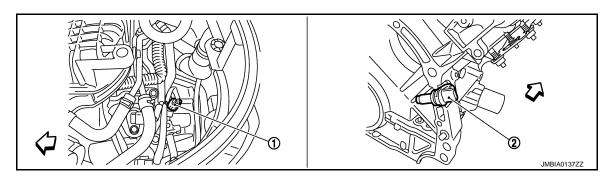
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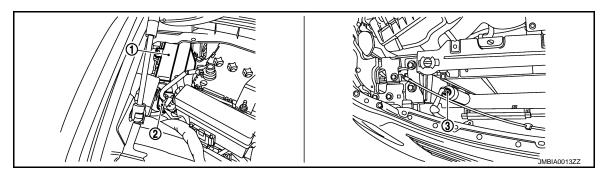
< SYSTEM DESCRIPTION >

- 13. Fuel injector No. 5
- 14. Knock sensor

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 □: Vehicle front

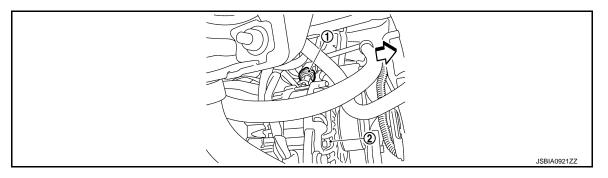


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀ : Vehicle front



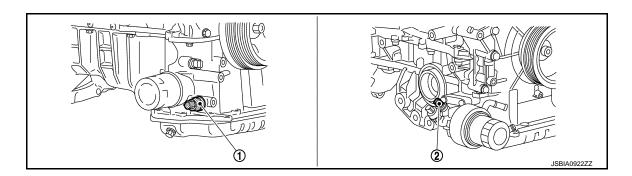
1. IPDM E/R

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

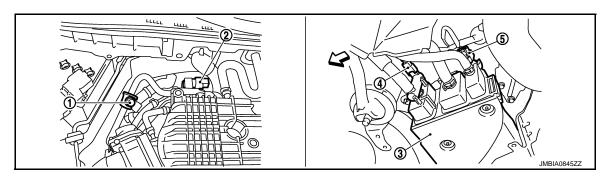


- 1. Power steering pressure sensor
- 2. Alternator

∀ : Vehicle front

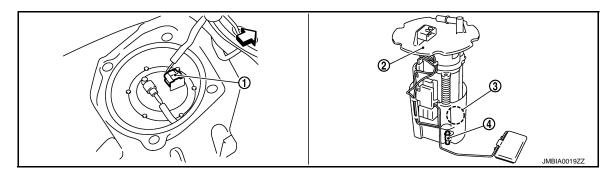


- 1. Engine oil temperature sensor (2WD 2. models)
- Engine oil temperature sensor (AWD models)

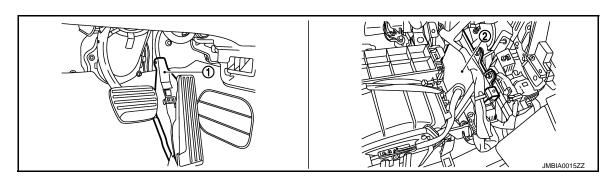


- EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- EVAP canister vent control valve
- EVAP control system pressure sen-

⟨□: Vehicle front



- harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- Fuel tank temperature sensor
- ∀
 □: Vehicle front



- Accelerator pedal position sensor
- ECM

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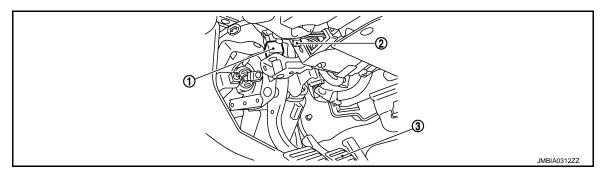
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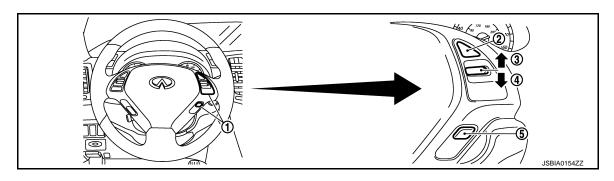
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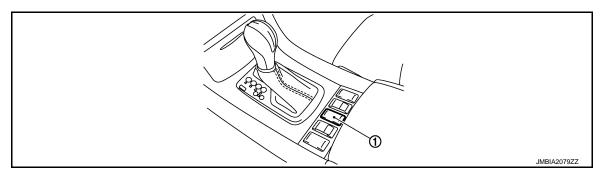


- Stop lamp switch
- 2. ASCD brake switch
- B. Brake pedal



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

3. RESUME/ACCELERATE switch



1. Snow mode switch

Component Description

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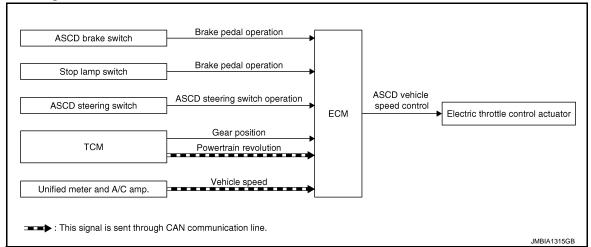
Component	Reference
Accelerator pedal position sensor	EC-1063, "Description"
Camshaft position sensor (PHASE)	EC-907, "Description"
Crankshaft position sensor (POS)	EC-902, "Description"
Engine coolant temperature sensor	EC-814, "Description"
Power steering pressure sensor	EC-987, "Description"
Refrigerant pressure sensor	EC-1111, "Description"

[VQ25HR FOR USA AND CANADA]

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000007463111



System Description

INFOID:0000000007463112

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
ASCD brake switch	Brake pedal operation			
Stop lamp switch	Brake pedal operation		Electric throttle control actuator	
ASCD steering switch	ASCD steering switch operation	ASCD vahiola anada control		
TCM	Gear position	ASCD vehicle speed control		
TOW	Powertrain revolution*			
Unified meter and A/C amp.	Vehicle speed*			

^{*:} This signal is sent to the ECM through 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.

The ASCD operation status is indicated by two indicators (CRUISE and SET on the information display) on the combination meter. If any malfunction occurs in the ASCD system, SET indicator blink and ASCD control is deactivated.

NOTE:

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

SET OPERATION

Press MAIN switch. (CRUISE is indicator on the information display.)

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 is indicated on the information display, and the set speed is also displayed.)

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. And then ASCD will keep the new set speed.

CANCEL OPERATION

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

CANCEL switch is pressed

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Selector lever is changed to N, P, R position
- 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 indicators.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator may blink slowly.
 - When the engine coolant temperature decreases to the normal operating temperature, CRUISE indicator 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 keep the new set speed.

RESUME OPERATION

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

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

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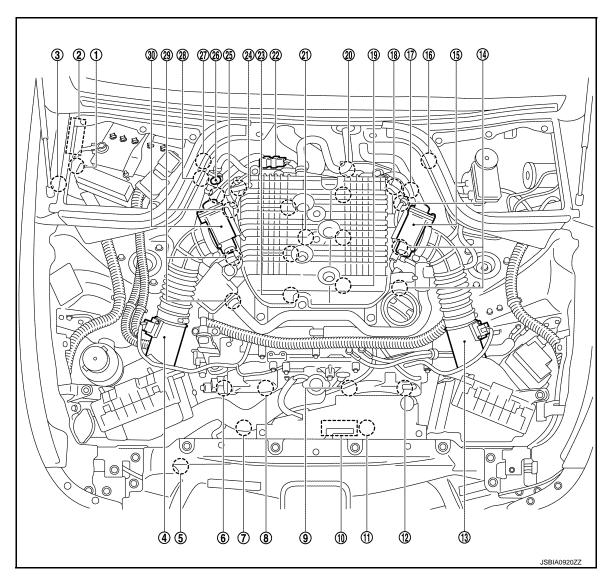
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Component Parts Location



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- 2. IPDM E/R
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)

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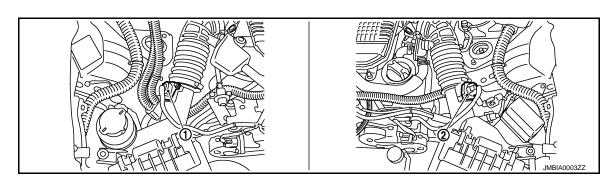
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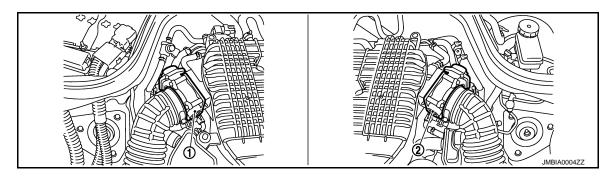
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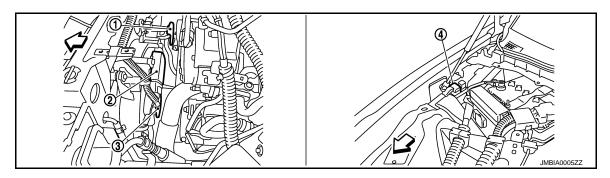
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- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



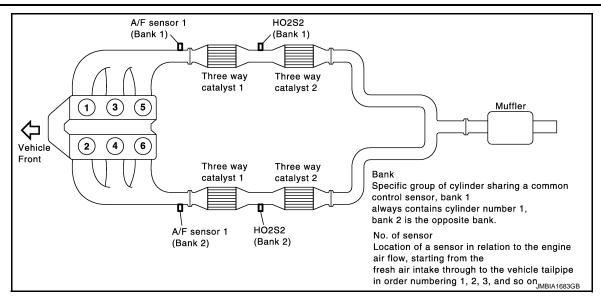
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)

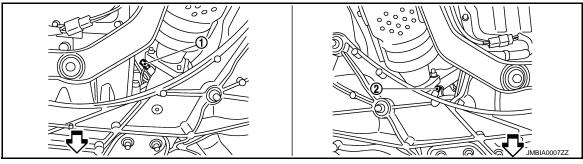


- Cooling fan motor-2
- Cooling fan relay
- ⟨□: Vehicle front

- Cooling fan control module
- 3. Cooling fan motor-1

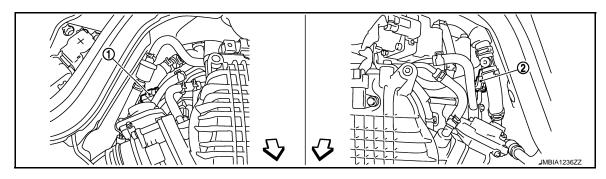
[VQ25HR FOR USA AND CANADA]





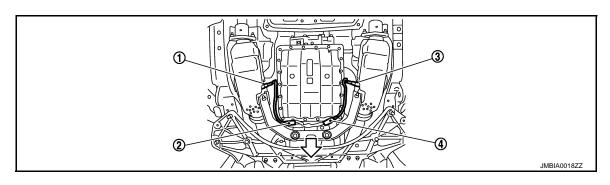
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front



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

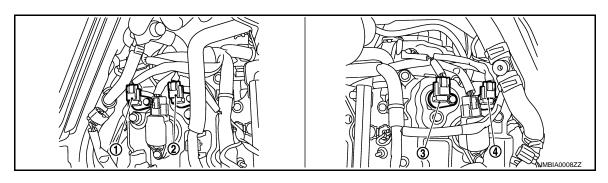
∀: Vehicle front



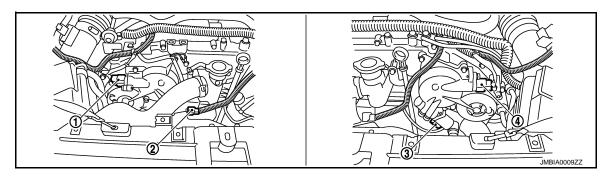
AUTOMATIC SPEED CONTROL DEVICE (ASCD) PTION > [VQ25HR FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

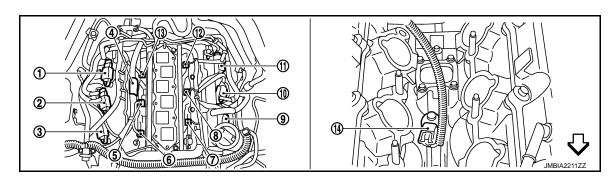
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ∀
 : Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- 2. Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- 1. Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 3. Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

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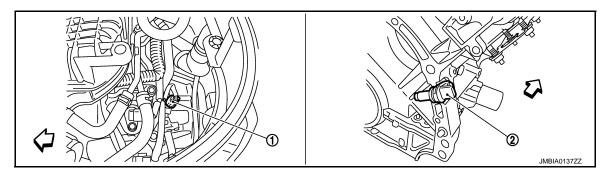
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sistor)

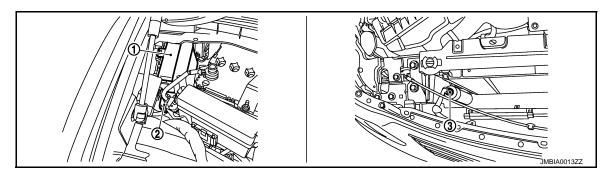
[VQ25HR FOR USA AND CANADA]

- 13. Fuel injector No. 5
- 14. Knock sensor

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 : Vehicle front

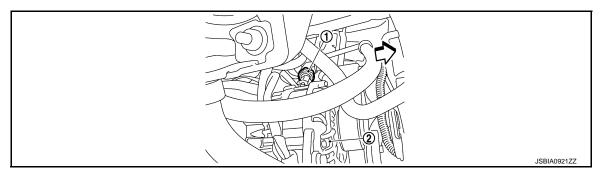


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀: Vehicle front



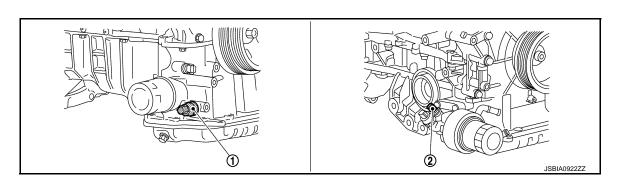
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

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 □: Vehicle front



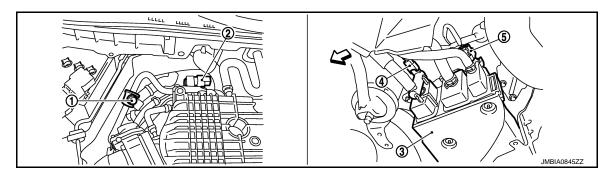
AUTOMATIC SPEED CONTROL DEVICE (ASCD)

[VQ25HR FOR USA AND CANADA]

Engine oil temperature sensor (2WD 2. models)

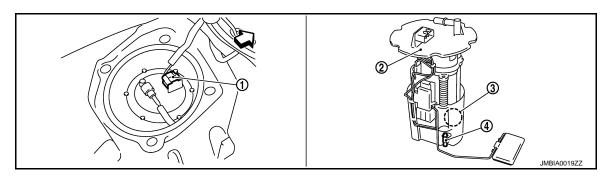
< SYSTEM DESCRIPTION >

Engine oil temperature sensor (AWD models)

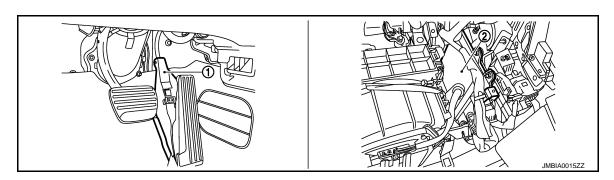


- EVAP service port
- EVAP canister purge volume control 3. **EVAP** canister solenoid valve
- EVAP canister vent control valve
- EVAP control system pressure sen-

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 □: Vehicle front



- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- Fuel tank temperature sensor
- ∀ : Vehicle front



Accelerator pedal position sensor ECM

Revision: 2013 February

EC-697

2012 G Sedan

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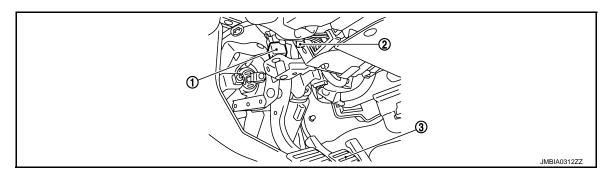
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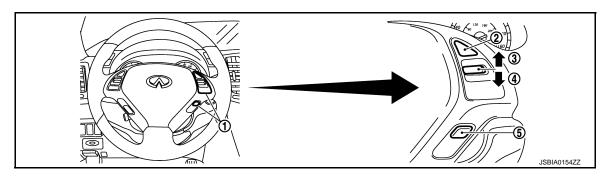
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[VQ25HR FOR USA AND CANADA]



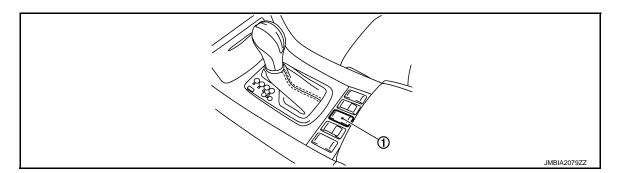
- Stop lamp switch
- 2. ASCD brake switch
- Brake pedal



- 1. ASCD steering switch
- 2. CANCEL switch

3. RESUME/ACCELERATE switch

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



1. Snow mode switch

Component Description

INFOID:0000000007463114

Component	Reference
ASCD steering switch	EC-1048, "Description"
ASCD brake switch	EC-1051, "Description"
Stop lamp switch	EC-1051, "Description"
Electric throttle control actuator	EC-1029, "Description"
ASCD indicator	EC-1084, "Description"

CAN COMMUNICATION

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

CAN COMMUNICATION

System Description

INFOID:0000000007463115

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.

Refer to LAN-26, "CAN Communication Signal Chart", about CAN communication for detail.

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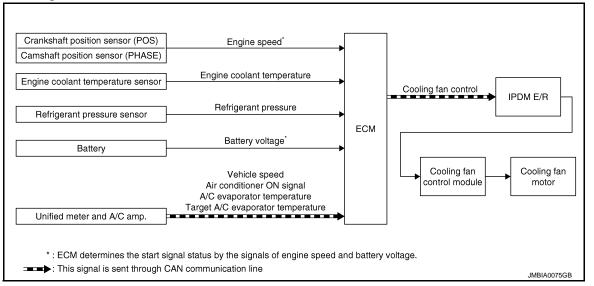
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COOLING FAN CONTROL

System Diagram

INFOID:0000000007463116



System Description

INFOID:0000000007463117

INPUT/OUTPUT SIGNAL CHART

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

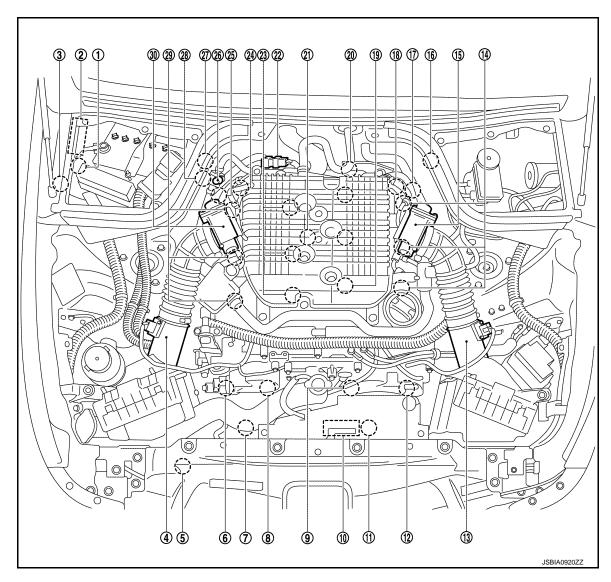
SYSTEM DESCRIPTION

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.

^{*2:} This signal is sent to ECM through CAN communication line.

Component Parts Location

INFOID:0000000007463118



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
 - Intake valve timing control solenoid valve (bank 1)
- Cooling fan motor-1
- Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- Engine coolant temperature sensor 20.
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- 3. Cooling fan relay
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Exhaust valve timing control magnet retarder (bank 2)
- Electric throttle control actuator 15. (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- (bank 1)

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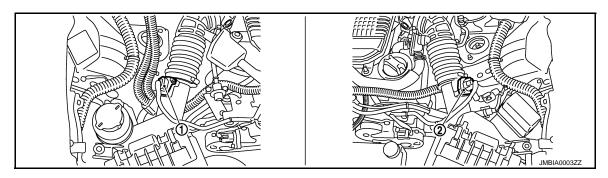
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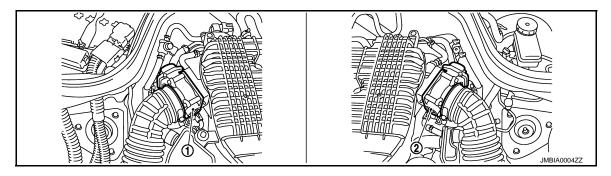
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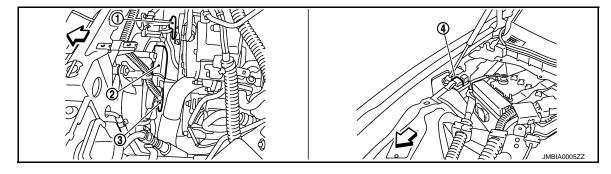
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- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



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



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

Cooling fan relay

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 : Vehicle front

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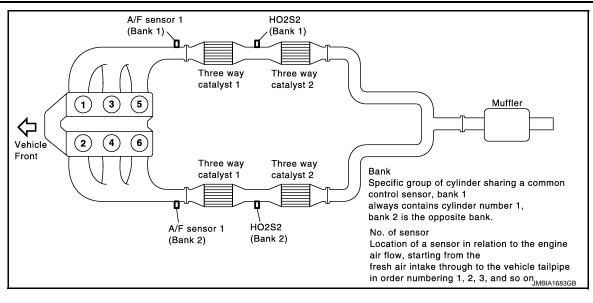
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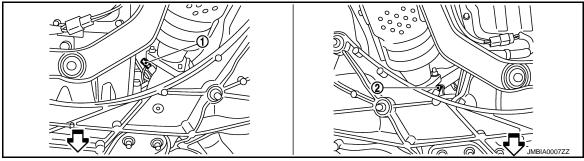
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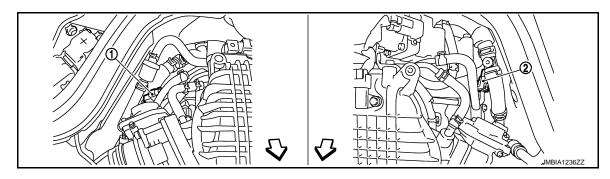
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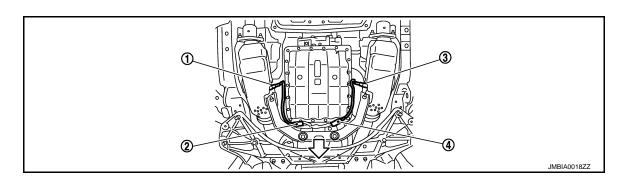
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front

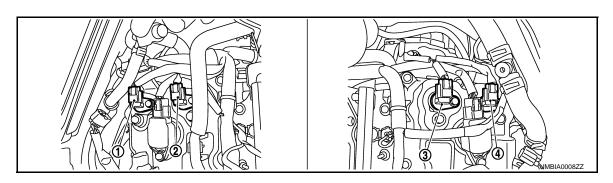


- 1. A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

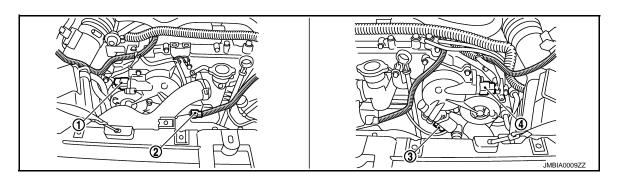
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 □: Vehicle front



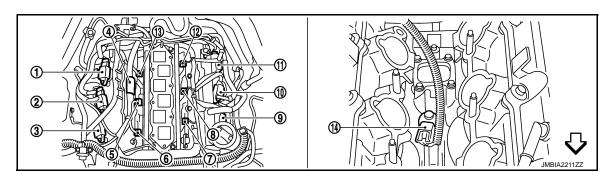
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- 4. Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

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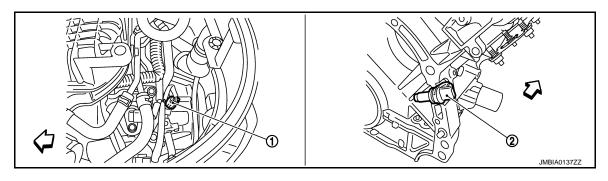
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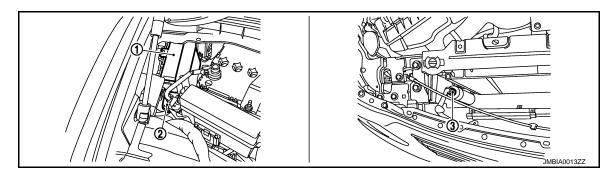
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- 13. Fuel injector No. 5
- 14. Knock sensor

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 □: Vehicle front

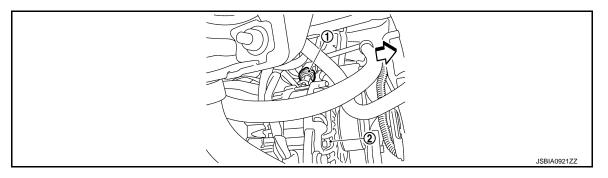


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀ : Vehicle front



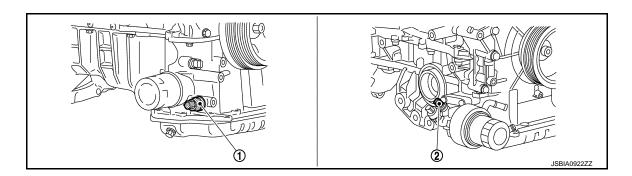
1. IPDM E/R

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

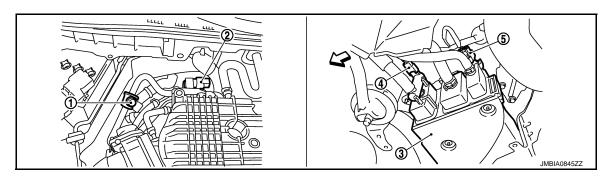


- 1. Power steering pressure sensor
- 2. Alternator

∀ : Vehicle front

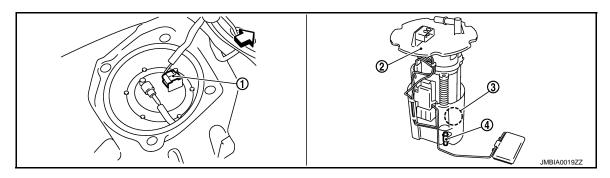


- 1. Engine oil temperature sensor (2WD 2. models)
- Engine oil temperature sensor (AWD models)

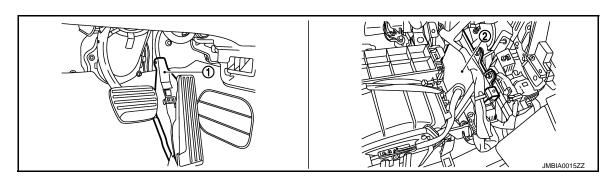


- EVAP service port
- EVAP canister purge volume control 3. **EVAP** canister solenoid valve
- EVAP canister vent control valve
- EVAP control system pressure sen-

⟨□: Vehicle front



- harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- Fuel tank temperature sensor
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 □: Vehicle front



- Accelerator pedal position sensor
- ECM

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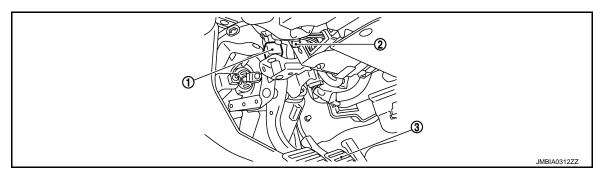
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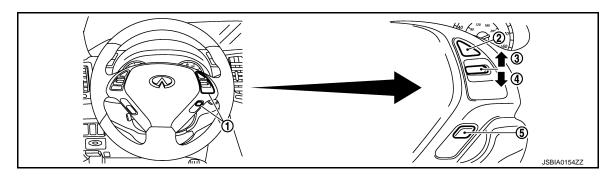
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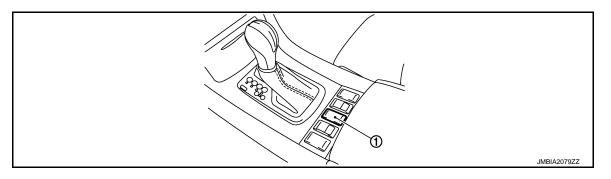


- Stop lamp switch
- 2. ASCD brake switch
- 3. Brake pedal



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

3. RESUME/ACCELERATE switch



1. Snow mode switch

Component Description

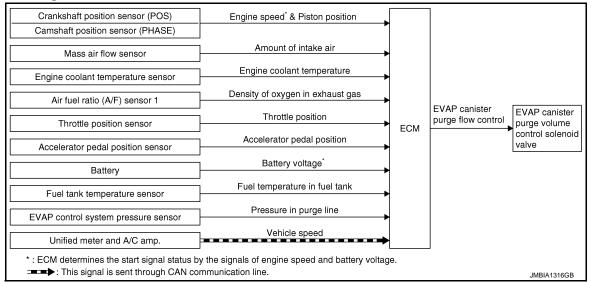
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Component	Reference
Camshaft position sensor (PHASE)	EC-907, "Description"
Crankshaft position sensor (POS)	EC-902, "Description"
Cooling fan control module	EC-1085, "Description"
Cooling fan motor	EC-1085, "Description"
Engine coolant temperature sensor	EC-814, "Description"
Refrigerant pressure sensor	EC-1111, "Description"

EVAPORATIVE EMISSION SYSTEM

System Diagram

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System Description

INFOID:0000000007463121

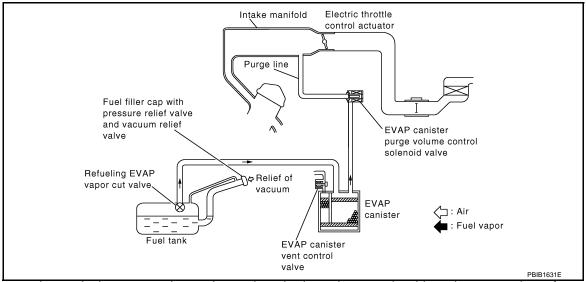
INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Familia and data Distant and itian		
Camshaft position sensor (PHASE)	Engine speed*1 & Piston position		
Mass air flow sensor	Amount of intake air	Amount of intake air	
Engine coolant temperature sensor	Engine coolant temperature		EVAP canister purge volume control solenoid valve
Battery	Battery voltage*1	EVAP canister purge flow control	
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
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	1	
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 through CAN communication line.

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.

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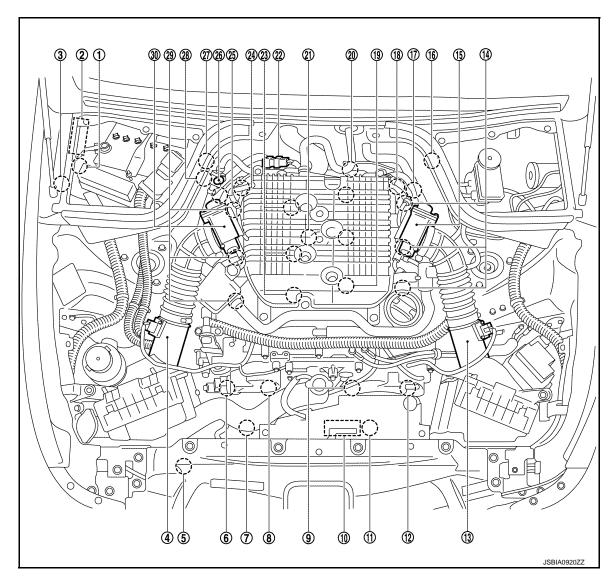
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Component Parts Location

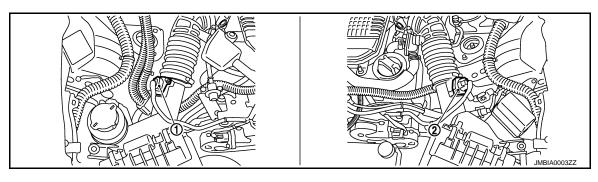
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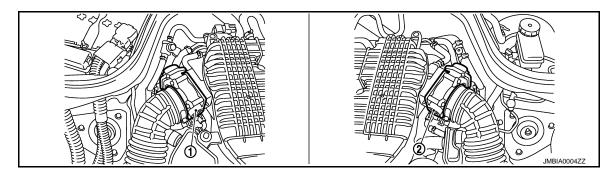
- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

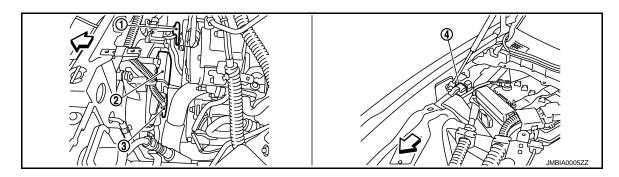
- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)



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



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



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

∀ : Vehicle front

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EC-711 Revision: 2013 February 2012 G Sedan

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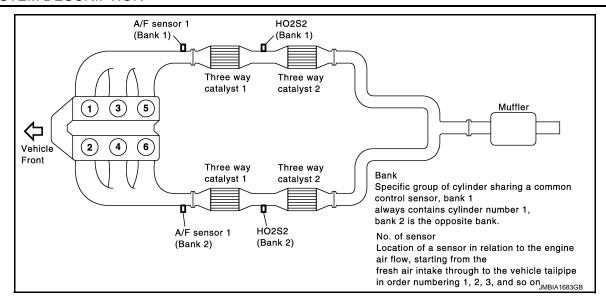
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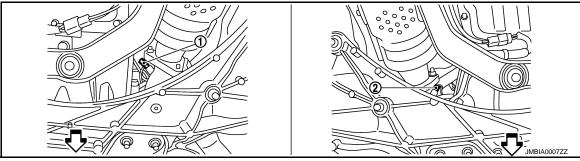
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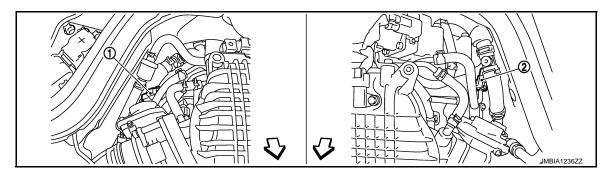
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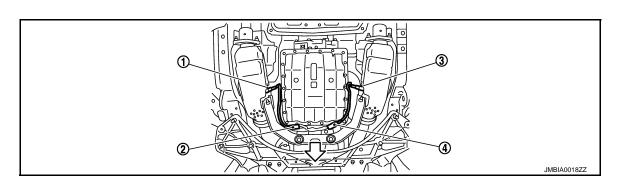
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front

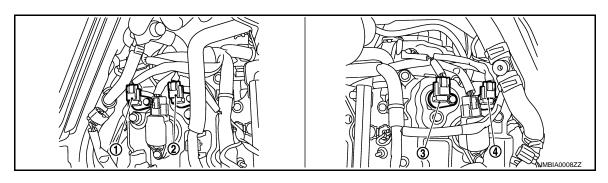


- 1. A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

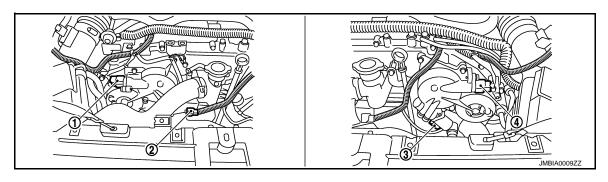
⟨□: Vehicle front



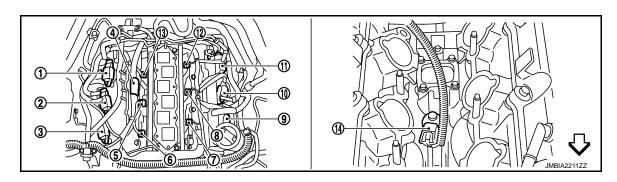
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ⟨□: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet 4. retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- Fuel injector No. 2 7.
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- Ignition coil No. 6 (with power tran-11. sistor)
- Ignition coil No. 1 (with power tran-3. sistor)
- 6. Fuel injector No. 1
- sistor)

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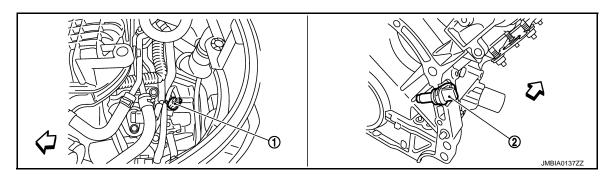
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Ignition coil No. 2 (with power tran-

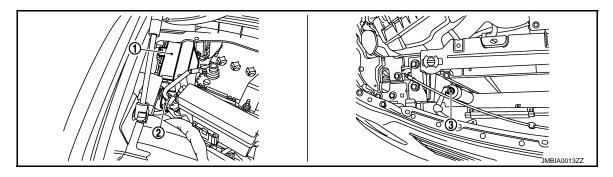
12. Fuel injector No. 6

- 13. Fuel injector No. 5
- 14. Knock sensor

∀ : Vehicle front

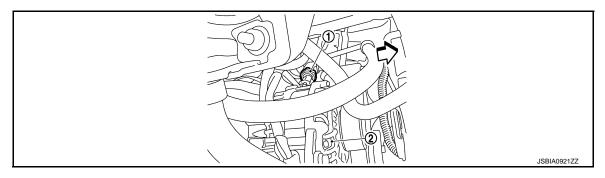


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ⟨□: Vehicle front



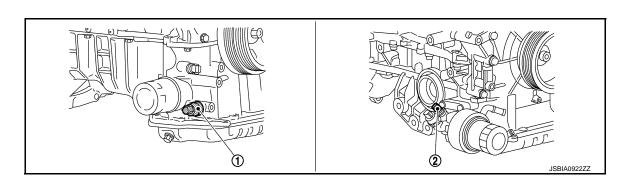
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

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 : Vehicle front



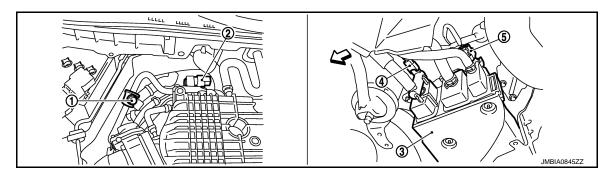
EVAPORATIVE EMISSION SYSTEM

[VQ25HR FOR USA AND CANADA]

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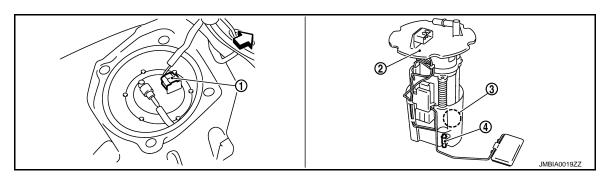
Engine oil temperature sensor (2WD 2. models)

Engine oil temperature sensor (AWD models)



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

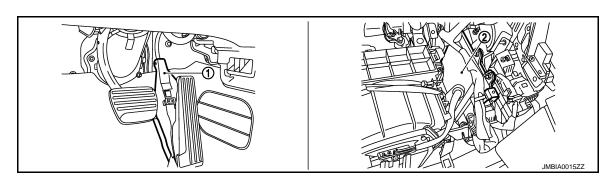
⟨□: Vehicle front



 Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector

ECM

- 4. Fuel tank temperature sensor
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 □: Vehicle front



Accelerator pedal position sensor

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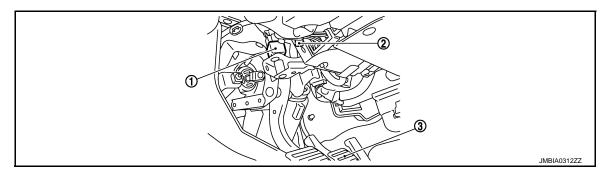
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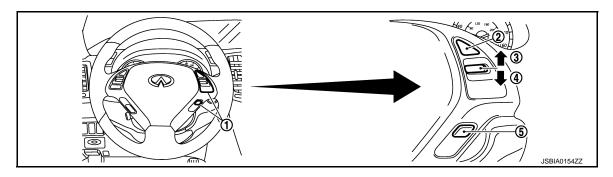
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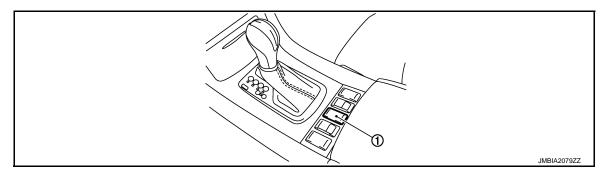


- Stop lamp switch
- 2. ASCD brake switch
- 3. Brake pedal



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

3. RESUME/ACCELERATE switch



1. Snow mode switch

Component Description

INFOID:0000000007463123

Component	Reference	
A/F sensor 1	EC-829, "Description"	
Accelerator pedal position sensor	EC-1063, "Description"	
Camshaft position sensor (PHASE)	EC-907, "Description"	
Crankshaft position sensor (POS)	EC-902, "Description"	
Engine coolant temperature sensor	EC-814, "Description"	
EVAP canister purge volume control solenoid valve	EC-929, "Description"	
EVAP control system pressure sensor	EC-945, "Description"	
Fuel tank temperature sensor	EC-875, "Description"	
Mass air flow sensor	EC-794, "Description"	
Throttle position sensor	EC-817, "Description"	

EXHAUST VALVE TIMING CONTROL

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

EXHAUST VALVE TIMING CONTROL

System Diagram

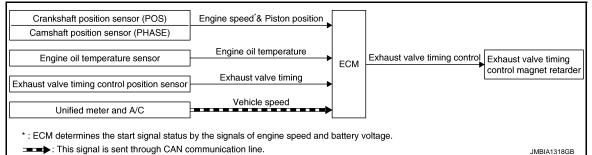
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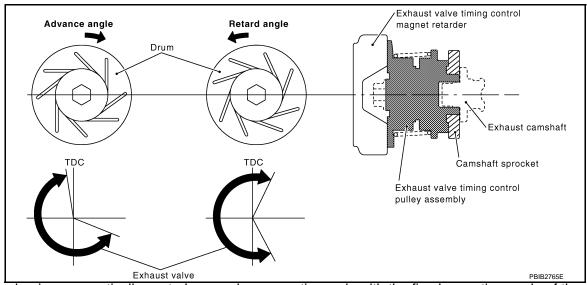
System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Fraince and d*1 9 Dieter resition	Exhaust valve	Exhaust valve timing control magnet retarder	
Camshaft position sensor (PHASE)	Engine speed*1 & Piston position			
Engine oil temperature sensor	Engine oil temperature			
Exhaust valve timing control position sensor	Exhaust valve timing signal	tiring control		
Unified meter and A/C amp.	Vehicle speed* ²			

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

SYSTEM DESCRIPTION



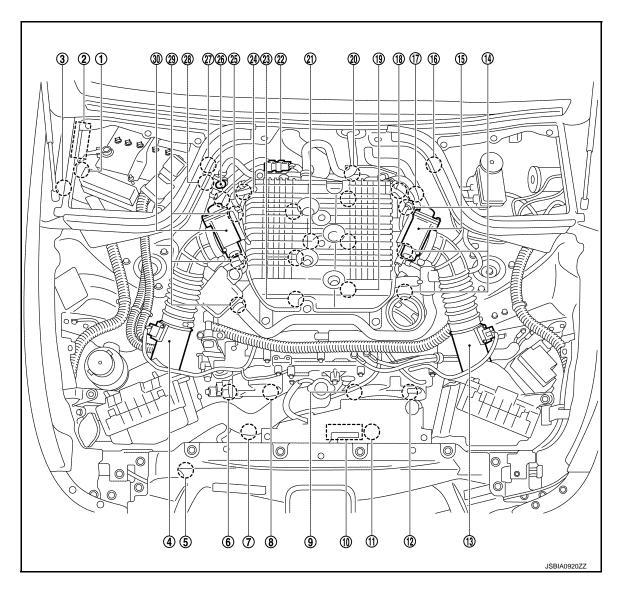
This mechanism magnetically controls cam phases continuously with the fixed operating angle of the exhaust valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine oil temperature. Then, the ECM sends ON/OFF pulse duty signals to the exhaust valve timing control magnet retarder depending on driving status. This makes it possible to control the shut/open timing of the exhaust valve to increase engine torque and output in a range of high engine speed.

^{*2:} This signal is sent to the ECM through CAN Communication line

Component Parts Location

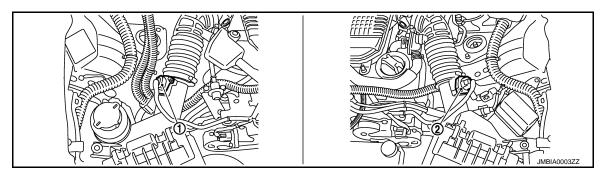
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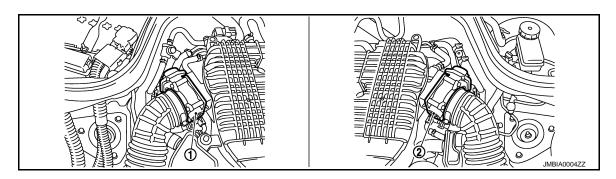
- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

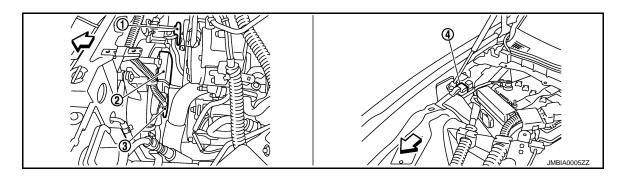
- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)



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



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



- 1. Cooling fan motor-2
- . Cooling fan relay
- ∀ : Vehicle front

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

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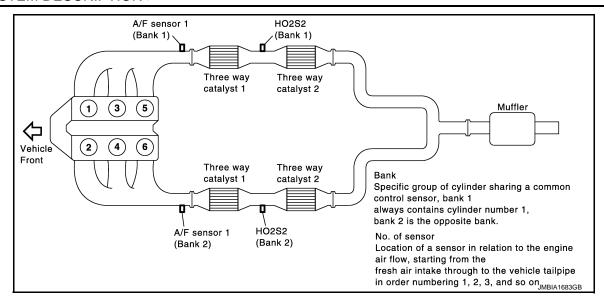
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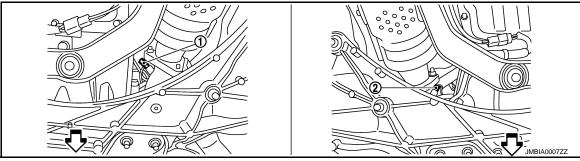
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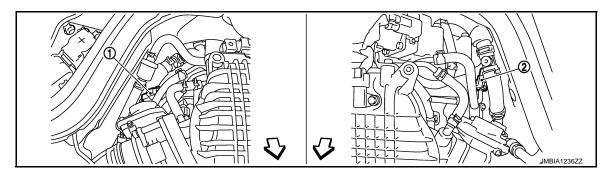
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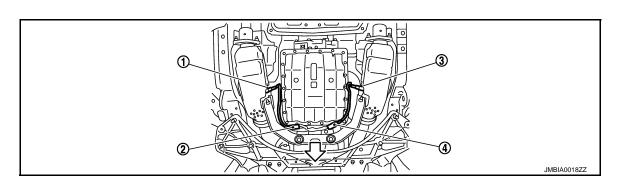
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front



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

⟨□: Vehicle front

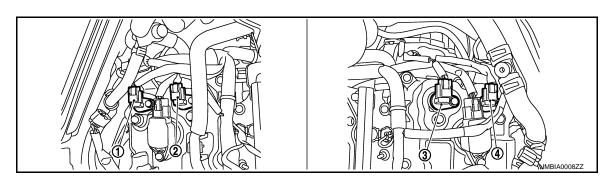


EXHAUST VALVE TIMING CONTROL

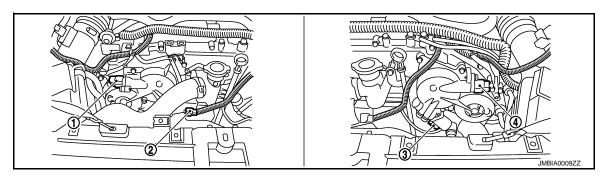
< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

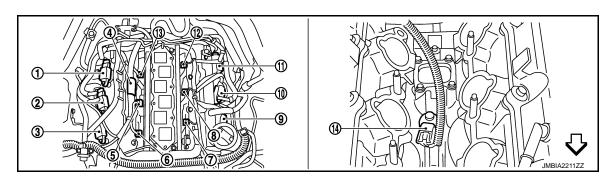
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ⟨□: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- Fuel injector No. 2 7.
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- Fuel injector No. 4
- Ignition coil No. 6 (with power tran-11. sistor)

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- Ignition coil No. 1 (with power tran-3. sistor)
- Fuel injector No. 1
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- 12. Fuel injector No. 6

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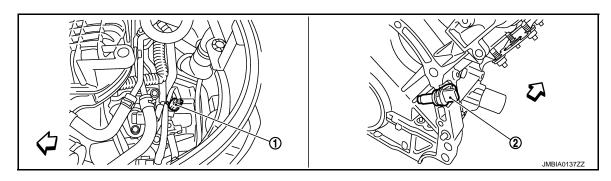
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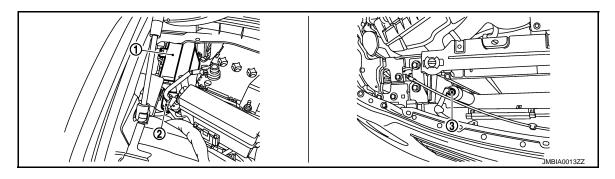
Ignition coil No. 2 (with power tran-

- 13. Fuel injector No. 5
- 14. Knock sensor

∀ : Vehicle front

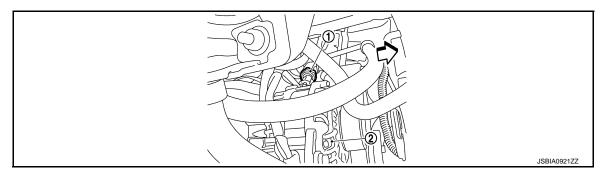


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ⟨□: Vehicle front



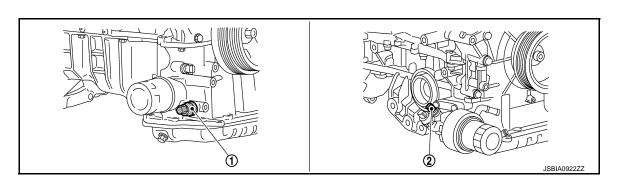
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

∀
 □: Vehicle front



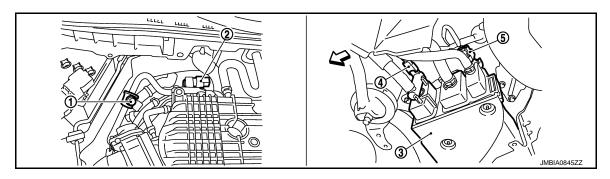
EXHAUST VALVE TIMING CONTROL

[VQ25HR FOR USA AND CANADA]

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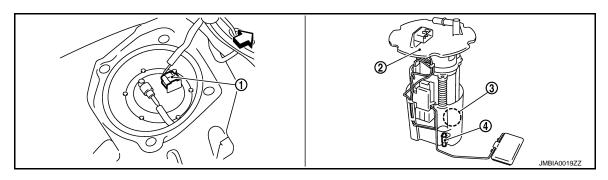
Engine oil temperature sensor (2WD 2. models)

Engine oil temperature sensor (AWD models)

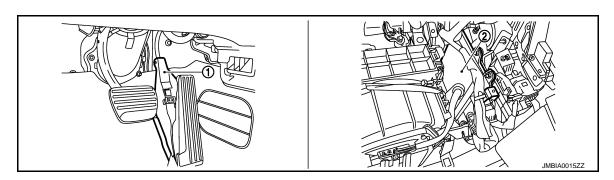


- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- EVAP control system pressure sensor

⟨□: Vehicle front



- 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
- ∀ : Vehicle front



1. Accelerator pedal position sensor 2. ECM

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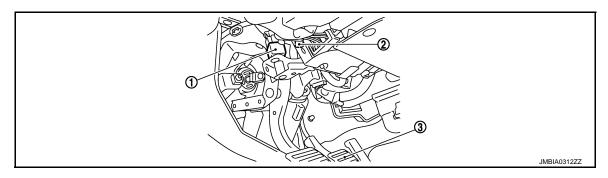
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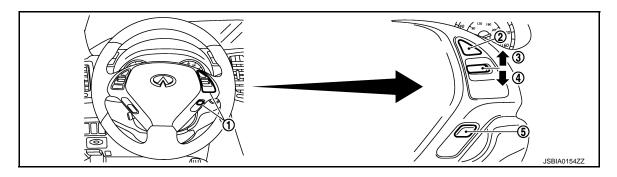
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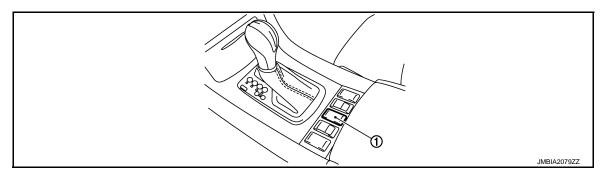


- Stop lamp switch
- 2. ASCD brake switch
- 3. Brake pedal



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

. RESUME/ACCELERATE switch



1. Snow mode switch

Component Description

INFOID:0000000007463127

Component	Reference
Camshaft position sensor (PHASE)	EC-907, "Description"
Crankshaft position sensor (POS)	EC-902, "Description"
Engine oil temperature sensor	EC-883, "Description"
Exhaust valve timing control magnet retarder	EC-791, "Description"
Exhaust valve timing control position sensor	EC-1001, "Description"

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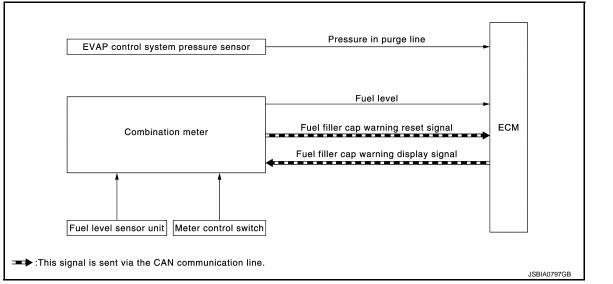
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FUEL FILLER CAP WARNING SYSTEM

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Input

Unit/Sensor	Input signal to ECM	ECM function
EVAP control system pressure sensor		
Oznakia atian arasta	Fuel level	Fuel filler cap warning control
Combination meter	Fuel filler cap warning reset signal*	

^{*:} This signal is sent to the ECM via the CAN communication line.

Output

Unit Output signal		Actuator
ECM	Fuel filler cap warning display signal*	Combination meter

^{*:} This signal is sent to the combination meter via the CAN communication line.

SYSTEM DESCRIPTION

The fuel filler cap warning system alerts the driver to the prevention of the fuel filler being left uncapped and malfunction occurrences after refueling, by turning ON the fuel filler cap warning display on the combination meter

ECM judges a refueled state, based on a fuel level signal transmitted from the combination meter.

When a very small leak is detected through the EVAP leak diagnosis performed after judging the refueled state, ECM transmits a fuel filler cap warning display signal (request for display ON) to the combination meter via CAN communication.

When receiving the signal, the combination meter turns ON the fuel filler cap warning display.

CAUTION:

Check fuel filler cap installation condition when the fuel filler cap warning display turns ON.

Reset Operation

The fuel filler cap warning lamp tunes OFF, according to any condition listed below:

- Reset operation is performed by operating the meter control switch on the combination meter.
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.
- EVAP leak diagnosis result is normal.
- Fuel refilled.

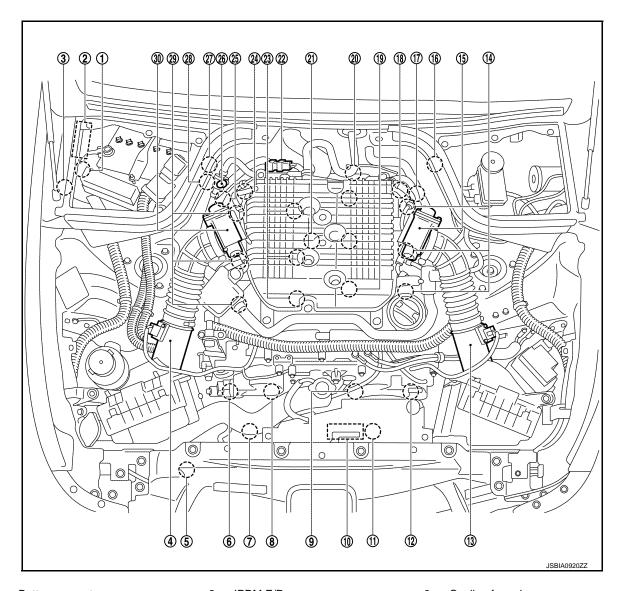
· DTC erased by using CONSULT.

NOTE:

MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

Component Parts Location

INFOID:0000000007463130



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- Cooling fan motor-2 7.
- Cooling fan control module
- 13. Mass air flow sensor (with intake air 14. Ignition coil (with power transistor) temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control 23. Fuel injector (bank 1) solenoid valve

- IPDM E/R 2.
- Refrigerant pressure sensor
- 8. Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- and spark plug (bank 2)
- sensor (bank 2)
- 20. Engine coolant temperature sensor

- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid 9. valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 17. Exhaust valve timing control position 18. Camshaft position sensor (PHASE) (bank 2)
 - 21. Knock sensor
 - 24. Camshaft position sensor (PHASE) (bank1)

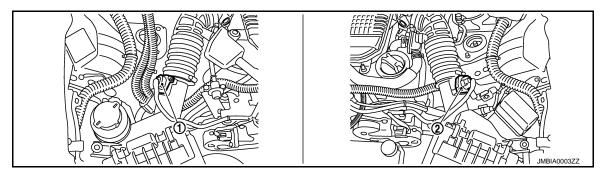
FUEL FILLER CAP WARNING SYSTEM

< SYSTEM DESCRIPTION >

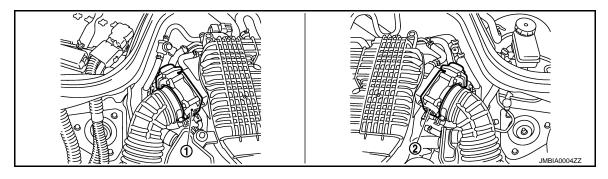
[VQ25HR FOR USA AND CANADA]

- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 27. A/F sensor 1 (bank 1)

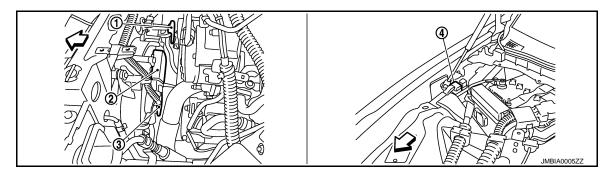
- 28. Crankshaft position sensor (POS)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)
- 30. Electric throttle control actuator (bank 1)



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



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



- Cooling fan motor-2
- Cooling fan control module
- Cooling fan motor-1

- Cooling fan relay
- ∀
 : Vehicle front

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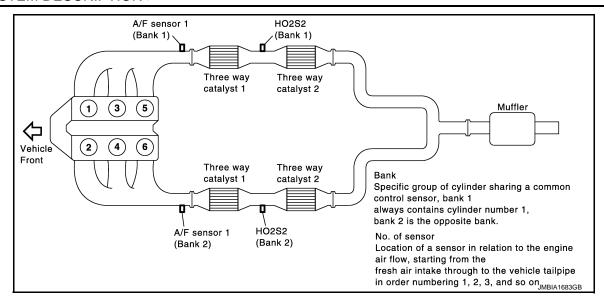
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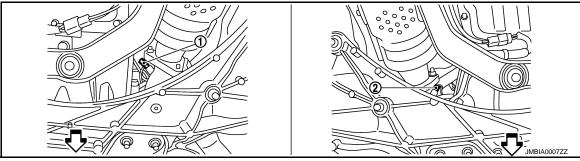
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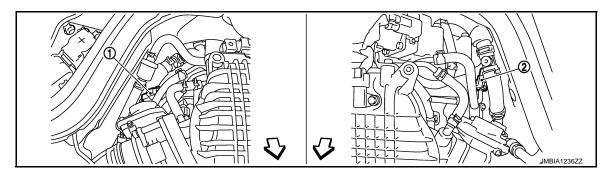
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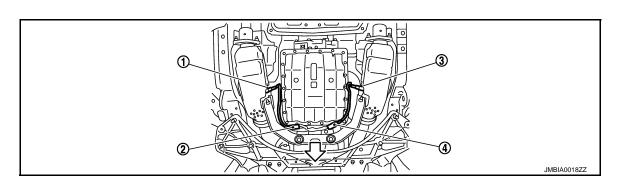
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front

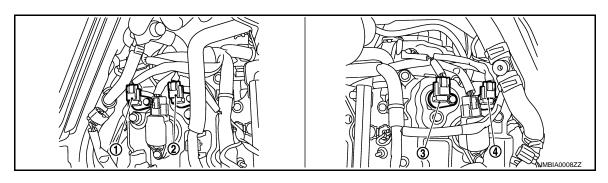


- A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

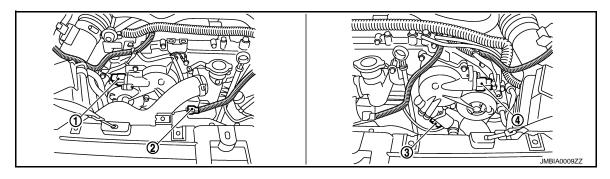
⟨□: Vehicle front



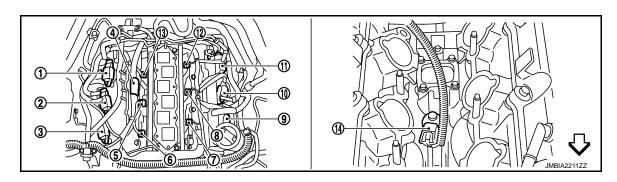
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ⟨□: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet 4. retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power tran-1. sistor)
- 4. Condenser
- Fuel injector No. 2 7.
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- Ignition coil No. 6 (with power tran-11. sistor)

EC-729

- Ignition coil No. 1 (with power tran-3. sistor)
- 6. Fuel injector No. 1
- sistor)

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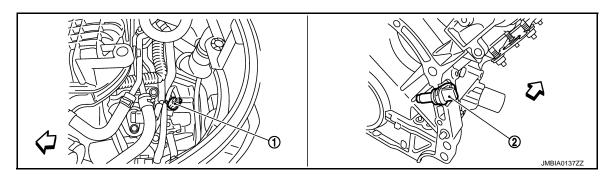
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Ignition coil No. 2 (with power tran-

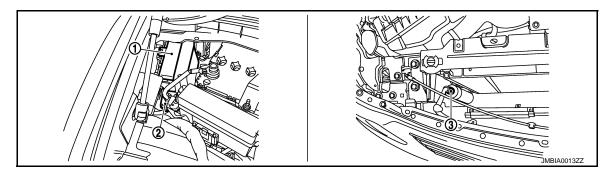
12. Fuel injector No. 6

- 13. Fuel injector No. 5
- 14. Knock sensor

∀ : Vehicle front

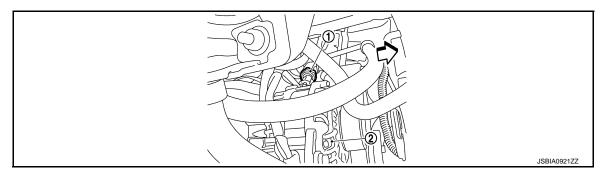


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀: Vehicle front



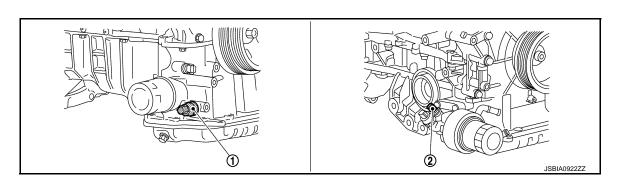
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

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 □: Vehicle front



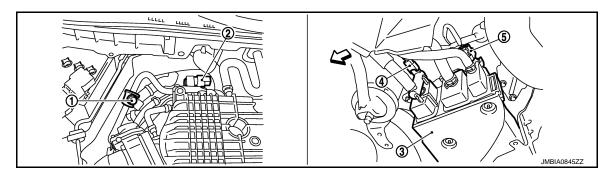
FUEL FILLER CAP WARNING SYSTEM

[VQ25HR FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

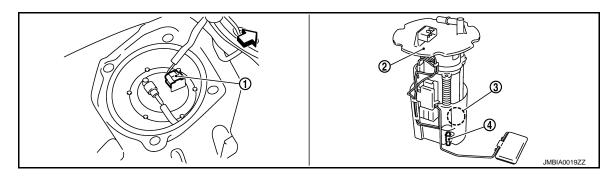
Engine oil temperature sensor (2WD 2. models)

Engine oil temperature sensor (AWD models)

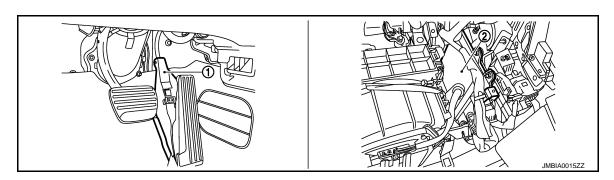


- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- EVAP control system pressure sensor

⟨□: Vehicle front



- 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
- ∀ : Vehicle front



1. Accelerator pedal position sensor 2. ECM

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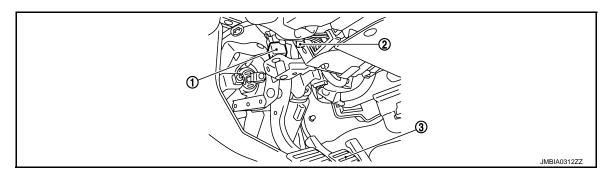
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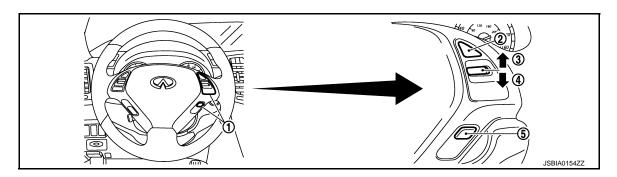
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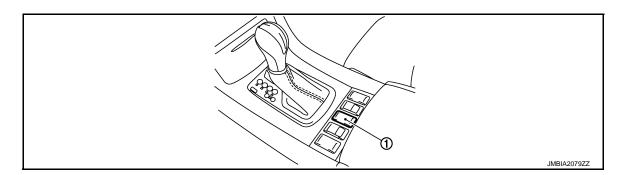
- 1. Stop lamp switch
- 2. ASCD brake switch
- 3. Brake pedal



- 1. ASCD steering switch
- CANCEL switch

3. RESUME/ACCELERATE switch

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



1. Snow mode switch

Component Description

INFOID:0000000007463131

Component	Reference
EVAP control system pressure sensor	EC-945. "Description"

INTAKE VALVE TIMING CONTROL

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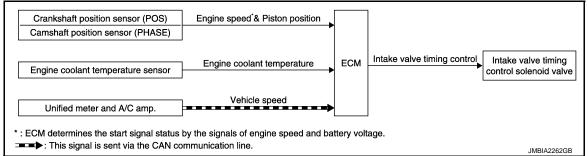
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INFOID:0000000007463133

INTAKE VALVE TIMING CONTROL

System Diagram



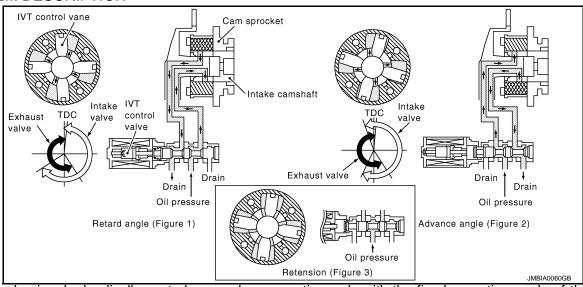
System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine speed*1 & Piston position			
Camshaft position sensor (PHASE)	Engine speed * & Piston position	Intake valve	Intake valve timing control	
Engine coolant temperature sensor	Engine coolant temperature	timing control	solenoid valve	
Unified meter and A/C amp.	Vehicle speed*2			

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

SYSTEM DESCRIPTION



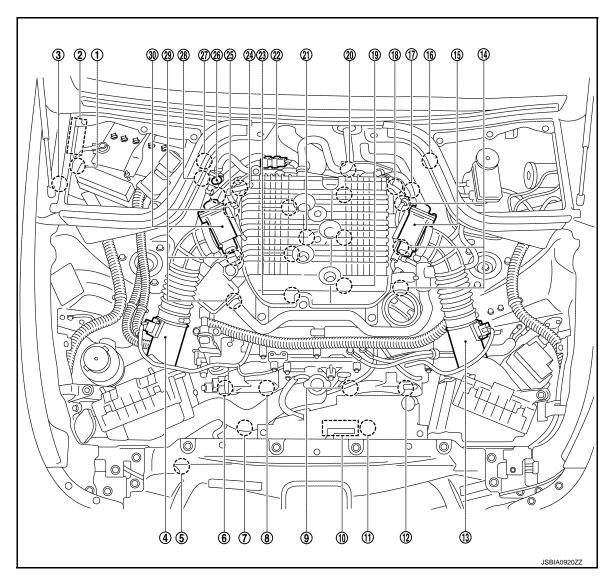
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

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.

^{*2:} This signal is sent to the ECM via the CAN communication line

Component Parts Location

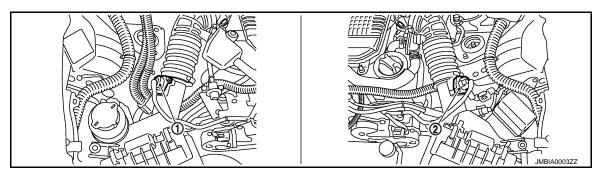
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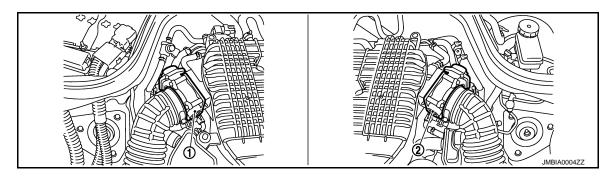
- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

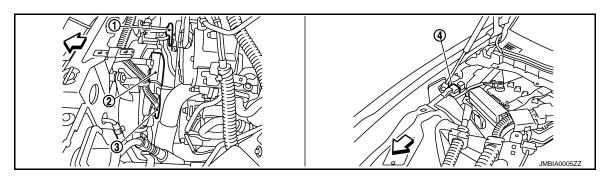
- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)



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



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



- 1. Cooling fan motor-2
- 4. Cooling fan relay
- ∀
 : Vehicle front

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

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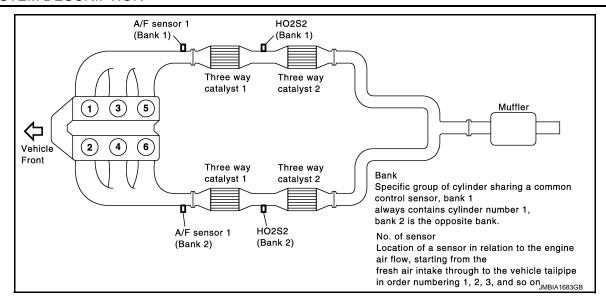
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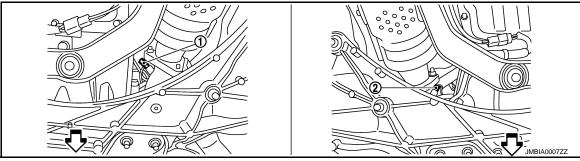
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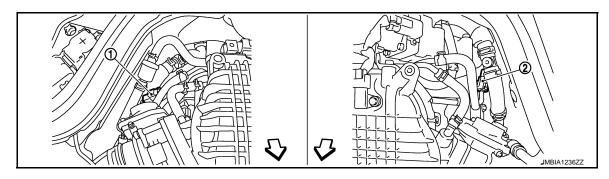
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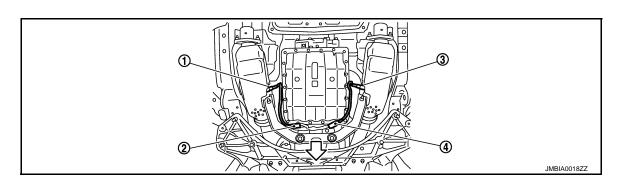
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front



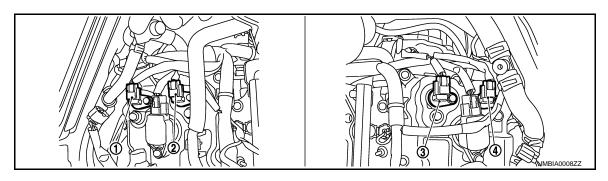
- A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

⟨□: Vehicle front

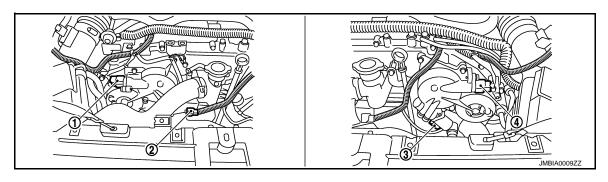


< SYSTEM DESCRIPTION >

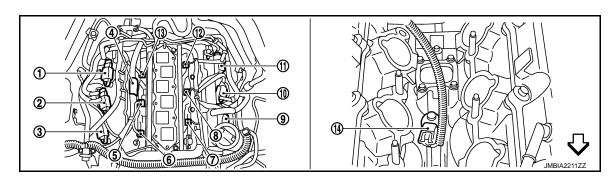
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ⟨□: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet 4. retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- Fuel injector No. 2 7.
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- Ignition coil No. 6 (with power tran-11. sistor)
- Ignition coil No. 1 (with power tran-3. sistor)
- 6. Fuel injector No. 1
- sistor)

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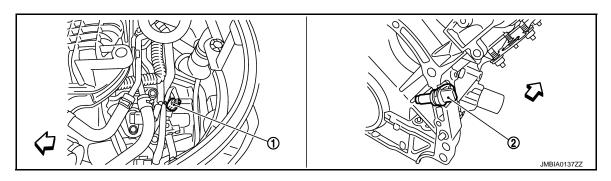
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Ignition coil No. 2 (with power tran-

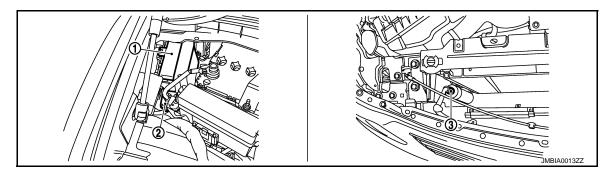
12. Fuel injector No. 6

- 13. Fuel injector No. 5
- 14. Knock sensor

∀ : Vehicle front

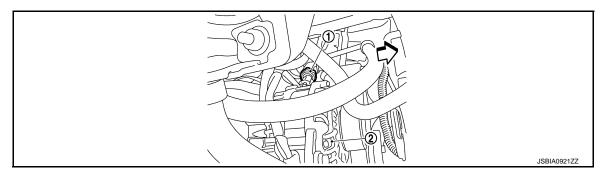


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀: Vehicle front



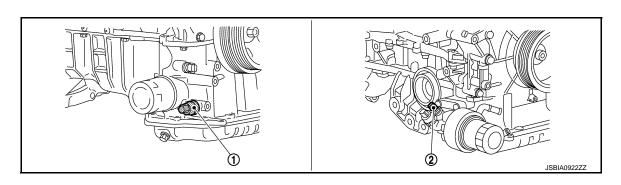
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

∀
 □: Vehicle front



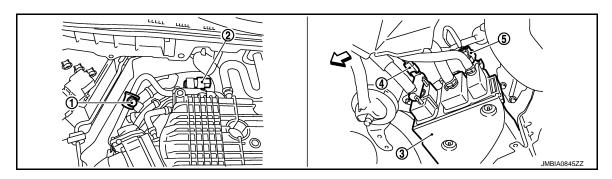
INTAKE VALVE TIMING CONTROL

[VQ25HR FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

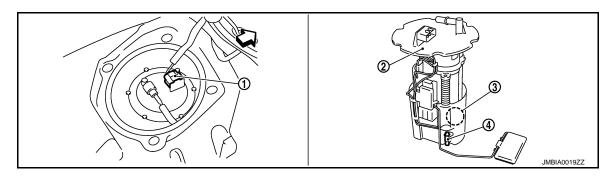
Engine oil temperature sensor (2WD 2. models)

Engine oil temperature sensor (AWD models)

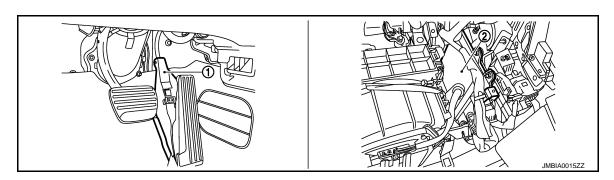


- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve
- EVAP control system pressure sensor

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 □: Vehicle front



- 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
- ∀ : Vehicle front



1. Accelerator pedal position sensor 2. ECM

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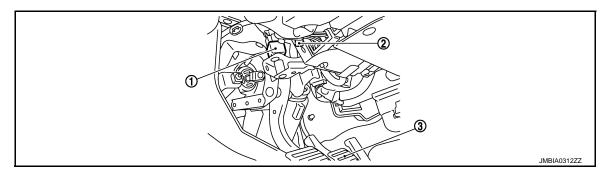
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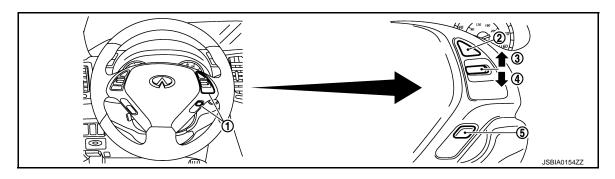
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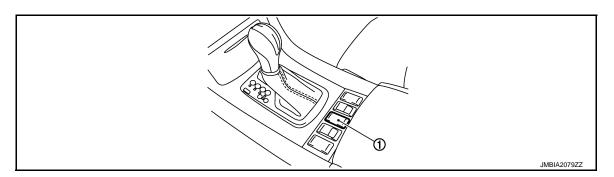


- Stop lamp switch
- 2. ASCD brake switch
- 3. Brake pedal



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

8. RESUME/ACCELERATE switch



1. Snow mode switch

Component Description

INFOID:0000000007463135

Component	Reference
Camshaft position sensor (PHASE)	EC-907, "Description"
Crankshaft position sensor (POS)	EC-902, "Description"
Engine coolant temperature sensor	EC-814, "Description"
Intake valve timing control solenoid valve	EC-788, "Description"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000007463136

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in ECU memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

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GST (Generic Scan Tool)

INFOID:0000000007463137

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to EC-741, "Diagnosis Description".

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NOTE:

Service \$0A is not applied for regions where it is not mandated.

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DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION: 1st Trip Detection Logic and Two Trip Detection Logic

NFOID:0000000007463138

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 when 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.

×: Applicable —: Not applicable

	MIL				DTC		1st trip DTC	
Items	1st trip		2nd 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 (Refer to EC-1142, "DTC Index".)	_	×	_	_	×	_	_	_
Except above	_	_	_	×	_	×	×	_

DIAGNOSIS DESCRIPTION: DTC and Freeze Frame Data

INFOID:0000000007463139

DTC AND 1ST TRIP DTC

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 light up (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 saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored 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 light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

For malfunctions in which 1st trip DTCs are displayed, refer to <u>EC-1142</u>, "<u>DTC Index</u>". 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.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

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 EC-626, "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 or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

[VQ25HR FOR USA AND CANADA]

< SYSTEM DESCRIPTION >

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 stored 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. 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		
2	Except the above items			
3	1st trip freeze frame data			

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 can be stored in the ECM). If freeze frame data is stored in the ECM memory and 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.

DIAGNOSIS DESCRIPTION: Counter System

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 come on.
- The MIL will turn OFF after the vehicle is driven 3 times (driving pattern B) with no malfunction. The 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.
- 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 CONSULT 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.

COUNTER SYSTEM CHART

Items	Fuel Injection System	Misfire	Other
MIL (turns OFF)	3 (pattern B)	3 (pattern B)	3 (pattern B)
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)
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>", "Fuel Injection System"

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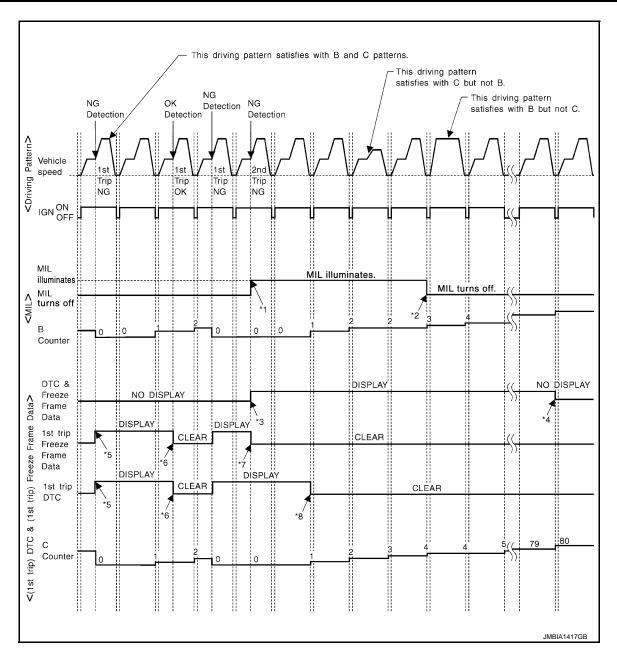
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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and 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 driv- *3: When the same malfunction is deen 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.
- tected 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

Refer to EC-746, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern C

Refer to EC-746, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Example:

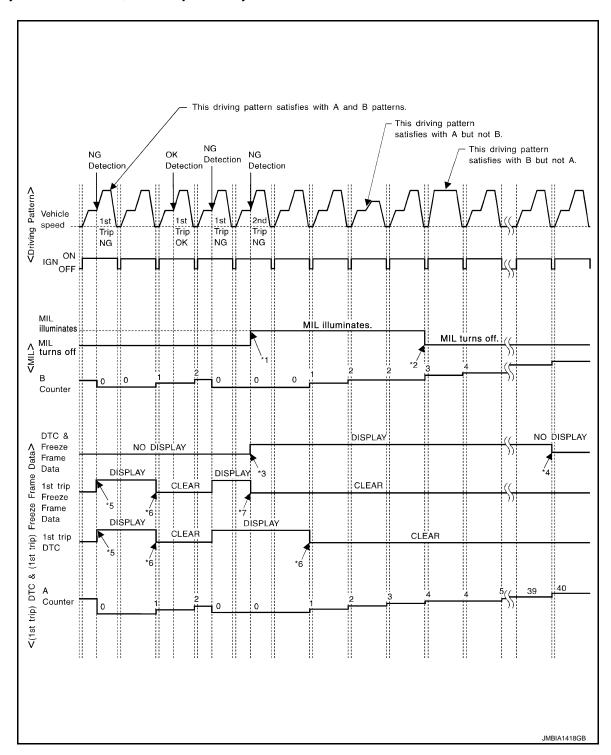
If the stored freeze frame data is as per the following:

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: more than 70°C (158°F)

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"



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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *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.

- *2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 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.
- tected in two consecutive trips, the DTC and the 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.

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

Driving Pattern A

Refer to EC-746, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern B

Refer to EC-746, "DIAGNOSIS DESCRIPTION: Driving Pattern".

DIAGNOSIS DESCRIPTION: Driving Pattern

INFOID:0000000007463141

CAUTION:

Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A.

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 120 km/h (44 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 60 km/h (19 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- A lapse of 22 minutes or more after engine start.

NOTE:

- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ±375 rpm

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Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%] Engine coolant temperature condition:

 When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).

• When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE:

- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DIAGNOSIS DESCRIPTION: System Readiness Test (SRT) Code

INFOID:0000000007463142

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/ISO 15031-5.

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:

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 permanent DTC is stored or MIL is 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"), DTC (No DTCs) and permanent DTC (No permanent DTCs) before the inspection.

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-diagr	nosis result	Diagnosis	← ON → 0	$\begin{array}{ccc} & & & \text{Ignitio} \\ \text{OFF} & \leftarrow & \text{ON} \rightarrow & \text{O} \end{array}$	n cycle $FF \leftarrow ON ightarrow OF$	$F \leftarrow ON \rightarrow$
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"

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Self-diagnosis result			Example				
		Diagnosis	Diagnosis $ \begin{array}{c} \text{Ignition cycle} \\ \leftarrow \text{ON} \rightarrow \text{ OFF } \leftarrow \text{ON} \rightarrow \text{ OFF } \leftarrow \text{ON} \rightarrow \end{array} $				
NG exists	Case 3	P0400	OK	OK	_	_	
		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.

When all SRT related self-diagnoses show OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate "CMPLT". → 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. → 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.
- During SRT driving pattern, the 1st trip DTC (NG) is detected prior to "CMPLT" of SRT and the self-diagnosis 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".

DIAGNOSIS DESCRIPTION: Malfunction Indicator Lamp (MIL)

INFOID:0000000007463143

ENGINE

SOON

When emission-related ECU detects a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions), it turns on/blinks MIL to inform the driver that a malfunction has been detected.

 The MIL illuminates when ignition switch is turned ON (engine is not running).

NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to <u>EC-1103</u>, "Component Function Check".

2. When the engine is started, the MIL should go off.

NOTE

If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

INFOID:0000000007463144

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function		
Bulb check	MIL can be checked.		
SRT status	ECM can read if SRT codes are set.		

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Diagnostic test mode	Function				
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.				
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.				
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC-637 , "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Description".				
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to <u>EC-637</u> , "THROTTLE VALVE CLOSED POSITION LEARNING: Description".				
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-637, "IDLE AIR VOLUME LEARNING : Description".				
Exhaust valve timing control learning	ECM can learn the exhaust valve timing. Refer to EC-639 , "EXHAUST VALVE TIMING CONTROL LEARNING: Description".				

BULB CHECK MODE

Description

This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).

Operation Procedure

- 1. Turn ignition switch ON.
- The MIL on the instrument panel should stay ON.
 If it remains OFF, check MIL circuit. Refer to <u>EC-1103</u>, "<u>Diagnosis Procedure</u>".

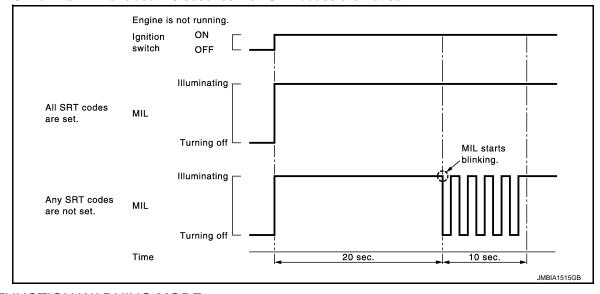
SRT STATUS MODE

Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to <u>EC-747</u>, "<u>DIAGNOSIS DESCRIPTION</u>: <u>System Readiness Test (SRT) Code</u>".

Operation Procedure

- Turn ignition switch ON and wait 20 seconds.
- SRT status is indicated as shown blow.
 - ECM continues to illuminate MIL if all SRT codes are set.
 - ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

Turn ignition switch ON.

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- 2. Check that MIL illuminates.
 - If it remains OFF, check MIL circuit. Refer to EC-1103, "Diagnosis Procedure".
- 3. Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
 - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
 - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MIL is blinking.

How to Set Self-diagnostic Results 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.
- After ignition switch is turned off, ECM is always released from the "self-diagnostic results" mode.
- 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:

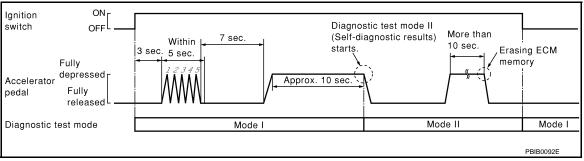
Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

4. Fully release the accelerator pedal.

ECM has entered to "Self-diagnostic results" mode.

NOTE:

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

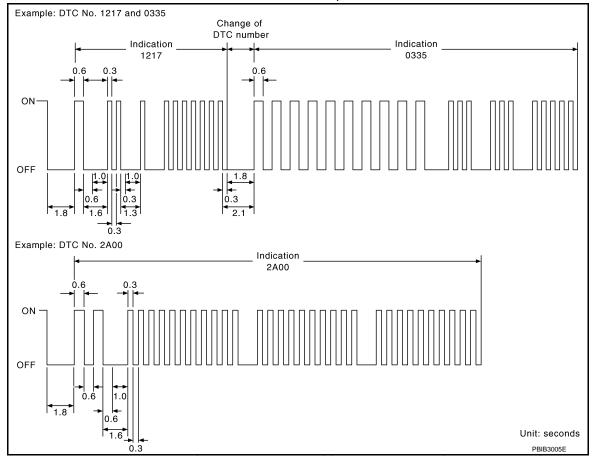


How to Read Self-diagnostic Results

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 "malfunction warning" mode, 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 unidentified codes can be identified by using the CONSULT 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	Е	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. Refer to EC-1142, "DTC Index".

How to Erase Self-diagnostic Results

By performing this procedure, ECM memory is erased and the following diagnostic information is erased as well.

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

NOTE:

Also, if a battery terminal is disconnected, ECM memory is erased and the diagnostic information as listed above is erased. (The amount of time required for erasing may vary from a few seconds to several hours.)

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

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- Turn ignition switch ON.
- 5. Set ECM in "self-diagnostic results" mode.
- 6. The diagnostic information has been erased from the backup memory in the ECM. Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
- 7. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT Function

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FUNCTION

Diagnostic test mode	Function
Self Diagnostic Result	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.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
ECU Identification	ECM part number can be read.
DTC Work support	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.

^{*:} The following emission-related diagnostic information is 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

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-1142, "DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in "self-diag results".

- When ECM detects a 1st trip DTC, 1t" is displayed for "TIME".
- When ECM has detected a current DTC, "0" is displayed for "TIME".
- If "TIME" is neither "0" nor "1t", the DTC occurred in the past and ECM shows the number of times the vehicle has been driven since the last detection of the DTC.

How to Erase DTC and 1st Trip DTC

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 EC-1142, "DTC Index"), skip step 1.
- Erase DTC in TCM. Refer to <u>TM-242, "DTC Index"</u>.
- Select "ENGINE" with CONSULT.
- 3. Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

Freeze Frame Data and 1st Trip Freeze Frame Data

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Freeze frame data item*	Description					
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-1142, "DTC_Index".)					
FUEL SYS-B1	"Fuel injection system status" at the moment a malfunction is detected is displayed.					
FUEL SYS-B2	One mode in the following 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					
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 schedule.					
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.					
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.					
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.					
INT MANI PRES [kPa]						
COMBUST CONDI- TION	These items are displayed but are not applicable to this model.					

^{*:} The items are the same as those of 1st trip freeze frame data.

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". 		

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Monitored item	Unit	Description	Remarks		
COOLAN TEMP/S °C or °F		The engine coolant temperature (determined by the signal voltage of the engine coolant tempera- ture sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The en- gine 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 is displayed.			
HO2S2 (B2)		is displayed.			
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	RICH/LEAN	Display of heated oxygen sensor 2 signal: 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.		
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from unified meter and A/C amp. 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		
ACCEL SEN 2	V	age is displayed.	ECM internally. Thus, they differs from ECM terminal voltage signal.		
TP SEN 1-B1		The throttle position sensor signal voltage is dis-	TP SEN 2-B1 signal is converted by COM integrally. These these differences.		
TP SEN 2-B1	V	played.	ECM internally. Thus, they differs 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 sen- sor) is indicated.			
EVAP SYS PRES	V	The signal voltage of EVAP control system pressure 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 conditioner switch as determined by the air conditioner signal. 			
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral 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 lighting switch are OFF.			
IGNITION SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch signal.			

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Monitored item	Unit	Description	Remarks
HEATER FAN SW	ON/OFF	Indicates [ON/OFF] condition from the heater fan switch signal.	
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 signals.	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.	
MASS AIRFLOW	g/s	Indicates the mass air flow computed by ECM according 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)	J. (gle.	
EXH/V TIM B1	°CA	Indicates [°CA] of exhaust camshaft retard angle.	
EXH/V TIM B2			
INT/V SOL (B1)		The control value of the intake valve timing con- trol solenoid valve (determined by ECM accord-	
INT/V SOL (B2)	%	 ing to the input signals) is indicated. The advance angle becomes larger as the value increases. 	
VTC DTY EX B1		The control value of the exhaust valve timing con-	
VTC DTY EX B2	%	 trol magnet retarder (determined by ECM according to the input signals) is indicated. The retard 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 (determined 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)	21112	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 input speed sensor signal.	

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

Monitored item	Unit	Description	Remarks
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	Display the condition of Idle Air Volume Learning 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 the snow mode switch signal.	
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by the signal voltage of the engine oil temperature sen- sor) 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	
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.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from unified meter and A/C amp. is displayed.	
SET VHCL SPD	km/h or mph	The preset vehicle speed 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.	
VHCL SPD CUT	NON/CUT	Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT	Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
AT OD MONITOR	ON/OFF	Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	
AT OD CANCEL	ON/OFF	Indicates [ON/OFF] condition of A/T O/D cancel request signal.	
CRUISE LAMP	ON/OFF	Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

Monitored item	Unit	Description	Remarks
SET LAMP	ON/OFF	Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
EXH V/T LEARN	YET/CMPLT	Display the condition of Exhaust Valve Timing Control Learning YET: Exhaust Valve Timing Control Learning has not been performed yet. CMPLT: Exhaust Valve Timing Control Learning has already been performed successfully.	
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 according 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		Indicates the correction of factor stored in ECM.	
A/F ADJ-B2	_	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 signals.	
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.	
THRTL STK CNT B1	These items	are displayed but are not applicable to this model.	
HO2 S2 DIAG1 (B1)	INCMP/CM- PLT	Indicates DTC P0139 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B1)	INCMP/CM- PLT	Indicates DTC P0139 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG1 (B2)	INCMP/CM- PLT	Indicates DTC P0159 self-diagnosis (delayed response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B2)	INCMP/CM- PLT	Indicates DTC P0159 self-diagnosis (slow response) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
EVAP LEAK DIAG	YET/ CMPLT	Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully.	
EVAP DIAG READY	ON/OFF	 Indicates the ready condition of EVAP leak diagnosis. ON: Diagnosis has been ready condition. OFF: Diagnosis has not been ready condition. 	

NOTE:

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

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
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
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
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	
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 WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. NOTE: WHEN STARTING ENGINE, CONSULT MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	IN THIS MODE, VIN IS REGISTERED IN ECM.	When registering VIN in ECM
EXH V/T CONTROL LEARN	IN THIS MODE, OPERATION TO LEARN EXHAUST VALVE TIMING CONTROL MAGNET RETARDER CHARACTERISTIC.	When learning the exhaust valve timing control
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	IDLE CONDITION	When adjusting target ignition timing
CLSD THL POS LEARN	IGNITION ON AND ENGINE STOPPED.	When learning the throttle valve closed position

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

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJEC- TION	Engine: Return to the original non-standard condition Change the amount of fuel injection using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	 Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
IGNITION TIM- ING	Engine: Return to the original non-standard condition Timing light: Set Retard the ignition timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.

DIAGNOSIS SYSTEM (ECM)

< SYSTEM DESCRIPTION >

[VQ25HR FOR USA AND CANADA]

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
POWER BAL- ANCE	 Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N Cut off each injector signal one at a time using CONSULT. 	Engine runs rough or dies.	Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil
ENG COOLANT TEMP	Engine: Return to the original non-standard condition Change the engine coolant temperature using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectors Engine coolant temperature sensor Fuel injector
FUEL PUMP RE- LAY	Ignition switch: ON (Engine stopped) Turn the fuel pump relay ON and OFF using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	Harness and connectors Fuel pump relay
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 CONSULT. 	Engine speed changes according to the opening percent.	Harness and connectors Solenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature	using CONSULT.	
VENT CON- TROL/V	Ignition switch: ON (Engine stopped) Turn solenoid valve ON and OFF with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	Harness and connectors Solenoid valve
INT V/T ASSIGN ANGLE	Engine: Return to the original non-standard condition Change intake valve timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectors Intake valve timing control solenoid valve
EXH V/T ASSIGN ANGLE	Engine: Return to the original non-standard condition Change exhaust valve timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectors Exhaust valve timing control magnet retarder
FAN DUTY CONTROL*	Ignition switch: ON Change duty ratio using CON-SULT.	Cooling fan speed changes.	Harness and connectors Cooling fan motor Cooling fan relay Cooling fan control module IPDM E/R
ALTERNATOR DUTY	Engine: Idle Change duty ratio using CON- SULT.	Battery voltage changes.	Harness and connectors IPDM E/R Alternator

^{*:} Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

- For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.
- "SRT STATUS" provides the presence of absence of Permanent DTCs stored in ECM memory.

PERMANENT DTC STATUS Mode

How to display permanent DTC status

- 1. Turn ignition switch OFF and wait at 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at 10 seconds.
- 4. Turn ignition switch ON.
- Select "PERMANENT DTC STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

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NOTE:

Permanent DTCs stored in ECM memory are displayed on the CONSULT screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP).

CAUTION:

Since the "PERMANENT DTC STATUS" screen displays the previous trip information, repeat the following twice to update the information: "Ignition switch OFF", "Wait for more than 10 seconds" and "Ignition switch ON".

Turi	JTION: n ignition switch from O us screen.	N to OFF twice to update the informa	ation on the	
PEI	RMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D	 ;
xx	xx	INCMP	INCMP	
xx	xx	CMPLT	INCMP	į
XX	xx	INCMP	CMPLT	<u> </u>
XX	xx	CMPLT	INCMP	:
XX	xx	INCMP	INCMP	
XX	xx	INCMP	INCMP	

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

SRT WORK SUPPORT Mode

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

PERMANENT DTC WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:

This mode is not used in regions that permanent DTCs are not regulated by law.

DTC WORK SUPPORT Mode

Test mode	Test mode Test item		Reference page
	EVP SML LEAK P0442/P1442*	P0455	EC-960
	EVP V/S LEAK P0456/P1456*	P0442	EC-923
EVAPORATIVE SYSTEM	EVP V/S LEAR F0456/F1456	P0456	EC-966
	PURG VOL CN/V P1444	P0443	EC-929
	PURG FLOW P0441	P0441	EC-918
	A/F SEN1 (B1) P1278/P1279	P0133	EC-841
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-829
AVF SEINT	A/F SEN1 (B2) P1288/P1289	P0153	EC-841
	A/F SEN1 (B2) P1286	P0150	EC-829
	HO2S2 (B1) P1146	P0138	EC-852
	HO2S2 (B1) P1147	P0137	EC-846
HO2S2	HO2S2 (B1) P0139	P0139	EC-860
ПО232	HO2S2 (B2) P1166	P0158	EC-852
	HO2S2 (B2) P1167	P0157	EC-846
	HO2S2 (B2) P0159	P0159	EC-860

^{*:} DTC P1442 and P1456 does not apply to V36 models but appears in DTC Work Support Mode screens.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description INFOID:0000000007463146 EC The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" in "DATA MONI-TOR" mode of CONSULT 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 value

or more malfunctions. The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.

in "SPEC" in "DATA MONITOR" mode is NOT within the SP value, the Engine Control System may have one

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-
- 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

Check that all of the following conditions are satisfied.

TESTING CONDITION

- 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)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Transmission: Warmed-up
- After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP SE 1" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- · Engine speed: Idle

>> GO TO 2.

2.PERFORM SPEC IN DATA MONITOR MODE

(P)With CONSULT

NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

- 1. Perform EC-631, "BASIC INSPECTION: Special Repair Requirement".
- 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.
- Check that monitor items are within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Go to EC-762, "Diagnosis Procedure".

> **EC-761** 2012 G Sedan

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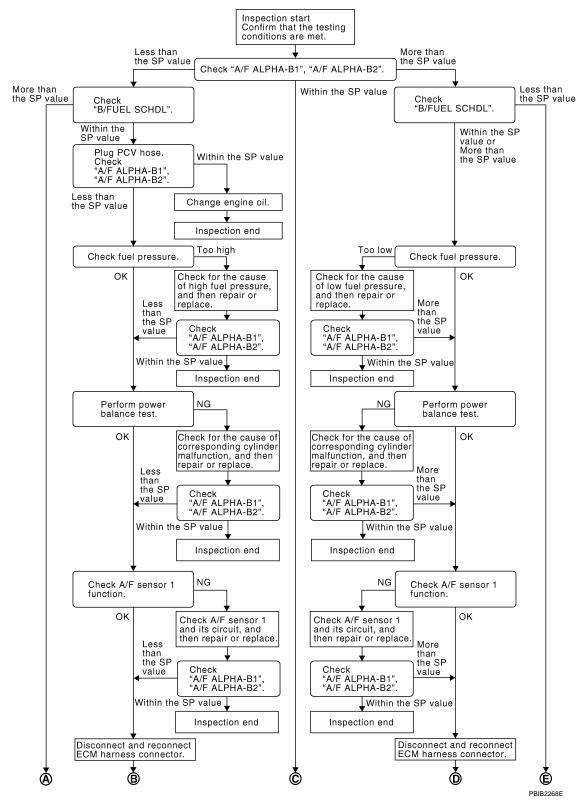
Revision: 2013 February

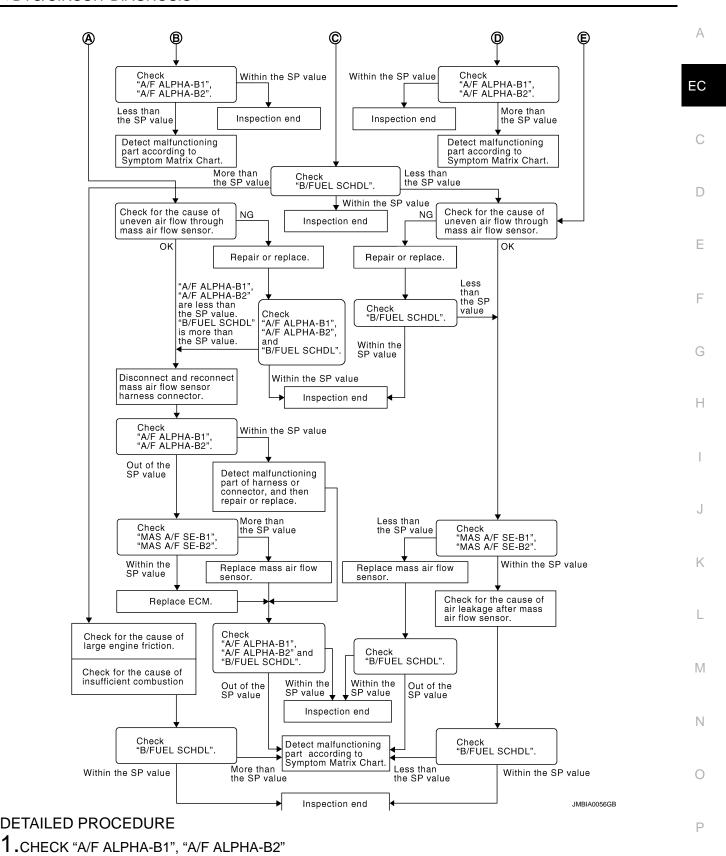
[VQ25HR FOR USA AND CANADA]

Diagnosis Procedure

INFOID:0000000007463148

OVERALL SEQUENCE





®With CONSULT

- Start engine.
- Confirm that the testing conditions are met. Refer to <u>EC-761, "Component Function Check"</u>.
- 3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that the each indication is within the SP value.

< DTC/CIRCUIT DIAGNOSIS > [VQ25HR FOR USA AND CANADA]

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 check 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 check 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 "Ā/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that the 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.
- 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 condition.

>> INSPECTION END

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-1165, "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. Refer to FL-6, "Removal and Installation".

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

7.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. Refer to FL-6. "Removal and Installation".

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

IVQ25HR FOR USA AND CANADAL

DTC/CIRCUIT DIAGNOSIS >	[VQ25HR FOR USA AND CANADA]		
CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"			
. Start engine.	EC" of "DATA MONITOR" mode, and check that the each		
the measurement value within the SP value? YES >> INSPECTION END NO >> GO TO 9.			
PERFORM POWER BALANCE TEST			
Perform "POWER BALANCE" in "ACTIVE TEST" Make sure that the each cylinder produces a mor the inspection result normal?			
YES >> GO TO 12. NO >> GO TO 10.			
O.DETECT MALFUNCTIONING PART			
heck the following. Ignition coil and its circuit (Refer to <u>EC-1097, "Com</u> r Fuel injector and its circuit (Refer to <u>EC-1091, "Com</u> Intake air leakage			
Low compression pressure (Refer to EM-168, "Insp	<u>ection"</u> .)		
the inspection result normal? YES >> Replace fuel injector and then GO TO 11 NO >> Repair or replace malfunctioning part and 1.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	Refer to EM-189, "Removal and Installation". I then GO TO 11.		
Start engine.	EC" of "DATA MONITOR" mode, and check that the each		
the measurement value within the SP value? YES >> INSPECTION END NO >> GO TO 12.			
2.CHECK A/F SENSOR 1 FUNCTION			
erform all DTC CONFIRMATION PROCEDURE relations are related by the process of the	i <u>c"</u> . i <u>c"</u> . i <u>c"</u> .		
For DTC P0133, P0153, refer to <u>EC-841, "DTC Log</u> For DTC P2A00, P2A03, refer to <u>EC-1077, "DTC Log</u>			
any DTC detected? YES >> GO TO 13.			
NO >> GO TO 15. 3. CHECK A/F SENSOR 1 CIRCUIT			
erform Diagnosis Procedure according to correspon	dina DTC.		
	g		
>> GO TO 14.			

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 15.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

- 1. Stop the engine.
- 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.
- Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-1153, "Symptom Table".

17. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check 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 check that the 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.DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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

>> GO TO 22.

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

EC

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

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-801, "Diagnosis Procedure". Then GO TO 29.

NO >> GO TO 23.

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 check that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 24.

>> More than the SP value: Replace malfunctioning mass air flow sensor, and then GO TO 29. Refer NO to EM-179, "Exploded View".

24.REPLACE ECM

- Replace ECM. Refer to EC-655, "Component Parts Location".
- 2. Go to EC-634, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> 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 of air cleaner element
- · Uneven dirt of air cleaner element
- Improper specification of 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 check that the indication is within the SP value.

Is the measurement value within the SP value?

>> INSPECTION END YES

>> Less than the SP value: GO TO 27. NO

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 check that the indication is within the SP value.

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 TO 30. Refer to EM-179, "Exploded View".

28.CHECK INTAKE SYSTEM

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

EC-767

Revision: 2013 February 2012 G Sedan

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- · Disconnection of oil level gauge
- · Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- · Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

$29.\mathsf{CHECK}$ "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 check that the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-1153, "Symptom Table".

30. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then check 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 EC-1153, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000007463149

1. CHECK GROUND CONNECTION-I

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- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between ECM harness connector and ground.

E	СМ	Ground	Continuity	
Connector	Connector Terminal		Continuity	
F101	8		Existed	
M107	123			
	124	Ground		
	127			
	128			

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO \Rightarrow GO TO 3. 3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F103, M116
- · Harness for open or short between ECM and ground

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

4.CHECK ECM POWER SUPPLY CIRCUIT-I

- Reconnect ECM harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between ECM harness connector and ground.

	+		_		Voltage
Connecto	or	Terminal	Connector	Terminal	
F102		53	M107	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- IPDM E/R harness connector E7
- 10 A fuse (No. 44)
- Harness for open or short between ECM and fuse

POWER SUPPLY AND GROUND CIRCUIT

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

>> Repair open circuit or 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 voltage will exist for a few seconds, then drop 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.
- 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. Refer to PCS-31, "Removal and Installation".

8.CHECK INTERMITTENT INCIDENT

Refer to GI-46, "Circuit Inspection".

>> INSPECTION END

9. CHECK ECM POWER SUPPLY CIRCUIT-III

- 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-IV

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

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

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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4. Also ched	ck harness for	short to grou	nd and short	to power.		
Is the inspect	ion result norr	mal?				Α
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	90 TO 11.					EC
II.DETECT	MALFUNCT	IONING PAR	Τ			LC
Check the foll		05 500				
Harness orHarness or						С
Harness for			M and IPDM	E/R		
	-					Б
>> R	depair open ci	rcuit or short t	to ground or	short to power	in harness or connectors.	D
12. CHECK	15 A FUSE					
1. Disconne	ect 15 A fuse (No. 50) from	IPDM E/R.			Е
2. Check 15	A fuse.	•				
Is the inspect		mal?				_
	GO TO 15. Replace 15 A f	iuco				F
	ECM POWER					
					-	G
	ect ECM harne ect IPDM E/R I					
				nector and IPD	M E/R harness connector.	
	-					Н
EC	СМ	IPDN	/I E/R	Continuity		
Connector	Terminal	Connector	Terminal	Continuity		I
M107	125	E7	49	Existed		
4. Also ched	ck harness for	short to grou	nd and short	to power.		
Is the inspect		mal?				J
	GO TO 15. GO TO 14.					
			т			K
	T MALFUNCT	IONING PAR	1			
Check the follHarness or		106 M6				
Harness for			M and IPDM	E/R		L
			_	short to power	in harness or connectors.	M
15. CHECK	INTERMITTE	NT INCIDEN	Т			
Refer to GI-43	3, "Intermitten	t Incident".				
Is the inspect						Ν
				emoval and Ins		
NO >> R	tepair open ci	rcuit or short t	to ground or	short to power	in harness or connectors.	0
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U0101 CAN COMM CIRCUIT

Description INFOID:0000000007463150

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:000000007463151

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 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-772, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-17, "Trouble Diagnosis Flow Chart".

INFOID:0000000007463152

U1001 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

U1001 CAN COMM CIRCUIT

Description INFOID:000000007463153

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

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 communication 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 1st trip DTC.

Is DTC detected?

YES >> EC-773, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to LAN-17, "Trouble Diagnosis Flow Chart".

INFOID:0000000007463155

Revision: 2013 February EC-773

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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-788</u>, "<u>DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0011	Intake valve timing control performance (bank 1)		Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve timing control solenoid valve
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

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 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

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

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained)	
COOLAN TEMP/S	More than 60°C (140°F)	
Selector lever	P or N position	

- Let engine idle for 10 seconds.
- Check 1st trip DTC.

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-775, "Diagnosis Procedure"

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

(I) With CONSULT

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

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)	
COOLAN TEMP/S	More than 60°C (140°F)	
Selector lever	1st or 2nd position	
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)	

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CAUTION:

Always drive at a safe speed.

Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-775, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463157

1. CHECK OIL PRESSURE WARNING LAMP

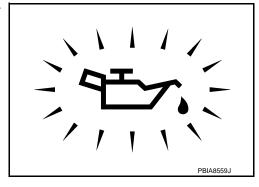
1. Start engine.

2. Check oil pressure warning lamp and confirm it is not illuminated.

Is oil pressure warning lamp illuminated?

YES >> Go to <u>LU-9</u>, "Inspection".

NO >> GO TO 2.



2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-776, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

3.check crankshaft position sensor (pos)

Refer to EC-905, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS). Refer to EM-273, "Exploded View".

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-911, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-246, "Exploded View".

5.CHECK CAMSHAFT (INTAKE)

Check the following.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

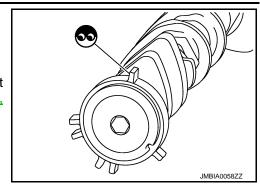
- · Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 6.

NO

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-246, <a href=""Exploded View".



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".

NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to EM-73, "Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463158

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- 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		
1 and 2	7.0 - 7.7 Ω [at 20°C (68°F)]		
1 or 2 and ground	${}^{\infty}\Omega$ (Continuity should not exist)		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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

CAUTION:

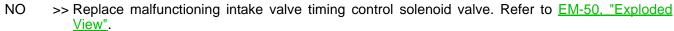
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

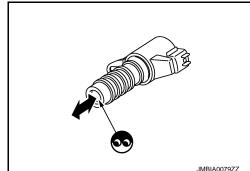
NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END





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P0014, P0024 EVT CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0014 or P0024 is displayed with DTC P0078, P0084 first perform trouble diagnosis for DTC P0078, P0084. Refer to <u>EC-791</u>, "<u>DTC Logic</u>".
- If DTC P0014 or P0024 is displayed with P1078, P1084 first perform trouble diagnosis for P1078, P1084. Refer to EC-1001, "DTC Logic".

	Trouble diagnosis		
DTC No.	name	DTC detecting condition	Possible cause
P0014	Exhaust valve timing control performance (bank 1)		Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Exhaust valve timing control position sensor
P0024	Exhaust valve timing control performance (bank 2)	There is a gap between angle of target and phase-control angle degree.	 Exhaust valve control magnet retarder Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Exhaust valve timing control pulley assembly

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 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

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

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	D position

- 4. Let engine idle for 10 seconds.
- Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-779, "Diagnosis Procedure"

NO >> GO TO 3.

3.perform dtc confirmation procedure-ii

(P)With CONSULT

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

P0014, P0024 EVT CONTROL

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

ENG SPEED	1,500 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

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CAUTION:

Always drive at a safe speed.

Check 1st trip DTC.

■With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-779, "Diagnosis Procedure"

>> INSPECTION END NO

Diagnosis Procedure

INFOID:0000000007463160

${f 1.}$ CHECK FUNCTION OF EXHAUST VALVE TIMING CONTROL

(II) With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "EXH V/T ASSIGN ANGLE" in "ACTIVE TEST" mode with CONSULT.
- Start engine and keep the engine speed at 2,500 rpm, then touch "START".
- Check that the values of "EXH/V TIM B1" and "EXH/V TIM B2" change when touching "UP" or "DOWN".

⋈ Without CONSULT

- 1. Start engine and rev engine up above 1,500 rpm.
- Read the voltage signal between ECM harness connector terminals as follows with an oscilloscope.

	ECM			
+		_		Voltage signal
Connector	Terminal	Connector	Terminal	
F101	6 [EVT control magnet retarder (bank 1) signal] 7 [EVT control magnet retarder (bank 2) signal]	M107	128	5V/div JMBIA0034GB

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 2.

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2.CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

Refer to EC-780, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3. Р

3.replace exhaust valve timing control magnet retarder

- 1. Replace malfunctioning exhaust valve timing control magnet retarder. Refer to EM-69. "Removal and
- Perform EC-639, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

4.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Refer to EC-1004, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning exhaust valve timing control position sensor. Refer to <u>EM-47</u>, "<u>Exploded</u> View".

5. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-905, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-96, "2WD : Exploded View"</u> (2WD models) or <u>EM-99, "AWD : Exploded View"</u> (AWD models).

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-911, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to <u>EM-47</u>, "Exploded View".

7.CHECK CAMSHAFT (EXH)

Check the following.

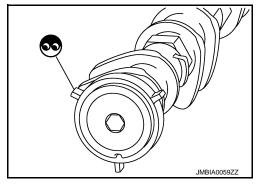
- · Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.

NO

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-69. "Removal and Installation".



8. 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".

NO >> GO TO 9.

9. REPLACE EXHAUST VALVE TIMING CONTROL PULLEY ASSEMBLY

- 1. Replace exhaust valve timing control pulley assembly and exhaust valve timing control magnet retarder. Refer to <u>EM-51</u>, "Removal and Installation" and <u>EM-69</u>, "Removal and Installation".
- 2. Perform EC-639, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463161

1. CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

1. Turn ignition switch OFF.

P0014, P0024 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- Disconnect exhaust valve timing control magnet retarder harness connector.
- Check resistance between exhaust valve timing control magnet retarder terminals as follows.

Terminals	Resistance
1 and 2	9.0 - 11.0 Ω [at 20°C (68°F)]

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Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace exhaust valve timing control magnet retarder

- Replace malfunctioning exhaust valve timing control magnet retarder. Refer to EM-69, "Removal and
- Perform EC-639, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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

Description INFOID.000000007463162

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	Air fuel ratio (A/F) sensor 1
Mass air flow sensor	Amount of intake air	TICALOT COTILION	noator

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

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 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-783, "Diagnosis Procedure".

NG >> INSPECTION END

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Diagnosis Procedure

INFOID:0000000007463164

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect air fuel ratio (A/F) sensor 1 harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F sensor	1	Ground	Voltage
DIC	Bank	Connector Terminal		Ground	Voltage
P0031, P0032	1	F66	4	Ground	Battery voltage
P0051, P0052	2	F67	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 E25, F30
- 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.

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

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

DTC	A/F sensor 1		ECM		Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0031, P0032	1	F66	3	F101	1	Existed
P0051, P0052	2	F67	3	1 101	5	LAISIEU

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

Is the inspection result normal?

YFS >> GO TO 5.

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

5.CHECK A/F SENSOR 1 HEATER

Refer to EC-784, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-35, "Exploded View". **CAUTION:**

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2012 G Sedan

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 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

7. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

>> Repair or replace malfunctioning part.

Component Inspection

INFOID:0000000007463165

1. CHECK AIR FUEL RATIO (A/F) SENSOR 1

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Check resistance between A/F sensor 1 terminals as follows.

Terminal	Resistance
3 and 4	1.98 - 2.42 Ω [at 25°C (77°F)]
3 and 1, 2	Ω∞
4 and 1, 2	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-35, "Exploded View". CAUTION:

- Discard any air fuel ratio (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 air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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P0037, P0038, P0057, P0058 HO2S2 HEATER

Description INFOID:0000000007463166

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	Heated oxygen sensor 2 heater	F
Above 3,600 rpm	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	G

DTC Logic

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 sensor 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 sensor 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 sensor 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 sensor 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.

- 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

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

2. PERFORM DTC CONFIRMATION PROCEDURE

- 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 1 minute.
- 7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-786, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463168

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

- 1. Disconnect heated oxygen sensor 2 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between HO2S2 harness connector and ground.

DTC	HO2S2			Ground	Voltage
ы	Bank	Connector	Terminal	Ground	voltage
P0037, P0038	1	F54	2	Ground	Battery voltage
P0057, P0058	2	F53	2	Giodila	Dattery Voltage

Is the inspection result normal?

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

${f 3.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- 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 or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between HO2S2 harness connector and ECM harness connector.

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

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

Is the inspection result normal?

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> GO TO 5.

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

${f 5}$.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-787, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

 $oldsymbol{6}$.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-35, "Exploded View". **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

.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

- Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.
- Check resistance between HO2S2 terminals as follows.

Terminal	Resistance
2 and 3	3.4 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	∞ Ω
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. Refer to EM-35, "Exploded View".

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

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P0075, P0081 IVT CONTROL SOLENOID VALVE

Description INFOID:0000000007463170

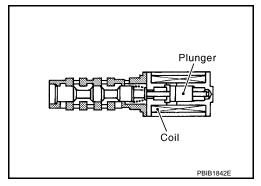
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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

INFOID:0000000007463171

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0075	Intake valve timing control so- lenoid valve (bank 1) circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	, , , ,	
P0081	Intake valve timing control so- lenoid valve (bank 2) circuit		valve circuit is open or shorted.) • Intake valve timing control solenoid valve	

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.
- Turn ignition switch ON.
- 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 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-788, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

INFOID:0000000007463172

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

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

P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

DTC	IVT control solenoid valve			Ground	Voltage	
	Bank	Connector	Terminal	Giodila	voltage	
P0075	1	F28	2	Ground	Battery voltage	
P0081	2	F29	2	Orodria		
Is the inspection result normal?						
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YES >> GO TO 3. NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

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

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Turn ignition switch OFF.

Disconnect ECM harness connector.

Check the continuity between intake valve timing (IVT) control solenoid valve harness connector and ECM harness connector.

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

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 or short to ground or short to power in harness or connectors.

f 4 .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-789, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

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>> INSPECTION END

Component Inspection

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

Turn ignition switch OFF.

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- Disconnect intake valve timing control solenoid valve harness connector.
- Check resistance between intake valve timing control solenoid valve terminals as follows.

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P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Terminals	Resistance		
1 and 2	7.0 - 7.7 Ω [at 20°C (68°F)]		
1 or 2 and ground	${}^{\infty}\Omega$ (Continuity should not exist)		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

2.check intake valve timing control solenoid valve-ii

Remove intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check 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.

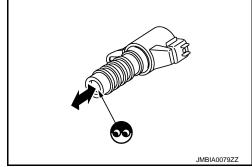
NOTE:

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. Refer to EM-50, "Exploded View".



P0078, P0084 EVT CONTROL MAGNET RETARDER

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

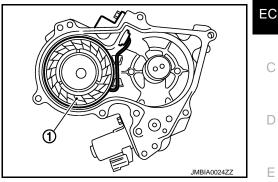
P0078, P0084 EVT CONTROL MAGNET RETARDER

Description INFOID:0000000007463174

Exhaust valve timing control magnet retarder (1) controls the shut/ open timing of the exhaust valve by ON/OFF pulse duty signals sent from the ECM.

The longer pulse width retards valve angle.

The shorter pulse width advances valve angle.



DTC Logic INFOID:0000000007463175

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0078	Exhaust valve timing control magnet retarder (bank 1) circuit	An improper voltage is sent to the ECM	Harness or connectors (Exhaust valve timing control magnet)	
P0084	Exhaust valve timing control magnet retarder (bank 2) circuit	through exhaust valve timing control magnet retarder.	retarder circuit is open or shorted.) • Exhaust valve timing control magnet retarder	Н

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.
- Turn ignition switch ON.
- 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 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-791, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

 ${f 1}$.CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect exhaust valve timing control magnet retarder harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between exhaust valve timing (EVT) control magnet retarder harness connector and ground.

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Revision: 2013 February

P0078, P0084 EVT CONTROL MAGNET RETARDER

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

DTC	EVT control magnet retarder			Ground	Voltage	
DIC	Bank	Connector	Terminal	Giodila	vollage	
P0078	1	F58	1	Ground	Battery voltage	
P0084	2	F59	1	Giodila	Battery voltage	

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- Harness for open or short between exhaust valve timing control magnet retarder and IPDM E/R
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

3.check exhaust valve timing control magnet retarder output signal circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between exhaust valve timing control (EVT) magnet retarder harness connector and ECM harness connector.

DTC	EVT control magnet retarder		ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0078	1	F58	2	F101	6	Existed
P0084	2	F59	2	1 101	7	LXISIGU

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 or short to ground or short to power in harness or connectors.

f 4.CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

Refer to EC-792, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.REPLACE EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

- 1. Replace malfunctioning exhaust valve timing control magnet retarder. Refer to <u>EM-69</u>, "Removal and Installation".
- 2. Perform EC-639, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463177

1. CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

1. Turn ignition switch OFF.

P0078, P0084 EVT CONTROL MAGNET RETARDER

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- Disconnect exhaust valve timing control magnet retarder harness connector.
- Check resistance between exhaust valve timing control magnet retarder terminals as follows.

Terminals	Resistance
1 and 2	9.0 - 11.0 Ω [at 20°C (68°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace exhaust valve timing control magnet retarder

- Replace malfunctioning exhaust valve timing control magnet retarder. Refer to EM-69, "Removal and Installation".
- Perform EC-639, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

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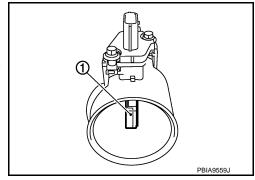
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P0101, P010B MAF SENSOR

Description INFOID.000000007463178

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.



DTC Logic

INFOID:0000000007463179

DTC DETECTION LOGIC

NOTE:

If DTC P0101 or P010B is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0101	MAF SEN/CIRCUIT-B1 [Mass air flow (MAF) sensor (bank 1) circuit range/perfor- mance]	 A high voltage from the sensor is sent to ECM under light load driving condition. A low voltage from the sensor is sent to ECM under heavy load driving condition. 	Harness or connectors (The sensor circuit is open or shorted.) Intake air leaks MAF sensor EVAP control system pressure sensor Intake air temperature sensor
P010B	MAF SEN/CIRCUIT-B2 [Mass air flow (MAF) sensor (bank 2) circuit range/perfor- mance]	 A high voltage from the sensor is sent to ECM under light load driving condition. A low voltage from the sensor is sent to ECM under heavy load driving condition. 	Harness or connectors (The sensor circuit is open or shorted.) Intake air leaks MAF sensor EVAP control system pressure sensor 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. Start engine and warm it up to normal operating temperature.
- Drive the vehicle for at least 5 seconds under the following conditions: CAUTION:

Always drive vehicle at a safe speed.

Selector lever	Suitable position
Vehicle speed	40 km/h (25 MPH) or more

NOTE:

P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- The gear must be fixed while driving the vehicle.
- Keep the accelerator pedal as steady as possible during cruising.
- 3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-795, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463180

CHECK INTAKE SYSTEM

Check the following items to see the installation condition and the connection condition of the joint.

- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

Is the inspection result normal?

>> GO TO 2. YES

NO >> Reconnect and replace error-detected parts.

2. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect MAF sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between MAF sensor harness connector and ground.

DTC		MAF sensor	Ground	Voltage	
DIC	Bank	ank Connector Terminal			Ground
P0101	1	F31	5	Ground	Battery
P010B	2	F42	5	Giodila	voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.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 or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

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EC-795 Revision: 2013 February

DTC	MAF sensor		ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0101	1	F31	4	F102	68	Existed
P010B	2	F42	4	F102	94	EXISTEC

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

Is the inspection result normal?

YES >> GO TO 6.

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

6.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	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0101	1	F31	3	F102	77	Existed
P010B	2	F42	3	F102	79	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

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

7. CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor (bank 1). Refer to EC-809, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

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

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-958, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor.

9. CHECK MAF SENSOR

Check MAF sensor. Refer to EC-796, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace malfunctioning mass air flow sensor.

10. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463181

1. CHECK MASS AIR FLOW SENSOR-I

(P)With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- Connect CONSULT 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.)	0.7 - 1.1
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*

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

♥Without CONSULT

- Turn ignition switch OFF.
- 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 [MAF sensor (bank 1) signal]	T	sensor (bank 1) 68	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	. ,		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4
	79	79 [MAF sensor (bank 2) 94 signal]	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
[IVIP			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.1 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.
- 2. 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 parts

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

(P)With CONSULT

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

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Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1 MAS A/F SE-B2	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*

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

♥Without CONSULT

- Repair or replace malfunctioning part.
- Start engine and warm it up to normal operating temperature.
- 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 [MAF sensor (bank 1) signal]	68	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1	
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	
F102			Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*	
F102		79 [MAF sensor (bank 2) 94 signal]	Ignition switch ON (Engine stopped.)	Approx. 0.4	
			Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1	
•	. ,		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	
			Idle to about 4,000 rpm	0.7 - 1.1 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

(P)With CONSULT

- 1. Turn ignition switch OFF.
- 2. Disconnect mass air flow sensor harness connector and reconnect it again.
- Start engine and warm it up to normal operating temperature.
- 4. Connect CONSULT 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 MAS A/F SE-B2	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*

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

Without CONSULT

- 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.

P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
77 [MAF sensor (bank 1) signal]		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1	
	` '	ank 1) 68	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*
F 102		79 AF sensor (bank 2) 94 signal]	Ignition switch ON (Engine stopped.)	Approx. 0.4
[MAF sensor			Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	• ,		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.1 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. Refer to EM-28, "Exploded View".

EC-799 Revision: 2013 February 2012 G Sedan

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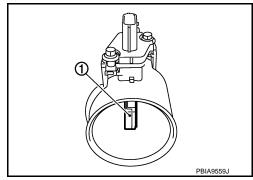
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Description INFOID:000000007463182

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.



DTC Logic

INFOID:0000000007463183

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	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.
- Check DTC.

Is DTC detected?

YES >> Go to EC-801, "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.

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< DTC/CIRCU	JIT DIA	GNOSIS >	·	,	o, i o i o o i i i i i i i i i i i i i i	[VQ25HR FOR USA AND CANADA]	
Is DTC detect	ed?						
	o to <u>EC</u> O TO 4	-801, "Diag	nosis Proc	edure".			Α
4.PERFORM	DTC C	ONFIRMA	TION PRO	CEDURE	FOR DTC P010	03 AND P010D-II	F0
		wait at leas	t 5 seconds	S.			EC
Check DT Is DTC detect							
YES >> G	o to <u>EC</u>	-801, "Diag TION END	inosis Proc	edure".			С
Diagnosis I	Proce	dure				INFOID:000000007463184	D
1.INSPECTION	ON STA	.RT					
Confirm the de	etected	DTC.					Е
Which DTC is	detecte	<u>ed?</u>					
P0102, P010							F
P0103, P010 2.CHECK IN							
Check the following			nn .				0
 Air duct 		or connection	JII.				G
Vacuum hosIntake air pa		netween air	duct to inte	ake mani	fold		
Is the inspecti	_		addi to inte	are man	iola		Н
	O TO 3						
_		ct the parts					
3.CHECK GF			IION				
 Turn igniti Check ard 			95. Refer to	Ground	Inspection in GI	-46, "Circuit Inspection".	J
Is the inspecti							
	O TO 4						17
NO >> R 4.CHECK MA	•	replace gr			шт		K
 Disconne Turn igniti 		air flow (M ch ON.	Ar) sensor	namess	connector.		L
3. Check the	e voltage	e between I	MAF senso	r harness	s connector and	ground.	
		MAF sens	or				\mathbb{N}
DTC	Bank	Connector	Terminal	Ground	Voltage		
P0102, P0103	1	F31	5				N
P010C, P010D	2	F42	5	Ground	Battery voltage		
la tha inant!		14 10	l .				

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 or short to ground or short to power in harness or connectors.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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			ECM		Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0102, P0103	1	F31	4	F102	68	Existed	
P010C, P010D	2	F42	4	1 102	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 or 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	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0102, P0103	1	F31	3	F102	77	Existed	
P010C, P010D	2	F42	3	F102	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 or short to ground or short to power in harness or connectors.

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-802, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning mass air flow sensor. Refer to EM-28. "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463185

1. CHECK MASS AIR FLOW SENSOR-I

(P)With CONSULT

- 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 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 MAS A/F SE-B2	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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

♥Without CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 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 [MAF sensor (bank 1)	68	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1	
	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 - 1.1 to Approx. 2.4'	
F 102		94	Ignition switch ON (Engine stopped.)	Approx. 0.4	
	79		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1	
	[MAF sensor (bank 2) signal]		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	
			Idle to about 4,000 rpm	0.7 - 1.1 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.
- 2. 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 parts

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

(P)With CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- Connect CONSULT and select "DATA MONITOR" mode.
- 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 MAS A/F SE-B2	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*

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

Without CONSULT

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

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

3. 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	68	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1	
	[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 - 1.1 to Approx. 2.4*	
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4	
	79		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1	
	[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 - 1.1 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

(I) With CONSULT

- 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 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 - 1.1
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 - 1.1 to Approx. 2.4*

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

Without CONSULT

- 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 >

[VQ25HR FOR USA AND CANADA]

	ECM			
Connector	+ -		Condition	Voltage (V)
Connector	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77	68	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	[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 - 1.1 to Approx. 2.4*
F 102		94	Ignition switch ON (Engine stopped.)	Approx. 0.4
	79		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	[MAF sensor (bank 2) signal]		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.1 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. Refer to EM-28, "Exploded View".

EC-805 Revision: 2013 February 2012 G Sedan

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P0111 IAT SENSOR

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0111	IAT SENSOR 1 B1 [Intake air temperature (IAT) sensor circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the IAT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the IAT sensor circuit) IAT sensor

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Is it necessary to erase permanent DTC?

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

2. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-807, "Component Function Check".

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to <u>EC-807</u>, "<u>Diagnosis Procedure</u>".

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

TESTING CONDITION:

- · Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the food open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

P0111 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is 1st trip DTC detected? YES >> Proceed to EC-807, "Diagnosis Procedure". NO >> INSPECTION END						
	Function END				INTO ID COCCOCCOTTOCT I	
					INFOID:0000000007768544	EC
	AKE AIR TEMPERATUR	E (IAT) SENSOR			
Disconnect	n switch OFF. mass air flow sensor (ba stance between mass air					С
Terminals	Condition		Resistance (kΩ)			D
1 and 2	Temperature [°C (°F)] 2	5 (77)	1.800 – 2.200			
YES >> GO TO 2. NO >> Proceed to EC-807, "Diagnosis Procedure".						E F
Check intermitte	ent incident. Refer to GI-	43, "In	termittent Incide	nt".		
Is the inspection	n result normal? SPECTION END					G
	ceed to <u>EC-807, "Diagno</u>	osis P	rocedure".			
Diagnosis P	rocedure				INFOID:0000000007768545	Н
1.CHECK INTA	AKE AIR TEMPERATUR	E (IAT) SENSOR			
Check intake ai	r temperature sensor. Re	efer to	EC-807, "Comp	onent Inspection".		I
<u> </u>	result normal?					
	_	nsor (v	vith intake air te	mperature sensor) (bank 1)	. Refer to EM-28,	J
2.CHECK INT	ERMITTENT INCIDENT					K
Check intermitte	ent incident. Refer to GI-	43, "In	termittent Incide	<u>nt"</u> .		
>> INS	SPECTION END					L
Component	Inspection				INFOID:0000000007768546	
1.CHECK INTA	AKE AIR TEMPERATUR	E (IAT) SENSOR			M
 Turn ignition switch OFF. Disconnect mass air flow sensor (bank 1) harness connector. Check resistance between mass air flow sensor (bank 1) terminals as follows. 						Ν
Terminals	Condition		Resistance (kΩ)			0
1 and 2		5 (77)	1.800 – 2.200			_
<u> </u>	n result normal?					Р
YES >> INSPECTION END NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to EM-28. "Exploded View".						

P0112, P0113 IAT SENSOR

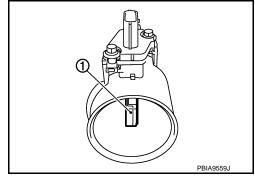
Description INFOID:000000007463186

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.

NOTE:

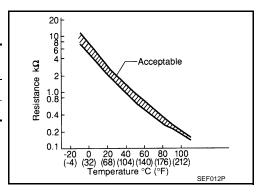
ECM uses only the intake air temperature sensor (bank 1) for engine control and self-diagnosis. It does not use the intake air temperature sensor (bank 2).



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
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).



DTC Logic

INFOID:0000000007463187

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature 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 short-
P0113	Intake air temperature sensor (bank 1) 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.
- Turn ignition switch ON.
- 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-809, "Diagnosis Procedure".

NO >> INSPECTION END

P0112, P0113 IAT SENSOR

INFOID:0000000007463189

< DTC/CIR	CUIT DI	AGNOSIS	>	[VQ25HR FOR USA AND CANADA]
Diagnosi	s Proce	edure		INFOID:0000000007463188
1. CHECK	GROUNI	D CONNE	CTION	
	nition swi			
	•			er to Ground Inspection in GI-46, "Circuit Inspection".
Is the inspe	oction res GO TO		<u> </u>	
_		∠. or replace g	around co	nnection.
_	•			E SENSOR POWER SUPPLY CIRCUIT
-				th intake air temperature sensor) (bank 1) harness connector.
2. Turn ig	nition swi	itch ON.	•	
3. Check	the volta	ge betweei	n mass aii	r flow sensor (bank 1) harness connector and ground.
MAFaana	or (bank 1)			
Connector	Termina	Ground	Voltage	(V)
F31	2	Ground	Approx	, <u> </u>
				X. 5
Is the inspe	GO TO		<u>{</u>	
			t or short t	to ground or short to power in harness or connectors.
3.CHECK	INTAKE	AIR TEMP	ERATURI	E SENSOR GROUND CIRCUIT FOR OPEN AND SHORT
2. Discon	the conti	/I harness		c air flow sensor (bank 1) harness connector and ECM harness con-
MAF senso	or (bank 1)	EC	CM	
Connector	Terminal	Connector	Terminal	Continuity
F31	1	F102	68	Existed
4. Also ch	neck harn	ess for sho	ort to grou	ind and short to power.
Is the inspe	ection res	ult normal	?	
YES >>				to make a long to make a to make a long to be a make a make a make a make a make a make a make a make a make a
		•		to ground or short to power in harness or connectors.
				E SENSOR
Refer to EC				<u>n"</u> .
Is the inspe			<u> </u>	
			flow sen	sor (with intake air temperature sensor) (bank 1). Refer to EM-28,
5. CHECK			ICIDENT	
Refer to GI				
>>	NSPEC	TION END)	

Component Inspection

1.CHECK INTAKE AIR TEMPERATURE SENSOR

- 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.

EC-809 Revision: 2013 February 2012 G Sedan

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Terminals	Condition	Resistance ($k\Omega$)	
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 (with intake air temperature sensor) (bank 1). Refer to <u>EM-28</u>, <u>"Exploded View"</u>.

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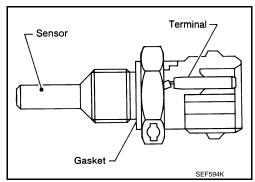
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P0116 ECT SENSOR

Description INFOID:000000007463190

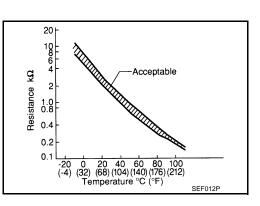
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-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).



INFOID:0000000007463191

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC [Engine coolant temperature (ECT) sensor circuit range/per- formance]	The comparison result of signals transmitted to ECM from each temperature sensor (ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the ECT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the ECT sensor circuit) ECT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-812, "Component Function Check".

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-813, "Diagnosis Procedure".

Revision: 2013 February EC-811 2012 G Sedan

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

TESTING CONDITION:

- · Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 4.

f 4 . PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

The vehicle must be cooled with the hood open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-813, "Diagnosis Procedure".

>> INSPECTION END NO

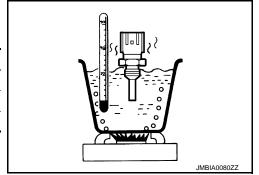
Component Function Check

INFOID:0000000007463192

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect ECT sensor harness connector.
- Remove ECT sensor. Refer to <u>CO-32, "VQ37VHR : Exploded View"</u>.
 Check resistance between ECT sensor terminals by heating <u>I</u> 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 >> GO TO 2.

NO >> Proceed to EC-813, "Diagnosis Procedure".

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

>> Proceed to EC-813, "Diagnosis Procedure". NO

P0116 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Diagnosis Procedure

INFOID:0000000007463193

1. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Check ECT sensor. Refer to EC-816, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace ECT sensor. Refer to CO-32, "VQ37VHR: Exploded View".

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

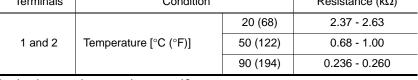
Component Inspection

INFOID:0000000007463194

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- Disconnect engine coolant temperature sensor harness connector. 2.
- Remove engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".
- Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

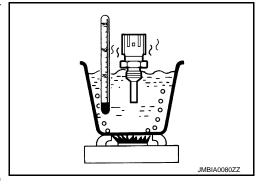
Terminals	Condition	Resistance ($k\Omega$)	
		20 (68)	2.37 - 2.63
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".



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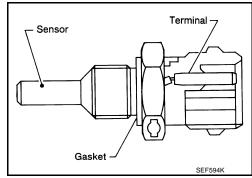
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P0117, P0118 ECT SENSOR

Description INFOID:000000007463195

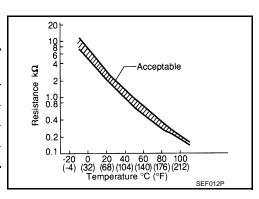
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-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).



INFOID:0000000007463196

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0117	Engine coolant tem- perature sensor cir- cuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.) Engine coolant temperature sensor	
P0118	Engine coolant tem- perature sensor cir- cuit 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

- Turn ignition switch ON and wait at least 5 seconds.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-815, "Diagnosis Procedure".

NO >> INSPECTION END

Revision: 2013 February EC-814 2012 G Sedan

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Diagnosi	s Proce	dure			INFOID:0000000074631	
1. CHECK	GROUNE	CONNE	CTION			А
2. Check Is the insper	ection results GO TO 2	onnection ult normal? 2.	<u> </u>		nd Inspection in GI-46, "Circuit Inspection".	EC
NO >> 2.CHECK	> Repair o				CUIT	C
1. Discon 2. Turn ig	nect engir	ne coolant tch ON.	temperati	ure (ECT)	sensor harness connector. ss connector and ground.	D
ECT	sensor					Е
Connector	Terminal	Ground	Voltage	(V)		
F17	1	Ground	Approx	. 5		F
Is the inspe	ection resu	ılt normal?)			
	> GO TO 4 > GO TO 3	3.	IG PART			G
Check the		1011011111	10 17(10)			- н
• Harness		s F106, F	107			П
• Harness	for open o	r short be	tween EC	Γ sensor a	and ECM	
4		-		•	or short to power in harness or connectors.	
			JUND CIF	RCUII FO	R OPEN AND SHORT	_ J
	Inition swit		connector			
					ness connector and ECM harness connector.	
					_	K
ECT s	ensor	EC	M	Continuity		
Connector		Connector	Terminal		_	L
F17	2	F102	84	Existed	-	
4. Also ch			•	nd and sn	ort to power.	M
	SO TO 5		_			IVI
			or short t	o ground o	or short to power in harness or connectors.	
5.CHECK	ENGINE	COOLAN	Т ТЕМРЕГ	RATURE	SENSOR	Ν
Refer to EC	C-816, "Co	mponent	Inspection	<u>"</u> .		_
Is the inspe			<u>-</u>			0
	> GO TO 6		-l		Potento CO 20 IIV/027//UD - 5111-//	
_	•	•	-	perature s	ensor. Refer to CO-32, "VQ37VHR: Exploded View".	_
6.CHECK						_ P
Refer to GI	<u>-43, "Inter</u>	<u>mittent Inc</u>	<u>cident"</u> .			

>> INSPECTION END

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

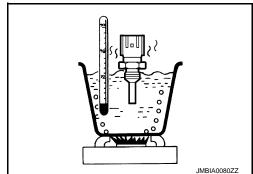
Component Inspection

INFOID:0000000007463198

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. Refer to CO-32, "VQ37VHR: Exploded View".
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)	
		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

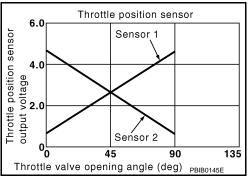
NO

>> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".

Description INFOID:0000000007463199

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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic INFOID:0000000007463200

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-995, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 (bank 1) circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	
P0123	Throttle position sensor 2 (bank 1) circuit high input	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 input	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 input	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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2 PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

>> Go to EC-818, "Diagnosis Procedure". YES

NO >> INSPECTION END

EC-817 Revision: 2013 February 2012 G Sedan

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Diagnosis Procedure

INFOID:0000000007463201

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

- 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	Electric throttle control actuator			Ground	Voltage (V)
DIO	Bank	Connector	Terminal	Ground	voltage (v)
P0122, P0123	1	F6	1	Ground	Approx. 5
P0227, P0228	2	F27	1	Ground	дриох. 3

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK THROTTLE POSITION SENSOR 2 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	Electric throttle control actuator		ECM		Continuity	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0122, P0123	1	F6	4	F101	40	Existed
P0227, P0228	2	F27	4	FIUI	48	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 or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator		ECM		Continuity	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0122, P0123	1	F6	3	F101	34	Existed
P0227, P0228	2	F27	3	1 101	35	LAISIEU

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 or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK THROTTLE POSITION SENSOR

Refer to EC-819, "Component Inspection".

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.replace electric throttle control actuator

Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".

Go to EC-819, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK THROTTLE POSITION SENSOR

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- Perform EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- Turn ignition switch ON.
- 5. Set selector lever to D position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM				
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
	30	40	Accelerator pedal: Fully released	More than 0.36
I	[TP sensor 1 (bank 1)]	Accelerator pedal: Fully depressed	Less than 4.75	
	31 [TP sensor 1 (bank 2)]	48	Accelerator pedal: Fully released	More than 0.36
F101			Accelerator pedal: Fully depressed	Less than 4.75
FIUI	34	40	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 1)]	40	Accelerator pedal: Fully depressed	More than 0.36
	35	48	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 2)]		Accelerator pedal: Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".
- Go to EC-819, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

EC-819 Revision: 2013 February 2012 G Sedan

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INFOID:0000000007463203

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

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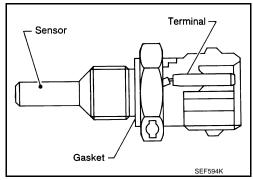
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P0125 ECT SENSOR

Description INFOID:0000000007463204

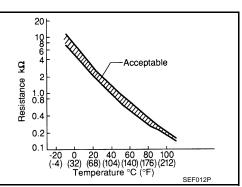
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-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).



INFOID:0000000007463205

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-814, "DTC Logic".

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.

- 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.

>> GO TO 2.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

(P)With CONSULT

- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- Check that "COOLAN TEMP/S" is above 10°C (50°F).

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EC-821 Revision: 2013 February 2012 G Sedan

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

With GST

Follow the procedure "With CONSULT" above.

Is it above 10°C (50°F)?

YES >> INSPECTION END

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

1. 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 because the test result will be OK.

CAUTION:

Be careful not to overheat engine.

2. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> EC-822, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463206

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-822, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace engine coolant temperature sensor. Refer to EM-30, "Exploded View".

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 <u>CO-28</u>, "Removal and Installation".

4. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463207

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect engine coolant temperature sensor harness connector.
- Remove engine coolant temperature sensor. Refer to <u>CO-32, "VQ37VHR: Exploded View"</u>.

P0125 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance ($k\Omega$)
'-		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. Refer to CO-32, "VQ37VHR: Exploded View".

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P0127 IAT SENSOR

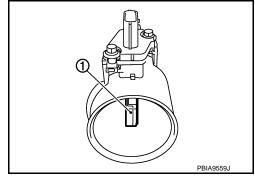
Description INFOID:000000007463208

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.

NOTE:

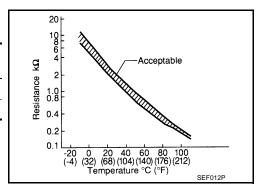
ECM uses only the intake air temperature sensor (bank 1) for engine control and self-diagnosis. It does not use the intake air temperature sensor (bank 2).



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
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).



DTC Logic

INFOID:0000000007463209

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

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:

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

With CONSULT

- 1. Wait until engine coolant temperature is less than 96°C (205°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- Check the engine coolant temperature.

P0127 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine. NOTE: Perform the following steps before engine coolant temperature is above 96°C (205°F).	А				
Perform the following steps before engine coolant temperature is above 96°C (205°F). 2. Turn ignition switch ON. 3. Select "DATA MONITOR" mode with CONSULT.	EC				
 Start engine. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds. CAUTION: Always drive vehicle at a safe speed. Check 1st trip DTC. 					
With GST Follow the procedure "With CONSULT" above.	D				
Is 1st trip DTC detected? YES >> Go to EC-825, "Diagnosis Procedure". NO >> INSPECTION END	Е				
Diagnosis Procedure	_				
1. CHECK GROUND CONNECTION	F				
 Turn ignition switch OFF. Check ground connection M95. Refer to Ground Inspection in <u>GI-46. "Circuit Inspection"</u>. 	G				
YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK INTAKE AIR TEMPERATURE SENSOR	Н				
Refer to EC-825, "Component Inspection".	ı				
Is the inspection result normal?					
YES >> GO TO 3. NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor). Refer to EM-28 . "Exploded View".	J				
3. CHECK INTERMITTENT INCIDENT	1.6				
Refer to GI-43. "Intermittent Incident".	K				
>> INSPECTION END	ı				
Component Inspection					
1. CHECK INTAKE AIR TEMPERATURE SENSOR					
 Turn ignition switch OFF. Disconnect mass air flow sensor (bank 1) harness connector. Check resistance between mass air flow sensor (bank 1) terminals as follows. 	N				
Terminals Condition Resistance (kΩ)					
1 and 2	0				
Is the inspection result normal? YES >> INSPECTION END NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to EM-28, "Exploded View".	Р				

P0128 THERMOSTAT FUNCTION

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303, P0304, P0305 or P306, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304, P0305, P0306. Refer to <u>EC-894, "DTC Logic"</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 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 engine has run long enough.	ThermostatLeakage from sealing portion of thermostatEngine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

NOTE:

Never refuel before and during the following 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.

>> GO TO 2.

2.PRECONDITIONING-II

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Check the following conditions:

Ambient temperature	−7°C (19°F) or more
A/C switch	OFF
Blower fan switch	OFF

- 3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
- Check the following conditions:

COOLAN TEMP/S	-10°C - 69°C (14 - 156°F)

Is the condition satisfied?

YES >> GO TO 3.

NO >> 1. Satisfy the condition.

2. GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

- Start engine.
- 2. Drive the vehicle until the following condition is satisfied.

CAUTION:

Always drive vehicle at safe speed.

STEP 1

Drive the vehicle under the conditions instructed below until the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" becomes at least 25°C (45°F).

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

COOLAN TEMP/S	75°C (167	7°F) or less	•	Α
FUEL T/TMP SE		the value calculated by subtracting Pr) from "COOLAN TEMP/S".*	· 	
*: Example	'		•	EC
COOLAN TEM	P/S	FUEL T/TMP SE		
70°C (158°F)		45°C (113°F) or less		С
65°C (149°F)		40°C (104°F) or less		
60°C (140°F)	35°C (95°F) or less		
T/TMP SE" main NOTE: Keep the accelera - STEP 3	ntained at tor pedal a	25°C (45°F) or more. as steady as possible during cro	erence between "COOLAN TEMP/S" and "FUEL uising. AN TEMP/S" increases by 6°C (11°F).	D E
Keep the accelerated Is the condition satisticated YES >> GO TO NO >> GO TO	fied? 4. 1.	as steady as possible during cru	uising.	G
T.PERFORM DIC	CONFIRM	MATION PROCEDURE-II		Н
COOLAN TEMP/S CAUTION: Always drive volume 2. Check 1st trip D	ehicle at s	following condition is satisfied. 75°C (167°F) or more safe speed.	•	J
Is 1st trip DTC detection				
•	to <u>EC-82</u>	7, "Diagnosis Procedure". D		K
Diagnosis Proce	edure		INFOID:000000007768548	ı
1.CHECK ENGINE	COOLAN	T TEMPERATURE SENSOR		_
Refer to EC-827, "C Is the inspection res YES >> INSPEC NO >> Replace	ult normal	?		M
Component Insp		,	INFOID:000000007768549	
		T TEMPERATURE SENSOR	INF-01D:000000007768549	0
 Turn ignition sw Disconnect engine 	itch OFF. ne coolan	t temperature sensor harness of the mperature sensor.	connector.	Ρ

P0128 THERMOSTAT FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

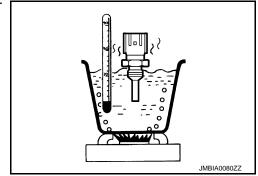
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (kΩ)
1 and 2 Temperature [°C (°F)]	20 (68)	2.10 - 2.90	
	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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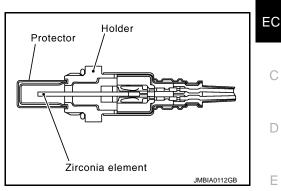
P0130, P0150 A/F SENSOR 1

Description INFOID:0000000007463212

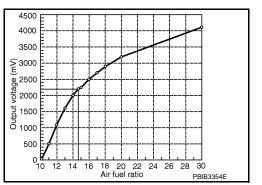
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 INFOID:0000000007463213

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 fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
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 the range other than approx. 2.2 V.		
	(bank 1) circuit	B) The A/F signal computed by ECM from the A 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 the range other than approx. 2.2 V.	or shorted.) • A/F sensor 1
(bai	(bank 2) circuit	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	

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.
- Turn ignition switch ON.
- 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 FOR MALFUNCTION A

- 1. Start engine and warm it up to normal operating temperature.
- 2. Let it idle for 2 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-831, "Diagnosis Procedure".

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: 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.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Does the indication fluctuates around 2.2 V?

YES >> GO TO 4.

NO >> Go to <u>EC-831</u>, "<u>Diagnosis Procedure</u>".

f 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.
- 2. Touch "START".
- 3. When the following conditions are met, "TESTING" will be displayed on the CONSULT screen.

ENG SPEED	1,000 - 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

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 screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 3.

${f 5}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake during 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 screen?

YES >> INSPECTION END

NO >> Go to EC-831, "Diagnosis Procedure".

/.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-831, "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?

YES >> INSPECTION END

P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

NO >> Go to EC-831, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007463214

1. PERFORM COMPONENT FUNCTION CHECK

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- Start engine and warm it up to normal operating temperature.
- Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
- Shift the selector lever to D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

Never apply brake during releasing the accelerator pedal.

- Repeat steps 2 to 3 for five times.
- 5. Stop the vehicle and turn ignition switch OFF.
- Wait at least 10 seconds and restart engine.
- Repeat steps 2 to 3 for five times.
- 8. Stop the vehicle and connect GST to the vehicle.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-831, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463215

CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect A/F sensor 1 harness connector.
- Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F sensor 1			Voltage
	Bank	Connector	Terminal	Ground	voltage
P0130	1	F66	4	Ground	Battery voltage
P0150	2	F67	4	Ground	battery voltage

Is the inspection result normal?

YES >> GO TO 4.

>> GO TO 3. NO

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- 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.

f 4 .CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Turn ignition switch OFF.

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- 2. Disconnect ECM harness connector.
- 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	1 F66			57		
P0130		F00	2	F102	61	Existed	
P0150	2	F67	1	1 102	65		
P0150	2 107	2		66			

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity	
DIC	Bank Connector Terr		Terminal	Giodila	Continuity	
P0130	1	F66	1			
F0130	'	1 00	2	Ground	Not existed	
P0150	2	E67	1	Giodila	Not existed	
F0130	2 F67		2			

DTC	EC	CM	Ground	Continuity	
DIC	Connector Terminal		Giodila	Continuity	
P0130		57		Not existed	
F0130	F102	61	Ground		
P0150		65			
F0130		66			

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to <u>EM-35, "Exploded View"</u>. **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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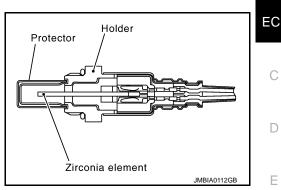
P0131, P0151 A/F SENSOR 1

Description INFOID:0000000007463216

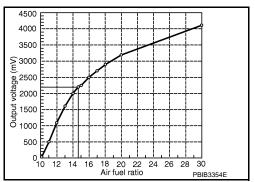
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 INFOID:0000000007463217

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 low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
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

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.
- 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

(P)With CONSULT

- Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

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P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 0 V?

YES >> Go to EC-834, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
- 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.

3. 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 the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step
- 4. Check 1st trip DTC.

®With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-834, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463218

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage	
	Bank	Connector	Terminal	Giodila	vollage	
P0131	1	F66	4	Ground	Battery voltage	
P0151	2	F67	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 E25, F30
- IPDM E/R harness connector E7

P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 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 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 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
P0131	1	F66	1		57	
PUISI	'	1 00	2	F102	61	Existed
P0151	2 F67	F67	1	1 102	65	
PU151		2		66		

Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity	
DIC	Bank Connector T		Terminal	Giodila	Continuity	
P0131	1	F66	1			
FUISI	ı	1 00	2	Ground	Not existed	
P0151	2	E67	1	Giodila	Not existed	
P0151	2 F67	2				

DTC	EC	CM	Ground	Continuity	
DIC	Connector Terminal		Ground	Continuity	
P0131		57			
P0131	F102	61	Ground	Not existed	
P0151	1 102	65			
		66			

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

$\mathbf{5}.$ check intermittent incident

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

O.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-35, "Exploded View".

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).

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P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

>> INSPECTION END

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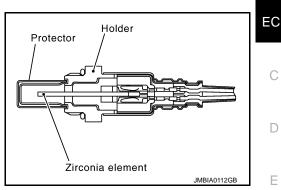
P0132, P0152 A/F SENSOR 1

Description INFOID:0000000007463219

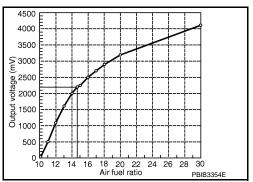
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 INFOID:0000000007463220

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.
- Turn ignition switch ON.
- 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

(P)With CONSULT

- Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

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P0132, P0152 A/F SENSOR 1

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 5 V?

YES >> Go to EC-838, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
- 2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

Always drive vehicle at a safe speed.

3. 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 the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step
- 4. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC is detected?

YES >> Go to EC-838, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463221

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F sensor	Ground	Voltage		
DIC	Bank	Connector	Terminal	Giodila	voitage	
P0132	1	F66	4	Ground	Battery voltage	
P0152	2	F67	4	Glound		

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- IPDM E/R harness connector E7

P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 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 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	
P0132	20132 1		1		57		
F0132	'	F66	2	F102	61	Existed	
P0152	2	F67	1	1 102	65	LAISIEU	
FU152	2 107	107	2		66		

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC		A/F sensor	Ground	Continuity	
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0132	1	F66	1		
F0132	'	1 00	2	Ground	Not existed
P0152	2	E67	1	Giodila	
F0152	2 F67		2		

DTC	EC	CM	Ground	Continuity	
DIC	Connector	Terminal	Ground		
P0132		57			
F0132	F102	61	Ground	Not existed	
P0152		65	Giodila		
		66			

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to <u>EM-35. "Exploded View"</u>.

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).

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P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

>> INSPECTION END

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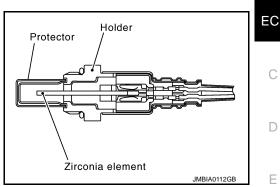
P0133, P0153 A/F SENSOR 1

Description INFOID:0000000007463222

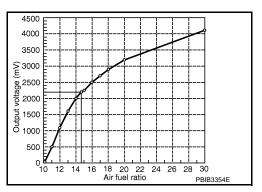
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 INFOID:0000000007463223

DTC DETECTION LOGIC

To judge the malfunction of A/F sensor 1, 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 response		Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
P0153	Air fuel ratio (A/F) sensor 1 (bank 2) circuit slow response	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

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

Will CONSULT be used?

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P0133, P0153 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> GO TO 2. NO >> GO TO 5.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(I) With CONSULT

- Start engine and warm it up to normal operating temperature.
- 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.
- 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.
- 6. Touch "START".

Is "COMPLETED" displayed on CONSULT screen?

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

3.perform dtc confirmation procedure-ii $\,$

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-843, "Diagnosis Procedure".

f 4 .PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. After perform the following procedure, "TESTING" will be displayed on the CONSULT screen.
- Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
- Fully release accelerator pedal and then let engine idle for about 10 seconds.

If "TESTING" is not displayed after 10 seconds, refer to EC-761, "Component Function Check".

- Wait for about 20 seconds at idle under the condition that "TESTING" is displayed on the CONSULT screen.
- 3. Check that "TESTING" changes to "COMPLETED".

If "TESTING" changed to "OUT OF CONDITION", refer to EC-761, "Component Function Check".

4. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-843, "Diagnosis Procedure".

5.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select Service \$01 with GST.
- 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.

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

>> Repair or replace malfunctioning part.

7. PERFORM DTC CONFIRMATION PROCEDURE

- 1. 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 under no load.
- Let engine idle for 1 minute.
- Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
- Fully release accelerator pedal and then let engine idle for about 1 minute.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-843, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YFS >> GO TO 2.

NO >> Repair or replace ground connection.

2.RETIGHTEN A/F SENSOR 1

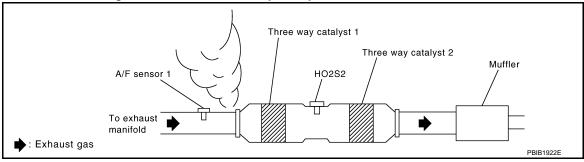
Loosen and retighten the A/F sensor 1. Refer to EM-35, "Exploded View".

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

Start engine and run it at idle.

Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 5.

${f 5}$.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to EC-640, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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?

>> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-867, "DTC Logic" YES or EC-871, "DTC Logic".

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< DTC/CIRCUIT DIAGNOSIS >

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 sensor	r 1	Ground	Voltage	
ыс	Bank	Connector			voltage	
P0133	1	F66	4	Ground	Battery voltage	
P0153	2	F67	4	Giodila		

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- 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.

$8. \mathsf{CHECK}$ 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	nk Connector Term		Connector	Terminal	Continuity
P0133	1	F66	1		57	
F0133	'	1 00	2	F102	61	Existed
P0153	2 F67	F67	1	1102	65	LAISIEU
FU103		2		66		

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC			A/F sensor	Ground	Continuity	
	DIC	Bank	Connector	Terminal	Giodila	Continuity
	P0133	1	F66	1		Not existed
	1 0133	'	1 00	2	Ground	
	P0153	53 2	F67	1	Giodila	
	F0103			2		

DTC	EC	CM	Ground	Continuity	
DIC	Connector	Terminal	Giodila		
P0133		57			
F0133	F102	61	Ground	Not existed	
P0153		65	Giodila		
F0155		66			

5. Also check harness for short to power.

Is the inspection result normal?

P0133, P0153 A/F SENSOR 1

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< DTC/CIRCUIT DIAGNOSIS > I	VQ25HR FOR USA AND CANADA]
YES >> GO TO 9.	harnosa or connectors
NO >> Repair open circuit or short to ground or short to power in I $9.CHECK$ AIR FUEL RATIO (A/F) SENSOR 1 HEATER	narness or connectors.
Refer to EC-784, "Component Inspection".	
Is the inspection result normal?	E
YES >> GO TO 10.	
NO >> GO TO 13. 10.check mass air flow sensor	
Check both mass air flow sensor (bank 1 and bank 2).	
Refer to EC-796, "Component Inspection".	
s the inspection result normal? YES >> GO TO 11.	
NO >> Replace malfunctioning mass air flow sensor. Refer to EM-	-28, "Exploded View".
11.check pcv valve	
Refer to EC-1109, "Component Inspection".	
s the inspection result normal?	
YES >> GO TO 12. NO >> Repair or replace PCV valve. Refer to EM-47, "Exploded \(\)	/iew"
12. CHECK INTERMITTENT INCIDENT	
Perform GI-43, "Intermittent Incident".	
s the inspection result normal?	
YES >> GO TO 13.	
NO >> Repair or replace malfunctioning part.	
13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1	
Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to <u>EM-35. "E</u> CAUTION:	Exploded View".
Discard any A/F sensor which has been dropped from a height	t 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 thre • Cleaner [commercial service tool (J-43897-18 or J-43897-12)] (commercial service tool).	
>> INSPECTION END	
	,

P0137, P0157 HO2S2

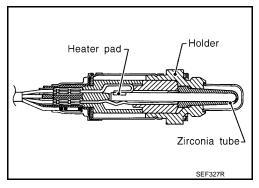
Description INFOID:000000007463225

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.

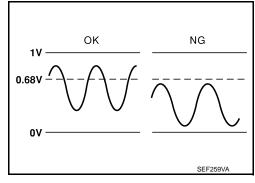


DTC Logic

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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 maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 (bank 1) circuit low voltage	The maximum voltage from the sensor is not	Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2
P0157	Heated oxygen sensor 2 (bank 2) circuit low voltage	reached to the specified voltage.	Fuel pressureFuel 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.
- Turn ignition switch OFF and wait at least 10 seconds.

Will CONSULT be used?

YES >> GO TO 2. NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE

(A) With CONSULT

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.

P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- Turn ignition switch ON.
- 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.
- 6. Let engine idle for 1 minute.
- Select "DATA MONITOR" mode with CONSULT.
- Check 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).

- Open engine hood.
- 10. Select "HO2S2 (B1) P1147" (for DTC P0137) or "HO2S2 (B2) P1167" (for DTC P0157) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- 11. Follow the instruction of CONSULT.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-848, "Diagnosis Procedure".

CANNOT BE DIAGNOSED>>GO TO 3.

3.perform dtc confirmation procedure again

- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- Perform DTC confirmation procedure again.

>> GO TO 2.

4. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

Perform component function check. Refer to EC-847, "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-848, "Diagnosis Procedure".

Component Function Check

 ${f 1}$.PERFORM COMPONENT FUNCTION CHECK-I

⋈Without CONSULT

- Start engine and warm it up to the normal operating temperature.
- 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.
- 4. Let engine idle for 1 minute.
- Check the voltage between ECM harness connector terminals under the following condition.

			ECM				
	DTC	Connector	+	_	Condition	Voltage	
		Connector	Terminal Terminal				
	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

NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.

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	ECM				
DTC	Connector	+	-	Condition	Voltage
	Terminal Terminal				
P0137	F102	76	84	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at
P0157	1 102	80	04	Reeping engine at tale for 10 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			Voltage
DTC	Connector	+	-	Condition	
Connector	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	80		04	sition	least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-848, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463228

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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-640, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".</u>
- 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 EC-867, "DTC Logic".

NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- Disconnect ECM harness connector.
- Check the continuity between HO2S2 harness connector and ECM harness connector.

D.	тс	HO2S2			EC	Continuity	
D	10	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0	137	1	F54	1	F102	84	Existed
P0	157	2	F53	1	1 102	04	LAISIGU

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

Is the inspection result normal?

YES >> GO TO 4.

[VQ25HR FOR USA AND CANADA]

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

f 4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	Continuity	
Bank		Connector	Terminal	Connector	Terminal	Continuity
P0137	1	F54	4	F102	76	Existed
P0157	2	F53	4	1 102	80	LAISIEU

Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity	
ыс	Bank	Connector	Terminal	Giodila	Continuity
P0137	1	F54	4	Ground	Not existed
P0157	2	F53	4	Giouna	NOT EXISTED

DTC	EC	CM	Ground	Continuity	
DIC	Connector	Terminal	Giodila	Continuity	
P0137	F102	76	Ground	Not existed	
P0157	1 102	80	Ground	INOL EXISTED	

Also check harness for short to power.

Is the inspection result normal?

>> GO TO 5. YES

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

${f 5.}$ CHECK HEATED OXYGEN SENSOR 2

Refer to EC-849, "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. Refer to EX-5, "Exploded View".

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

.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1.INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

YES >> GO TO 2.

Revision: 2013 February

EC-849

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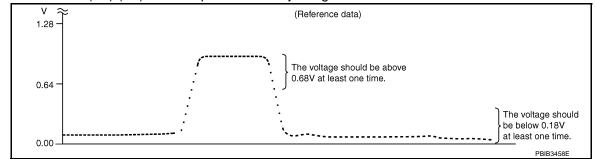
INFOID:0000000007463229

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

(P)With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- 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

- 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		
F400	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. The voltage should be below 0.18 V at least once during this procedure.
F102	80 [HO2S2 (bank 2)]			

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.

[VQ25HR FOR USA AND CANADA]

ECM				
Connector	+ -		Condition	Voltage
Connector -	Terminal	Terminal		
F102 -	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. The voltage should be below 0.18 V at least once during this procedure.
	80 [HO2S2 (bank 2)]			

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.

ECM					
Connector	+	_	Condition	Voltage	
	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)]	84	Coasting from 80 km/h (50 MPH) in D position	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.	
	80 [HO2S2 (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. Refer to <u>EX-5</u>, "<u>Exploded View</u>".

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

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P0138, P0158 HO2S2

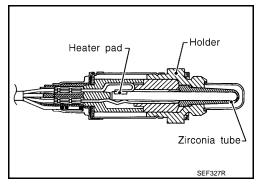
Description INFOID:000000007463230

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

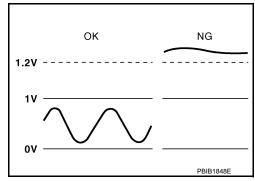
INFOID:0000000007463231

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.

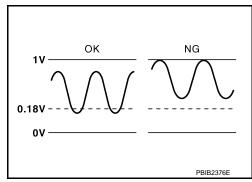
MALFUNCTION A

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition 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 voltage	В)	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

P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

DIC/CIF	RCUIT DIAGNOSIS >	•	[٧٧	ZORK FOR USA AND CANADA
DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
	Heated ovviden sensor?	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
P0158 Heated oxygen sensor 2 (bank 2) circuit high voltage		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
TC CON	FIRMATION PROC	EDU	RE	
.PRECO	NDITIONING			
		has	been previously conducted, alway	s perform the following procedure
	ducting the next test. Inition switch OFF and	l wait	t at least 10 seconds.	
. Turn ig	nition switch ON.			
. ruirig	gnition switch OFF and	ı wan	t at least 10 seconds.	
>>	> GO TO 2.			
.PERFO	RM DTC CONFIRMAT	TION	PROCEDURE FOR MALFUNCTION	N A
			e normal operating temperature.	
	gnition switch OFF and gnition switch ON.	l wait	t at least 10 seconds.	
. Turn ig	nition switch OFF and			
	ngine and keep the en gine idle for 2 minutes		speed between 3,500 and 4,000 rpm	n for at least 1 minute under no load
	1st trip DTC.	•		
-	OTC detected?			
	> Go to <u>EC-855, "Diag</u> > With CONSULT: GO			
NO-2 >>	> Without CONSULT: (GO T	O 5.	
.PERFO	RM DTC CONFIRMAT	ΓΙΟΝ	PROCEDURE FOR MALFUNCTION	N B
With Co	ONSULT			
IOTE: or better	results, perform "DT	c w	ORK SUPPORT" at a temperature	of 0 to 30 °C (32 to 86 °F).
. Start e	ngine and warm it up	to the	e normal operating temperature.	,
	gnition switch OFF and gnition switch ON.	wan	t at least 10 seconds.	
. Turn ig	nition switch OFF and			
	ngine and keep the en gine idle for 1 minute.	gine	speed between 3,500 and 4,000 rpm	n for at least 1 minute under no load
. Select	"DATA MONITOR" mo			
If not,	warm up engine and g		ndicates more than 70°C (158°F). next step when "COOLAN TEMP/S"	indication reaches to 70°C (158°F)
	engine hood. "HO2S2 (B1) P1146"	' (for	DTC P0138) or "HO2S2 (B2) P116	6" (for DTC P0158) of "H0292" in
"DTC \	NORK SUPPORT" mo	ode v	vith CONSULT.	10 (101 D10 1 0100) 01 110202 11
1. Follow NOTE:	the instruction of COI	NSUL	_T.	
It will to	ake at most 10 minute		til "COMPLETED" is displayed.	
2. Touch	"SELF-DIAG RESULT	S".		

Which is displayed on CONSULT screen?

WINCH IS displayed on CONCOLL Scienti

OK >> INSPECTION END

NG >> Go to EC-855, "Diagnosis Procedure".

CONNOT BE DIAGNOSED>>GO TO 4.

[VQ25HR FOR USA AND CANADA]

f 4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B 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 FOR MALFUNCTION B

Without CONSULT

Perform component function check. Refer to EC-854, "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-855, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007463232

1.PERFORM COMPONENT FUNCTION CHECK-I

⋈Without CONSULT

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

	DTC + - Condition Terminal Terminal Terminal					
DTC			_	Condition	Voltage	
P0138	F102	76	84	Revving up to 4,000 rpm under no load at	The voltage should be below 0.18 V at	
P0158	1 102	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.

DTC	Connector	+ – Condition		Condition	Voltage	
	Connector		Terminal			
P0138	F102	76	84	Keeping engine at idle for 10 minutes	The voltage should be below 0.18 V at	
P0158	1 102	80 Keeping engine at idie ior to minutes		Reeping engine at fulle for 10 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.

[VQ25HR FOR USA AND CANADA]

		ECM				
DTC	Connector	+	_	Condition	Voltage	
	Connector Terminal		Terminal			
P0138	F102	76	84	Coasting from 80 km/h (50 MPH) in D po-		
P0158	1 102	80	04	sition	least once during this procedure.	
Is the ins	pection res	ult norma	<u>l?</u>			
YES :	>> INSPEC	CTION EN	ID			

>> Go to EC-855, "Diagnosis Procedure". NO

Diagnosis Procedure

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-852, "DTC Logic".

Which malfunction is detected?

Α >> GO TO 2

В >> GO TO 9.

2.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK HO2S2 CONNECTOR FOR WATER

- Disconnect heated oxygen sensor 2 harness connector.
- Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace harness or connectors.

f 4.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Disconnect ECM harness connector.
- 2. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		EC	CM	Continuity
DIO	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	1	F102	84	Existed
P0158	2	F53	1	1 102	04	LXISIEU

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 or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	CM	Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	4	F102	76	Existed
P0158	2	F53	4	1 102	80	LXISIEU

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

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DTC		HO2S2	Ground	Continuity	
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0138	1	F54	4	Ground	Not existed
P0158	2	F53	4	Giodila	INOL EXISTED

DTC	EC	CM	Ground	Continuity	
ыс	Connector	Terminal	Oround	Continuity	
P0138	F102	76	Ground	Not existed	
P0158	1 102	80	Giodila	Not existed	

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.

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

O.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-858, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View".

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

8.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 10.

>> Repair or replace ground connection. NO

10.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to EC-640, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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?

>> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-871, "DTC Logic". YES

>> GO TO 11. NO

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect heated oxygen sensor 2 harness connector.

[VQ25HR FOR USA AND CANADA]

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- 3. Disconnect ECM harness connector.
- 4. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	1	F102	84	Existed
P0158	2	F53	1	1 102	04	LXISIEU

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

Is the inspection result normal?

YES >> GO TO 12.

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

12.check ho2s2 input signal circuit for open and short

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

DTC		HO2S2		EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	4	F102	76	Existed
P0158	2	F53	4	1 102	80	LXISIGU

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity	
ыс	Bank	Connector Terminal		Giodila	Continuity
P0138	1	F54	4	Ground	Not existed
P0158	2	F53	4	Giodila	Not existed

DTC	EC	CM	Ground	Continuity	
	Connector	Terminal	Ground		
P0138	F102	76	Ground	Not existed	
P0158	F102	80	Giodila	Not existed	

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

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

13. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-858, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

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14. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View".

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

EC-857

15. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463234

1.INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

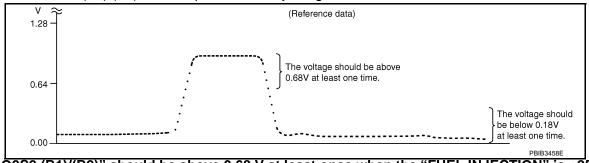
YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

(P)With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to the normal operating temperature.
- 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.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.
- 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

- 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.	
	80 [HO2S2 (bank 2)]		least 10 times	The voltage should be below 0.18 V at least once during this procedure.	

P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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.

ECM					
Connector -	+ -		Condition	Voltage	
	Terminal	Terminal			
F102 -	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.	
	80 [HO2S2 (bank 2)]			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 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

ECM					
Connector	+ -		Condition	Voltage	
	Terminal	Terminal			
F102 -	76 [HO2S2 (bank 1)]	- 84	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.68 V at least once during this procedure.	
	80 [HO2S2 (bank 2)]			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. Refer to EX-5, "Exploded View".

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

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P0139, P0159 HO2S2

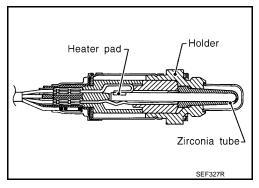
Description INFOID.000000007463235

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 1V in richer conditions to 0V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

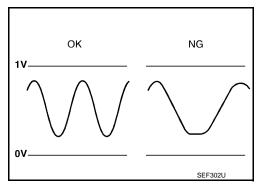


DTC Logic

INFOID:0000000007463236

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 response	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more	Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2
P0159	Heated oxygen sensor 2 (bank 2) circuit slow response	than the specified time computed by ECM.	Fuel systemEVAP systemIntake air system

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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.
- 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.

3.perform dtc confirmation procedure

(P)With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- 7. Let engine idle for 1 minute.
- 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- 9. Drive the vehicle in a proper gear at 60 km/h (38MPH) and maintain the speed.

CAUTION:

Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.

CAUTION:

- Enable the engine brake.
- · Always drive carefully.
- Never apply brake when releasing the accelerator pedal.
- 11. Repeat step 9 and 10 at least 8 times.
- 12. Check the following item of "DATA MONITOR".

DTC	Data monitor item	Status	
P0139	HO2 S2 DIAG1 (B1)		
F0139	HO2 S2 DIAG2 (B1)	CMPLT	
P0159	HO2 S2 DIAG1 (B2)	CIVIPLI	
	HO2 S2 DIAG2 (B2)		

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 6.

NO-1: "CMPLT" is not displayed on DIAG 1>>Perform DTC confirmation procedure again.

NO-2: "CMPLT" is not displayed on DIAG 2>>GO TO 4.

4. PERFORM DTC WORK SUPPORT

- Open engine hood.
- Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 6.

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- Perform DTC confirmation procedure again.

>> GO TO 3.

6.PERFORM SELF-DIAGNOSIS

(P)With CONSULT

Perform ECM self-diagnosis.

Is DTC "P0139" or "P0159" detected?

YES >> Proceed to EC-863, "Diagnosis Procedure".

NO >> INSPECTION END

/ .PERFORM COMPONENT FUNCTION CHECK

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EC-861

Revision: 2013 February

P0139, P0159 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Perform component function check. Refer to EC-862, "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 >> Proceed to EC-863, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007463237

1. PERFORM COMPONENT FUNCTION CHECK-I

⋈Without CONSULT

- 1. Start engine and warm it up to the normal operating temperature.
- 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	Terminal		Condition	Voltage	
		Connector	+	_			
	P0139	F102	76 84		Revving up to 4,000 rpm under no load at		
	P0159	1 102	80	04	least 10 times	0.24 V for 1 second 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 Connecto		Terminal		Condition	Voltage	
	Connector	+	_			
P0139	F102	76 84		Keeping engine at idle for 10 minutes	A change of voltage should be more than	
P0159			04	reeping engine at fale for 10 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			Voltage	
DTC	Connector	+	_	Condition		
	Connector	Terminal	Terminal			
P0139	F102	76	84	Coasting from 80 km/h (50 MPH) on the	A change of voltage should be more than	
P0159			04	suitable gear position	0.24 V for 1 second during this procedure	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-863, "Diagnosis Procedure".

P0139, P0159 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Diagnosis Procedure

INFOID:0000000007463238

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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-640, "MIXTURE RATIO SELF-LEARNING VALUE 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-867, "DTC Logic"</u> or <u>EC-871, "DTC Logic"</u>.

NO >> GO TO 3.

3.check ho2s2 ground circuit for open and short

- 1. Turn ignition switch OFF.
- 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	
P0139	1	F54	1	F102	84	Existed	
P0159	2	F53	1	1 102	04	LAISIEU	

5. 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 HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC		HO2S2		EC	Continuity		
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0139	1	F54	4	F102	76	Existed	
P0159	2	F53	4	1 102	80	LAISIEU	

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity	
	Bank	Connector	Terminal	Giodila	Continuity
P0139	1	F54	4	Ground	Not existed
P0159	2	F53	4	Ground	Not existed

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DTC	ECM			Ground	Continuity
	Bank	Connector	Terminal	Giodila	Continuity
P0139	1	F102	76	Ground	Not existed
P0159	2		80		

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 HEATED OXYGEN SENSOR 2

Refer to EC-864, "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

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463239

1.INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

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

2. CHECK HEATED OXYGEN SENSOR 2

(P)With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT.

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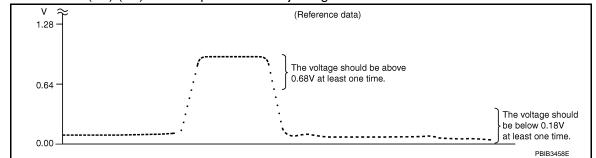
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7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



"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

- 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.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

	ECM				
Connector –	+ -		Condition	Voltage	
	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. The voltage should be below 0.18 V at	
	80 [HO2S2 (bank 2)]			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.

ECM					
Connector -	+ -		Condition	Voltage	
	Terminal	Terminal			
F102 -	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.	
	80 [HO2S2 (bank 2)]			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 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

[VQ25HR FOR USA AND CANADA]

	ECM				
Connector -	+ -		Condition	Voltage	
	Terminal	Terminal			
F102 -	76 [HO2S2 (bank 1)]	84	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.68 V at least once during this procedure.	
	80 [HO2S2 (bank 2)]	04		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. Refer to <u>EX-5</u>, "<u>Exploded View</u>".

- 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

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

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 the A/F sensors 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 lights up 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

- Clear the mixture ratio self-learning value. Refer to <u>EC-640, "MIXTURE RATIO SELF-LEARNING VALUE 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-868, "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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> Go to EC-868, "Diagnosis Procedure".

NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine.
- 3. Maintain the following conditions for at least 10 consecutive minutes. Hole 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.

Is 1st trip DTC detected?

YES >> Go to EC-868, "Diagnosis Procedure".

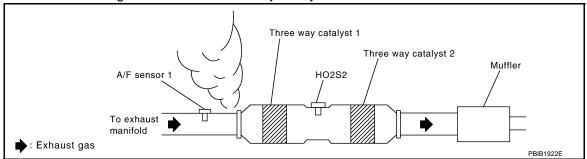
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463241

1. CHECK EXHAUST GAS LEAK

- Start engine and run it at idle.
- Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 2.

2. CHECK FOR INTAKE AIR LEAK

- 1. Listen for an intake air leak after the mass air flow sensor.
- Check PCV hose connection.

Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 3.

${f 3.}$ CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

- Turn ignition switch OFF.
- Disconnect corresponding A/F sensor 1 harness connector.
- 3. Disconnect ECM harness connector.
- 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
P0171	1	F66	1		57	
FUITI	'	1 00	2	F102	61	Existed
P0174	2	F67	1	F102	65	Existed
P0174	2	107	2		66	

5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

DTC		A/F sensor	1	Craund	Continuity
DTC	Bank	Connector	Terminal	Ground	Continuity
P0171	1	F66	1		
F0171 1		F00	2	Ground	Not existed
P0174	2	F67	1	Giodila	Not existed
F0174	2	F07	2		
DTC		ECM	Groui	nd Conti	tinuity
	Conne		al		<u> </u>
P0171		57			
	F102		Groui	nd Not ex	existed
P0174		65			
		66			<u> </u>
		arness for	-	ower.	
-		esult norm	<u>ar?</u>		
	> GO T > Repa		cuit or sho	rt to aroun	nd or short to power in harness or connectors.
	•	PRESSUF		to groun	c. c.lore to postor in namiood of confidence.
				- "Inon oot	stino!!
	•	ure. Refer t esult norm		o, "inspeci	ction
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. DETEC	T MAL	FUNCTIO	NING PAF	RT	
		and fuel tu			
		esult norm		99"'9'	
-				el pump as	ssembly". Refer to FL-5, "Exploded View".
		ir or replac			
.CHECK	MASS	AIR FLO	V SENSO	R	
With CC	NSUL	T			
Install	all rem	oved parts			
					TOR" mode with CONSULT.
For sp With G S		ion, refer t	J <u>⊏U-1108</u>	o, iviass A	Air Flow Sensor".
2		oved parts	<u>.</u>		
Check	mass	air flow ser	nsor signa		ce \$01 with GST.
-					Air Flow Sensor".
	<u>sureme</u> > GO T	ent value w	<u>ıtılılı the S</u>	pecificatio	<u>UII f</u>
			rs for rust	ed termina	nals or loose connections in the mass air flow sensor circuit or
-					sis Procedure".
.CHECK	FUNC	TION OF I	FUEL INJI	ECTOR	
With CC)NSUI	т			
Start e		•			
					TEST" mode with CONSULT.

3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT

1. Start engine and let it idle.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

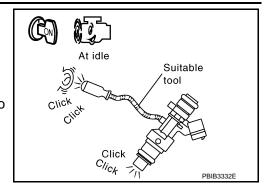
Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 8.

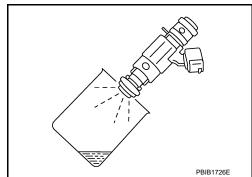
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-1091. "Diagnosis Procedure".



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-38</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, check that fuel sprays out from fuel injectors on bank 1.

For DTC P0174, check 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. Refer to EM-

38, "Removal and Installation".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

DTC Logic INFOID:0000000007463242

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 the A/F sensors 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 lights up 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.	•
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.
- Turn ignition switch ON.
- 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 EC-640, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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-872, "Diagnosis Procedure".

NO >> Remove spark plugs and check for fouling, etc. Refer to EM-47, "Removal and Installation".

f 4 . PERFORM DTC CONFIRMATION PROCEDURE-II

- Keep engine idle for at least 5 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-872, "Diagnosis Procedure".

>> GO TO 5. NO

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

5. PERFORM DTC CONFIRMATION PROCEDURE-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine.
- 3. Maintain the following conditions for at least 10 consecutive minutes. 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.

Is 1st trip DTC detected?

YES >> Go to EC-872, "Diagnosis Procedure".

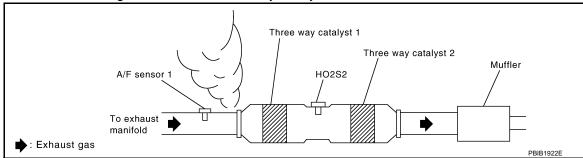
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463243

1. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 2.

2 . CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

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	F66	1		57	
F0172	'	1 00	2	F102	61	Existed
P0175	2	F67	1	F 102	65	Existed
P0175		F0/	2		66	1

5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

		A/F sensor	1			
DTC	Bank	Connector	Terminal	Ground	Continuity	
D0470	4	FCC	1			
P0172	1	F66	2	Ground	Not existed	
P0175	2	F67	1	Giouria	Not existed	
F0175	2	F07	2			
DTC		ECM	Grour	nd Conti	nuity	
	Conne		ıal			
P0172		57				
	F10		Grour	nd Not ex	risted	
P0175		65 66				
. Also cl	nack h	arness for	short to po	wer		
		esult norm	-	, M.C.I.		
•	> GO T		<u> </u>			
			cuit or sho	rt to grour	d or short to	power in harness or connectors.
.check	FUEL	PRESSUF	RE			
heck fuel	pressu	ıre. Refer t	o <u>EC-1165</u>	5, "Inspect	ion".	
	•	esult norm		-		
	> GO T					
_	•				ssembly". R	fer to FL-6, "Removal and Installation".
.CHECK	MASS	S AIR FLO	W SENSO	R 		
With CC						
		oved parts		ΓΑ ΜΟΝΙΤ	OR" mode v	vith CONSULT.
	_	_		_	ir Flow Sen	
With GS						
		oved parts		l in "Servic	ce \$01" with	GST
					ir Flow Sen	
the mea	sureme	ent value w	rithin the s	<u>pecificatio</u>	<u>n?</u>	
	> GO T					
NO >					als or loose sis Procedu	connections in the mass air flow sensor circuit or
CHECK	_	TION OF I	· ·		no i iuucuul	<u></u> .
			OLL IINJE	LOTOR		
With CC . Start e		.I				
. Perfori	ท ๊"PO\					with CONSULT.
		-	oroduces a	a moment	ary engine s	peed drop.
Without		SULT and let it id	•			
. Start e		יייי זו זכו ואמנ				

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

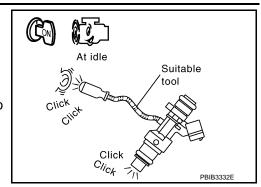
Listen to each fuel injector operating sound.

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-1091, "Diagnosis Procedure"</u>.



7. CHECK FUEL INJECTOR

- Remove fuel injector assembly. Refer to <u>EM-38, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.
- 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. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injectors.
- Crank engine for about 3 seconds. Check fuel 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. Refer to EM-38, "Removal and Installation".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

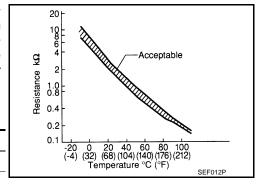
>> INSPECTION END

Description INFOID:0000000007463244

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 (sensor ground).

DTC Logic INFOID:0000000007463245

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition		Possible cause
	FTT SENSOR	A)	Rationally incorrect voltage from the	(The FTT sensor circuit is open or shorted) • FTT sensor
P0181	[Fuel tank temperature (FTT) sensor circuit range/performance]	B)	The comparison result of signals transmitted to ECM from each temperature sensor (ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	 Harness or connectors (High or low resistance in the FTT sensor circuit) FTT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7.

NO >> GO TO 2.

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

>> GO TO 3.

3.perform dtc confirmation procedure for malfunction a-i

- Turn ignition switch ON and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> Proceed to EC-877, "Diagnosis Procedure".

NO >> GO TO 4.

4. CHECK ENGINE COOLANT TEMPERATURE

(P)With CONSULT

- Select "COOLAN TEMP/S" in "DATA MONITOR" with CONSULT.
- Check "COOLAN TEMP/S" value.

With GST

Follow the procedure "With CONSULT" above.

"COOLAN TEMP/S" less than 60°C (140°F)?

YES >> INSPECTION END

NO >> GO TO 5.

${f 5.}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

(P)With CONSULT

- Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).
- Wait at least 10 seconds.
- Check 1st trip DTC.

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-877, "Diagnosis Procedure".

NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-877, "Component Function Check".

NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-877, "Diagnosis Procedure".

7. 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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- · Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 8.

8. PERFORM DTC CONFIRMATION PROCEDURE B

- Start engine and let it idle for 60 minutes.
- 2. Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the hood open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Check 1st trip DTC.

Is 1st trip DTC detected?

>> Proceed to EC-877, "Diagnosis Procedure". YES

NO >> INSPECTION END

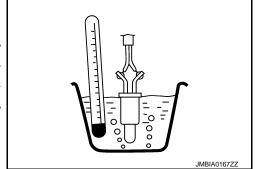
Component Function Check

INFOID:0000000007463246

1. CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

- Turn ignition switch OFF.
- Disconnect fuel level sensor unit and fuel pump harness connector. 2.
- Remove fuel level sensor unit. Refer to FL-6, "Removal and Installation". 3.
- 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	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
4 and 5	remperature [C (1)]	50 (122)	0.79 - 0.90



Is the inspection result normal?

YES >> GO TO 2.

>> Proceed to EC-877, "Diagnosis Procedure". NO

2. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END

>> Proceed to EC-877, "Diagnosis Procedure". NO

Diagnosis Procedure

INFOID:0000000007463247

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-875, "DTC Logic".

Which malfunction is detected?

>> GO TO 2. Α

В >> GO TO 7.

2.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Proceed to MWI-54, "Component Function Check".

${f 3.}$ CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect fuel level sensor unit and fuel pump harness connector.
- 3. Turn ignition switch ON.
- 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		Giodila	voltage (v)	
C5	4	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 5.

>> GO TO 4. NO

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM and fuel level sensor unit and fuel pump
- Loose or poor connection for each connector and harness
 - >> Repair open circuit, short to ground or short to power in harness or connector.

CHECK FTT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect combination meter harness connector.
- Check the continuity between fuel level sensor unit and fuel pump harness connector and combination meter harness connector.

Fuel level sensor unit and fuel pump		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
C5	5	M34	24	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 for open or short between fuel level sensor unit and fuel pump and combination meter
- Loose or poor connection for each connector and harness
 - >> Repair open circuit, short to ground or short to power in harness or connector.

7. CHECK FTT SENSOR

Check FTT sensor. Refer to EC-878, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "Removal and Installation".

8.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463248

1. CHECK FUEL TANK TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 3. Remove fuel level sensor unit and fuel pump (main). Refer to FL-6, "Removal and Installation".

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

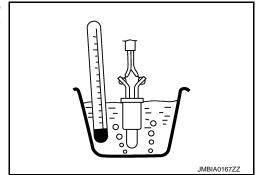
Check resistance between "fuel level sensor unit and fuel pump (main)" terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (kΩ)	
4 and 5	Temperature	[°C (°F)]	20 (68)	2.3 - 2.7
4 and 5	and 5 Temperature [°C (°		50 (122)	0.79 - 0.90

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump (main)". Refer to FL-6, "Removal and Installation".



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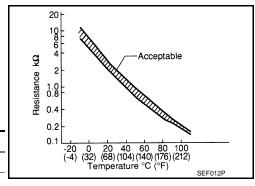
P0182, P0183 FTT SENSOR

Description INFOID:000000007463249

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 (Sensor ground).

DTC Logic

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.	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.
- 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 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-880, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463251

CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

P0182, P0183 FTT SENSOR

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS				
Is the inspection result normal?				
YES >> GO TO 3.				
NO >> Go to MWI-54, "C				
3.CHECK FUEL TANK TEMP				

omponent Function Check".

ERATURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between "fuel level sensor unit and fuel pump (main)" harness connector and ground.

	nsor unit and np (main)	Ground	Voltage (V)	
Connector Terminal				
B22	4	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 5. 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 or short to ground or short to power in harness or connector.

5.check fuel tank temperature sensor ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect "unified meter and A/C amp." harness connector.
- Check the continuity between "fuel level sensor unit and fuel pump (main)" harness connector and "unified meter and A/C amp." harness connector.

Fuel level sensor unit and fuel pump (main)		Unified meter and A/C amp.		Continuity
Connector	Terminal	Connector	Terminal	
B22	5	M67	58	Existed

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 M7, B1
- Harness for open or short between "fuel level sensor unit and fuel pump (main)" and "unified meter and A/C amp."

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

7.CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-882, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace "fuel level sensor unit and fuel pump (main)". Refer to FL-6, "Removal and Installation".

8.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

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>> INSPECTION END

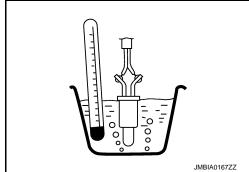
Component Inspection

INFOID:0000000007463252

1. CHECK FUEL TANK TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 3. Remove fuel level sensor unit and fuel pump (main). Refer to FL-6, "Removal and Installation".
- Check resistance between "fuel level sensor unit and fuel pump (main)" terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k Ω)	
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7
<u> </u>	remperature [O(1)]	50 (122)	0.79 - 0.90



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump (main)". Refer to FL-6, "Removal and Installation".

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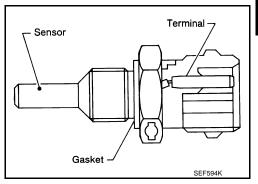
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P0196 EOT SENSOR

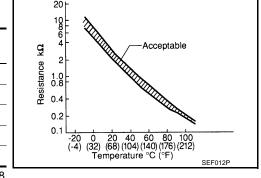
Description

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 (kΩ)
-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 DTC P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to <u>EC-887</u>, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition		Possible cause
		A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from EOT sensor and intake air temperature sensor.	Harness or connectors (The EOT sensor circuit is open or shorted) EOT sensor
P0196	EOT SENSOR [Engine oil temperature (EOT) sensor circuit range/performance]	B)	The comparison result of signals transmitted to ECM from each temperature sensor (ECT sensor, FTT sensor, and EOT sensor) shows that the signal voltage of the EOT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	Harness or connectors (High or low resistance in the EOT sensor circuit) EOT sensor

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 6. NO >> GO TO 2.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 3.

3.perform dtc confirmation procedure for multunction a-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. Start engine and let it idle for 5 minutes and 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-886, "Diagnosis Procedure".

NO >> GO TO 4.

f 4.PERFORM DTC CONFIRMATION PROCEDURE FOR MULFUNCTION A-II

(II) With CONSULT

- 1. Select "DATA MONITOR" mode with CONSULT.
- 2. Check that "COOLAN TEMP/S" indicates above 60°C (140°F).

If it is above 60°C (140°F), go to the following steps.

If it is below 60°C (140°F), warm engine up until "COOLAN TEMP/S" indicates more than 60°C (140°F). Then perform the following steps.

- 3. Turn ignition switch OFF and soak the vehicle in a cool place.
- 4. Turn ignition switch ON.

NOTE:

Do not turn ignition switch OFF until step 8.

- 5. Select "DATA MONITOR" mode with CONSULT.
- 6. 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)

If they are within the specified range, perform the following steps.

If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.

NOTE:

- Do not turn ignition switch OFF.
- If it is supposed to need a long period of time, do not deplete the battery.
- 7. Start engine and let it idle for 5 minutes.
- 8. Check 1st trip DTC.

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Proceed to EC-886, "Diagnosis Procedure".

NO >> GO TO 5.

5. PERFORM COMPONENT FUNCTION CHECK (FOR MULFUNCTION B)

Perform component function check. Refer to EC-885, "Component Function Check".

NOTE:

P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-886, "Diagnosis Procedure".

6.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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- Before performing the following procedure, do not add fuel.
- Before performing the following procedure, check that fuel level is between 1/4 and 4/4.
- Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 7.

7.PERFORM DTC CONFIRMATION PROCEDURE B

- Start engine and let it idle for 60 minutes.
- Move the vehicle to a cool place.

NOTE:

Cool the vehicle in an environment of ambient air temperature between -10°C (14°F) and 35°C (95°F).

3. Turn ignition switch OFF and soak the vehicle for 12 hours.

CAUTION:

Never turn ignition switch ON during soaking.

NOTE:

The vehicle must be cooled with the hood open.

4. Start engine and let it idle for 5 minutes or more.

CAUTION:

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-886, "Diagnosis Procedure".

>> INSPECTION END NO

Component Function Check

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

- Turn ignition switch OFF.
- Disconnect EOT sensor harness connector. 2.
- 3. Remove EOT sensor. Refer to CO-32, "VQ37VHR: Exploded View".
- 4. Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (kΩ)	
		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 >> GO TO 2.

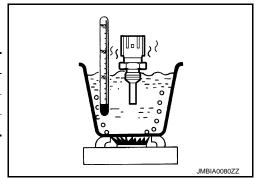
Revision: 2013 February

NO >> Proceed to EC-886, "Diagnosis Procedure".

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?



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P0196 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> INSPECTION END

NO >> Proceed to EC-886, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463256

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-886, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace engine oil temperature sensor. Refer to EM-44, "Exploded View".

3. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

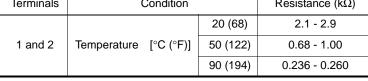
Component Inspection

INFOID:0000000007463257

1. CHECK ENGINE OIL TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect engine oil temperature sensor harness connector.
- Remove engine oil temperature sensor. Refer to EM-44. "Exploded View".
- Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

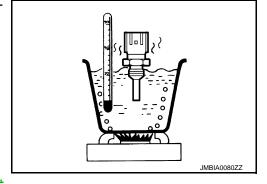
Terminals	Condition			Resistance ($k\Omega$)
		[°C (°F)]	20 (68)	2.1 - 2.9
1 and 2	Temperature [°C (°F)]		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260	



Is the inspection result normal?

YES >> INSPECTION END

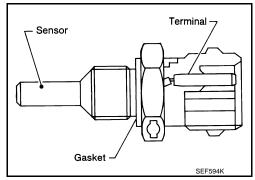
NO >> Replace engine oil temperature sensor. Refer to EM-44. "Exploded View".



P0197, P0198 EOT SENSOR

Description INFOID:0000000007463258

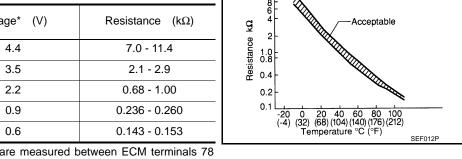
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



[VQ25HR FOR USA AND CANADA]

<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-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 INFOID:0000000007463259

DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC detecting condition	Possible Cause	•
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.)	
P0198	Engine oil tempera- ture sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine oil 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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

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P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> Go to EC-888, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463260

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK EOT SENSOR POWER SUPPLY

- 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	Glound	voltage (v)	
•	F38 ^{*1} F252 ^{*2}	1	Ground	Approx. 5	

^{*1:} AWD models

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F61, F251 (2WD models)
- Harness for short between ECM and EOT sensor

>> Repair short to ground in harness or connector.

4. CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

EOT s	ensor	EC	Continuity		
Connector	Terminal	Connector	Terminal	Continuity	
F38 ^{*1} F252 ^{*2}	2	F102	84	Existed	

^{*1:} AWD models

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 F61, F251 (2WD models)
- · Harness for open or short between ECM and EOT sensor

^{*2: 2}WD models

^{*2: 2}WD models

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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>> Repair open circuit or short to ground or short to ground in harness or connector.

6.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-889, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace engine oil temperature sensor. Refer to EM-44, "Exploded View".

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

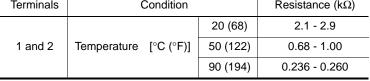
Component Inspection

INFOID:0000000007463261

1. CHECK ENGINE OIL TEMPERATURE SENSOR

- Turn ignition switch OFF.
- 2. Disconnect engine oil temperature sensor harness connector.
- 3. Remove engine oil temperature sensor. Refer to EM-44, "Exploded View".
- 4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

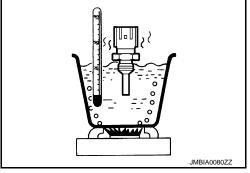
Terminals	Condition			Resistance ($k\Omega$)
			20 (68)	2.1 - 2.9
1 and 2	and 2 Temperature [°C (°F)]		50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to EM-44, "Exploded View".



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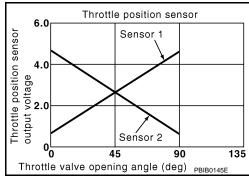
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EC-889 Revision: 2013 February 2012 G Sedan

Description INFOID:000000007463262

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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



DTC Logic

INFOID:000000007463263

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 EC-995, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 (bank 1) circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	
P0223	Throttle position sensor 1 (bank 1) circuit high input	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 input	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 input	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.

- 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.

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

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-891, "Diagnosis Procedure".

NO >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Diagnosis Procedure

INFOID:0000000007463264

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 1 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	rol actuator	Ground	Voltage (V)
	Bank	Connector	Terminal	Giodila	Voltage (V)
P0222, P0223	1	F6	1	Ground	Approx. 5
P2132, P2133	2	F27	1	Giodila	

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 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	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0222, P0223	1	F6	4	F101	40	Existed
P2132, P2133	2	F27	4	FIUI	48	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 or short to ground or short to power in harness or connectors.

f 4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0222, P0223	1	F6	2	F101	30	Existed
P2132, P2133	2	F27	2	1 101	31	LAISIEU

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

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-892, "Component Inspection".

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< DTC/CIRCUIT DIAGNOSIS > Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator. Refer to <u>EM-30, "Exploded View"</u>.
- Go to EC-892, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463265

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM				
Connector	+ -		Condition	Voltage (V)
Connector	Terminal	Terminal		
	30	40	Accelerator pedal : Fully released	More than 0.36
	[TP sensor 1 (bank 1)]	40	Accelerator pedal : Fully depressed	Less than 4.75
	31	48	Accelerator pedal : Fully released	More than 0.36
F101	[TP sensor 1 (bank 2)]	40	Accelerator pedal : Fully depressed	Less than 4.75
FIUI	34	40	Accelerator pedal : Fully released	Less than 4.75
	[TP sensor 2 (bank 1)]	40	Accelerator pedal : Fully depressed	More than 0.36
	35	48	Accelerator pedal : Fully released	Less than 4.75
	[TP sensor 2 (bank 2)]		Accelerator pedal : 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.
- Go to EC-892, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

NFOID:000000000746326

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.perform idle air volume learning

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< DTC/CIRCUIT DIAGNOSIS >

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Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

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< DTC/CIRCUIT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

DTC Logic

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crank-shaft 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.

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 over-heating, 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 on.

If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

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 light 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 on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder 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

- 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.
- Check 1st trip DTC.

< DTC/CIRCUIT DIAGNOSIS >

YES >> Go to EC-895, "Diagnosis Procedure".

NO >> GO TO 3.

Is 1st trip DTC detected?

3. PERFORM DTC CONFIRMATION PROCEDURE-II

- 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 the 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.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

CAUTION:

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

Engine speed in the freeze frame data ± 400 rpm			
Vehicle speed	Vehicle speed in the freeze frame data \pm 10 km/h (6 MPH)		
Basic fuel schedule	Basic fuel schedule in 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).		
condition	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).		

The time to driving 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

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-895, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- Start engine and run it at idle speed.
- 2. Listen for the sound of the intake air leak.
- Check PCV hose connection.

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.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.

YES-2 >> Without CONSULT: GO TO 4.

>> Repair or replace malfunctioning part.

3.PERFORM POWER BALANCE TEST

With CONSULT

Start engine.

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< DTC/CIRCUIT DIAGNOSIS >

- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Check 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

- Start engine and let it idle.
- Listen to each fuel injector operating sound.

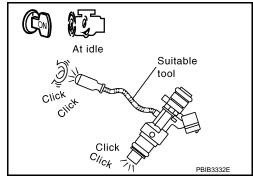
Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 5.

NO

>> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-1091, "Diagnosis Procedure".



5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

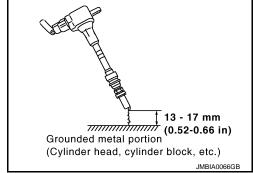
Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 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. Refer to EM-47, "Removal and Installation".
- 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:

- Do not approach to the spark plug and the ignition coil within 0.5 m (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9. >> GO TO 6. NO

< DTC/CIRCUIT DIAGNOSIS >

6. CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

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Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-1097, "Diagnosis Procedure".

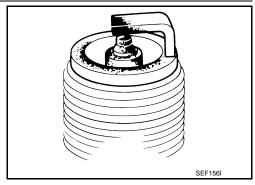
7. CHECK SPARK PLUG

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 EM-145, "Spark Plug".

NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 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?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-145, "Spark Plug"</u>.

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-17, "Inspection".

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

- 1. Install all removed parts.
- Check fuel pressure. Refer to <u>EC-1165</u>, "Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

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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". Refer to FL-6, "Removal and Installation".

NO >> Repair or replace malfunctioning part.

12. CHECK IDLE SPEED AND IGNITION TIMING

Check idle speed and ignition timing.

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< DTC/CIRCUIT DIAGNOSIS >

For procedure, refer to <u>EC-631, "BASIC INSPECTION: Special Repair Requirement"</u>. For specification, refer to <u>EC-1168, "Idle Speed"</u> and <u>EC-1168, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-631, "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			EC	Continuity		
Bank	Connector	Terminal	Terminal Connector Terminal		Continuity	
1	1 F66	1 566	1		57	
ı		2 F102	61	Existed		
2 F67	2 F67 1	1 102	65	Existed		
		2		66		

Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

	A/F sensor	Ground	Continuity		
Bank	Connector Terminal		Giodila	Continuity	
1	F66	1	Ground	Not existed	
1	F00	2			
2	E67	1			
	F67	2			

E	CM	Ground	Continuity	
Connector Terminal		Giodila	Continuity	
	57			
F102	61	Ground	Not existed	
1 102	65	Giodila		
	66			

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.

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

14. CHECK A/F SENSOR 1 HEATER

Refer to EC-784, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace (malfunctioning) A/F sensor 1. Refer to EM-35, "Exploded View".

15. CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT.

For specification, refer to EC-1168, "Mass Air Flow Sensor".

With GST

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to EC-1168, "Mass Air Flow Sensor".

< DTC/CIRCUIT DIAGNOSIS >

< DTC/CIRCUIT DIAGNOSIS >	[VQ25HR FOR USA AND CANADA]	
Is the measurement value within the specification?		
YES >> GO TO 16.		Α
NO >> Check connectors for rusted terminals or loose connectors	tions in the mass air flow sensor circuit or	
ground. Refer to <u>EC-801, "Diagnosis Procedure"</u> .		
16.check symptom matrix chart		EC
Check items on the rough idle symptom in EC-1153, "Symptom Table	<u>e"</u> .	
Is the inspection result normal?		С
YES >> GO TO 17.		
NO >> Repair or replace malfunctioning part.		
17.erase the 1ST TRIP DTC		D
Some tests may cause a 1st trip DTC to be set.		
Erase the 1st trip DTC from the ECM memory after performing the	tests. Refer to EC-752, "CONSULT Func-	
tion" or EC-748, "On Board Diagnosis Function".		Е
0.0 70 40		
>> GO TO 18.		_
18. CHECK INTERMITTENT INCIDENT		F
Refer to GI-43, "Intermittent Incident".		
		G
>> INSPECTION END		
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P0327, P0328 KS

Description INFOID:000000007463269

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:000000007463270

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name DTC detected condition		Possible cause	
P0327	Knock 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.)	
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Knock 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 run it for at least 5 seconds at idle speed.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-900, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463271

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46. "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

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

•	Knock sensor		EC	Continuity	
	Connector	Terminal	Connector Terminal		Continuity
	F206	2	F102	72	Existed

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

Is the inspection result normal?

P0327, P0328 KS

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F65, F205
- Harness for open or short between knock sensor and ECM

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

f 4.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between knock sensor harness connector and ECM harness connector.

•	Knock sensor		ECM		Continuity	
	Connector	Terminal	Connector Terminal		Continuity	
	F206	1	F102	73	Existed	

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F65, F205
- · Harness for open or short between ECM and knock sensor

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

O.CHECK KNOCK SENSOR

Refer to EC-901, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning knock sensor. Refer to EM-119, "Exploded View".

7 .CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK KNOCK SENSOR

- Turn ignition switch OFF.
- Disconnect knock sensor harness connector.
- Check resistance between knock sensor terminals as follows.

It is necessary to use an ohmmeter which can measure more than 10 M Ω .

Terminals	Resistance	
1 and 2	Approx. 532 - 588 kΩ [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. Refer to EM-119, "Exploded View".

EC-901 Revision: 2013 February 2012 G Sedan

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P0335 CKP SENSOR (POS)

Description INFOID:000000007463273

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.

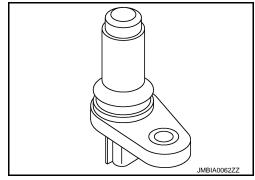
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

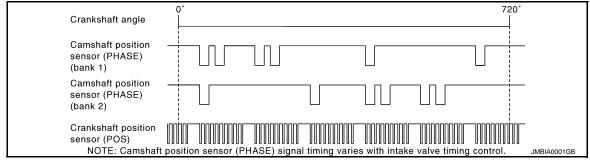
The changing gap causes the magnetic field near the sensor to change.

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.





DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (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 running. 	Harness or connectors [CKP sensor (POS) circuit is open or shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Battery current sensor Accelerator pedal position sensor EVAP control system pressure sensor Refrigerant pressure sensor Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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

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.

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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.

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Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-903, "Diagnosis Procedure".

>> INSPECTION END NO

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INFOID:0000000007463275

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF.

Check ground connection M95. Refer to Ground Inspection in GI-46, "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

Disconnect crankshaft position (CKP) sensor (POS) harness connector.

2. Turn ignition switch ON.

Check the voltage between CKP sensor (POS) harness connector and ground.

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CKP sen	sor (POS)	Ground	Voltage (V)	
Connector	Terminal	Ground	voltage (v)	
F2	1	Ground	Approx. 5	

Is the inspection result normal?

>> GO TO 8. YES

NO >> GO TO 3.

3.check crankshaft position (CKP) sensor (POS) power supply circuit-ii

Turn ignition switch ON.

Disconnect ECM harness connector.

Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

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CKP sensor (POS)		OS) ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F2	1	F101	46	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

f 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	F101 46 CKP sensor (POS)		F2	1		
	CMP sensor (PHASE) (bank 2)		F18	1		
F102	64	EVT control position sensor (bank 2)	F63	1		
		Battery current sensor	E21	1		
	103	APP sensor	E112	6		
M107	107	EVAP control system pressure sensor	B252	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.

- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-911, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1004, "Component Inspection".)
- Battery current sensor (Refer to EC-1034, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-948. "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-1111, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-1065, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1065, "Special Repair Requirement".

>> INSPECTION END

8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

•	CKP sensor (POS)		ECM		Continuity	
	Connector	Terminal	Connector	Terminal	Continuity	
	F2	2	F101	47	Existed	

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

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

CKP sensor (POS)		ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
F2	3	F101	37	Existed	

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

Is the inspection result normal?

YES >> GO TO 10.

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

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-905, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

>> Replace crankshaft position sensor (POS). Refer to EM-96, "2WD : Exploded View" (2WD mod-NO els) or EM-99, "AWD: Exploded View" (AWD models).

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. Refer to EM-119, "Exploded View".

12. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

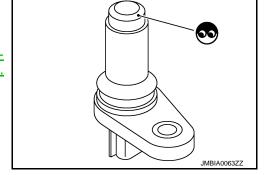
1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

- Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- 4. Remove the sensor. Refer to EM-96, "2WD: Exploded View" (2WD models) or EM-99, "AWD: Exploded View" (AWD models).
- 5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace crankshaft position sensor (POS). Refer to EM-96, "2WD: Exploded View" (2WD models) or EM-99, "AWD : Exploded View" (AWD models).



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance		
1 (+) - 2 (-)			
1 (+) - 3 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]		
2 (+) - 3 (-)			

Is the inspection result normal?

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P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> INSPECTION END

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-96, "2WD : Exploded View"</u> (2WD models) or <u>EM-99, "AWD : Exploded View"</u> (AWD models).

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P0340, P0345 CMP SENSOR (PHASE)

Description INFOID:000000007463277

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.

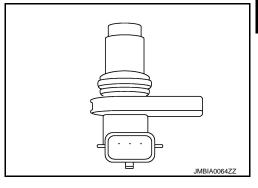
The sensor consists of a permanent magnet and Hall IC.

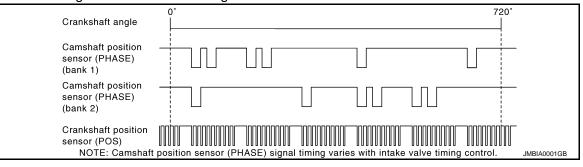
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-995, "DTC Logic".

Revision: 2013 February EC-907 2012 G Sedan

[VQ25HR FOR USA AND CANADA]

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) (bank 1) circuit		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
P0345	Camshaft position sensor (PHASE) (bank 2) 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 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.] [CKP sensor (POS) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Camshaft position sensor (PHASE) (bank 2) Crankshaft position sensor (POS) Exhaust valve timing control position sensor (bank 2) Battery current sensor Accelerator pedal position sensor EVAP control system pressure sensor Refrigerant pressure sensor Camshaft (INT) Starter motor Starting system circuit Dead (Weak) battery

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.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-909, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
- Check 1st trip DTC.

P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is 1st trip DTC detected?

YES >> Go to EC-909, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463279

CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.

>> Check starting system. Refer to STR-2, "Work Flow (With GR8-1200 NI)" or STR-5, "Work Flow NO (Without GR8-1200 NI)".

2.CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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-i

- Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
- Turn ignition switch ON. 2.
- Check the voltage between CMP sensor (PHASE) harness connector and ground.

DTC	С	MP sensor (P	HASE)	Ground	Voltage (V)
	Bank	Connector	Terminal	Giodila	voltage (v)
P0340	1	F5	1	Ground	Approx. 5
P0345	2	F18	1		дрргох. 3

Is the inspection result normal?

YES >> GO TO 10.

NO-1 >> P0340: Repair open circuit or short to ground or short to power in harness or connectors.

NO-2 >> P0345: GO TO 4.

f 4.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)			EC	CM	Continuity	
Ва	ınk	Connector	Terminal	Connector	Terminal	Continuity
2	2	F18	1	F102	64	Existed

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F106, F107
- Harness for open or short between CMP sensor (PHASE) and ECM

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

6.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

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< DTC/CIRCUIT DIAGNOSIS >

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F101	46	CKP sensor (POS)	F2	1		
		CMP sensor (PHASE) (bank 2)	F18	1		
F102 64	64	EVT control position sensor (bank 2)	F63	1		
	Battery current sensor	E21	1			
	103	APP sensor	E112	6		
M107	107	EVAP control system pressure sensor	B252	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-905, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1004, "Component Inspection".)
- Battery current sensor (Refer to EC-1034, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-948, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-1111</u>, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8. CHECK APP SENSOR

Refer to EC-1065, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation".</u>
- 2. Go to EC-1065, "Special Repair Requirement".

>> INSPECTION END

10. Check CMP sensor (Phase) ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

DTC	CI	MP sensor (Pl	HASE)	ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0340	1	F5	2	F102	96	Existed
P0345	2	F18	2	1 102	92	LAISIEU

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

Is the inspection result normal?

YES >> GO TO 12.

NO-1 >> P0340: Repair open circuit or short to ground or short to power in harness or connectors.

NO-2 >> P0345: GO TO 11.

11. DETECT MALFUNCTIONING PART

P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Check the following.

- Harness connectors F106, F107
- Harness for open or short between CMP sensor (PHASE) and ECM

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

12. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

DTC	CI	MP sensor (Pl	HASE)	EC	CM	Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0340	1	F5	3	F102	59	Existed
P0345	2	F18	3	1 102	63	LXISIEU

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

Is the inspection result normal?

YES >> GO TO 14.

NO-1 >> P0340: Repair open circuit or short to ground or short to power in harness or connectors.

NO-2 >> P0345: GO TO 13.

13.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F106, F107
- Harness for open or short between CMP sensor (PHASE) and ECM

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

14. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-911, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-68, "Exploded View".

15. CHECK CAMSHAFT (INT)

Check the following.

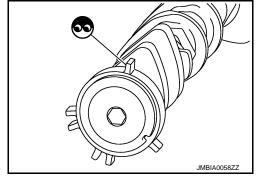
- Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 16.

NO

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-68. "Exploded View".



16. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

- Turn ignition switch OFF.
- Loosen the fixing bolt of the sensor.

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2012 G Sedan

P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

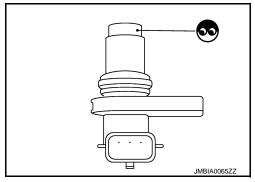
- Disconnect camshaft position sensor (PHASE) harness connector.
- Remove the sensor. Refer to EM-68, "Exploded View".
- Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-68, "Exploded View".



$2. \hbox{CHECK CAMSHAFT POSITION SENSOR (PHASE)-II}\\$

Check resistance camshaft position sensor (PHASE) terminals as follows.

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

>> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-68, "Exploded View". NO

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

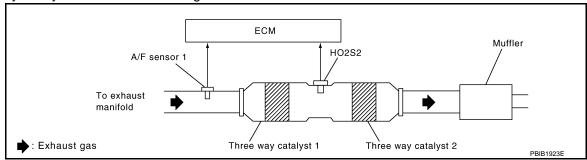
P0420, P0430 THREE WAY CATALYST FUNCTION

DTC Logic INFOID:0000000007463281

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
P0430	Catalyst system efficiency below threshold (bank 2)	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

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

Will CONSULT be used?

YES >> GO TO 2.

NO >> GO TO 6.

TESTING CONDITION:

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

Do not hold engine speed for more than the specified minutes below.

- Start engine and warm it up to the normal operating temperature.
- 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.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 7. Select "DATA MONITOR" mode with CONSULT.
- Check 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).
- Open engine hood.
- 10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 11. Rev engine up to 2,000 to 3,000 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 screen?

CMPLT>> GO TO 5.

INCMP >> GO TO 3.

3.perform dtc confirmation procedure-ii $\,$

- 1. Wait 5 seconds at idle.
- Rev engine up to 2,000 to 3,000 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 5.

NO >> GO TO 4.

f 4.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 2.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-915, "Diagnosis Procedure".

NO >> INSPECTION END

6.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

Perform component function check. Refer to EC-914, "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-915, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007463282

1. PERFORM COMPONENT FUNCTION CHECK

♥Without CONSULT

- 1. Start engine and warm it up to the normal operating temperature.
- 2. 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. 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.
- 7. Open engine hood.
- 8. Check the voltage between ECM harness connector terminals under the following condition.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

		ECM				
DTC	Connector	+	_	Condition	Voltage	
	Connector	Terminal	Terminal			
P0420	F102	76 [HO2S2 (bank 1)]	84	Keeping engine speed at 2,500 rpm	The voltage fluctuation cycle takes more than 5 seconds.	
P0430	1 102	80 [HO2S2 (bank 2)]	04	constant under no load	• 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0	
Is the in	spection re	sult normal?				
YES	>> INSPE	CTION END				

NO >> Go to EC-915, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

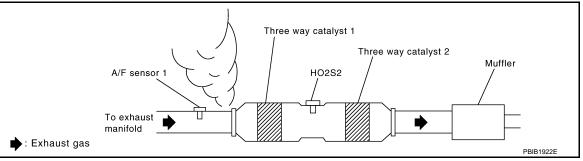
YES >> GO TO 2.

>> Repair or replace malfunctioning part. NO

2. CHECK EXHAUST GAS LEAK

Start engine and run it at idle.

Listen for an exhaust gas leak before the three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 3.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Check idle speed and ignition timing.

For procedure, refer to EC-631, "BASIC INSPECTION: Special Repair Requirement".

For specification, refer to EC-1168, "Idle Speed" and EC-1168, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the EC-631, "BASIC INSPECTION: Special Repair Requirement".

${f 5.}$ CHECK FUEL INJECTORS

- Stop engine and then turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as follows.

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	+	-	Voltage	
Connector	Terminal	Connector	Terminal	
	81	M107		Battery voltage
	82		128	
F102	85			
F102	86			
	89			
	90			

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform <u>EC-1091</u>, "<u>Diagnosis Procedure</u>".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- 1. Turn ignition switch OFF.
- 2. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT 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. Refer to EM-47, "Removal and Installation".
- 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.



CAUTION:

- Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.

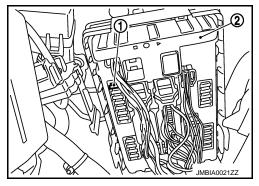
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

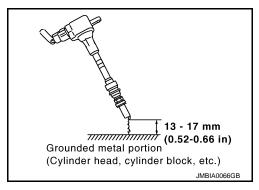
Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

7.check function of ignition coil-ii

1. Turn ignition switch OFF.





< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 2. Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for approximately 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 8.

NO >> Check ignition coil, power transistor and their circuits. Refer to <u>EC-1097</u>, "<u>Diagnosis Procedure</u>".

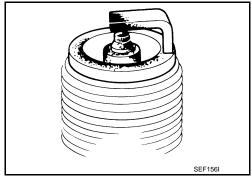
8. CHECK SPARK PLUG

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 EM-145, "Spark Plug".

NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

Reconnect the initial spark plugs.

2. Crank engine for approximately 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?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-145, "Spark Plug".

10. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- Remove fuel injector assembly.

Refer to EM-38, "Removal and Installation".

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.

Does fuel drip from fuel injector?

YES >> Replace the fuel injector(s) from which fuel is dripping. Refer to <u>EM-38</u>, "<u>Removal and Installation</u>".

NO >> GO TO 11.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace three way catalyst assembly. Refer to <u>EX-5</u>, "Exploded View".

NO >> Repair or replace harness or connector.

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DTC Logic

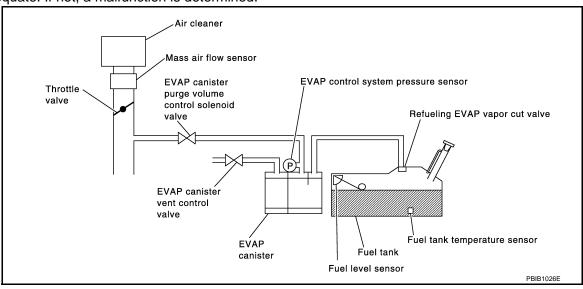
DTC DETECTION LOGIC

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 incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake 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.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.

Will CONSULT be used?

YES >> GO TO 2. NO >> GO TO 5.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

2.perform dtc confirmation procedure-i

With CONSULT

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-SULT.
- 7. Touch "START".

Is "COMPLETED" displayed on CONSULT screen?

>> GO TO 4. YES

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, "TESTING" will be displayed on the CONSULT screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 mph)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.25 - 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 screen?

YES >> GO TO 4.

NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 2.

4.PERFORM DTC CONFIRMATION PROCEDURE-III

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-920, "Diagnosis Procedure".

${f 5.}$ PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

Perform component function check. Refer to EC-919, "Component Function Check".

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?

YES >> INSPECTION END

NO >> Go to EC-920, "Diagnosis Procedure".

Component Function Check

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

- 1. Lift up drive wheels.
- 2.
- Turn ignition switch OFF and wait at least 10 seconds.

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Start engine (VDC switch OFF) and warm it up to normal operating temperature.

Turn ignition switch ON.

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[VQ25HR FOR USA AND CANADA]

- 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 under the following condition.

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 6) for at least 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-920, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463286

1. CHECK EVAP CANISTER

- 1. Turn ignition switch OFF.
- 2. Check EVAP canister for cracks.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

NO >> Replace EVAP canister. Refer to FL-16, "Removal and Installation".

2. CHECK PURGE FLOW

(P)With CONSULT

- 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- Start engine and let it idle.
- Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT.
- Touch "Qd" and "Qu" on CONSULT 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 >> GO TO 4.

3. CHECK PURGE FLOW

⋈ Without CONSULT

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-708, "System Diagram".
- Start engine and let it idle.

Do not depress accelerator pedal even slightly.

Check vacuum gauge indication before 60 seconds passed after starting engine.

Vacuum should not exist.

Revving engine up to 2,000 rpm after 100 seconds passed after starting engine.

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Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 4.

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4.CHECK EVAP PURGE LINE

- Turn ignition switch OFF.
- Check EVAP purge line for improper connection or disconnection. Refer to EC-708, "System Diagram".

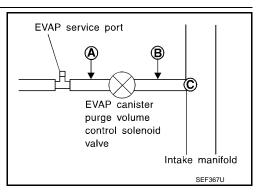
Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair EVAP purge line.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

- Disconnect purge hoses connected to EVAP service port A and EVAP canister purge volume control solenoid valve **B**.
- Blow air into each hose and EVAP purge port **C**.



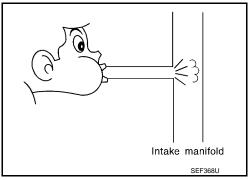
Check that air flows freely.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.

YES-2 >> Without CONSULT: GO TO 7.

NO >> Repair or clean hoses and/or purge port.



6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 8.

NO >> GO TO 7.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-933, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View".

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

- 1. Disconnect EVAP control system pressure sensor harness connector.
- Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-949, "DTC Logic" for DTC P0452, EC-954, "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-939, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

12. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to EC-708, "System Diagram".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace malfunctioning part.

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-43. "Intermittent Incident".

>> INSPECTION END

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P0442 EVAP CONTROL SYSTEM

DTC Logic

DTC DETECTION LOGIC

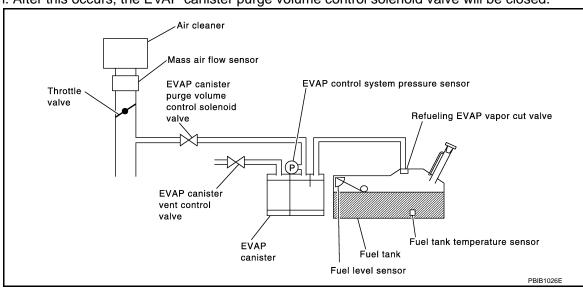
NOTE:

If DTC P0442 is displayed with DTC P0456, first perform the trouble diagnosis for DTC P0456. Refer to <u>EC-966, "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 properly.	 Incorrect fuel tank vacuum relief valve Incorrect fuel filler cap used Fuel filler cap remains open or does not 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 Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged EVAP canister is saturated with water EVAP control system pressure sensor Fuel level sensor and the circuit Refueling EVAP vapor cut valve 	K L M

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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.

- 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:

Check that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Will CONSULT be used?

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

2.perform dtc confirmation procedure

(P) With CONSULT

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).
- 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.
- 4. Check 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 "EVP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.

Follow the instructions displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT screen, go to <u>EC-631</u>, "BASIC INSPECTION: Special Repair Requirement".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-924, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE

Without CONSULT

NOTE:

Be sure to read the explanation of Driving Pattern in EC-642. "SRT Set Driving Pattern" 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. Turn ignition switch ON.
- 8. Check 1st trip DTC.

Is 1st trip DTC displayed?

YES-1 >> P0441: Go to <u>EC-920, "Diagnosis Procedure"</u>. YES-2 >> P0442: Go to <u>EC-924, "Diagnosis Procedure"</u>. NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463288

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

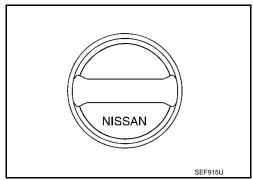
2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Replace with genuine NISSAN fuel filler cap. Refer to FL-6, "Removal and Installation".



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-928, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one. Refer to FL-6. "Removal and Installation".

5.CHECK FOR EVAP LEAK

Refer to EC-1166, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 6.

6.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

EVAP canister vent control valve is installed properly.

Refer to FL-16, "Removal and Installation".

EVAP canister vent control valve.

Refer to EC-939, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-14. "Exploded View".

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to <u>FL-14</u>, "<u>Exploded View</u>".

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

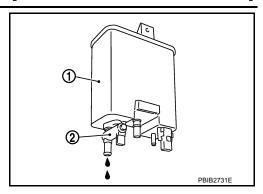
- Check if water will drain from EVAP canister (1).
 - 2 : EVAP canister vent control valve

Does water drain from the EVAP canister?

YES >> GO TO 8.

NO-1 >> With CONSULT: GO TO 10.

NO-2 >> Without CONSULT: GO TO 11.



8.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 10.

YES-2 >> Without CONSULT: 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
 - >> Repair hose or replace EVAP canister. Refer to FL-16, "Removal and Installation".

10.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- 1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
- Start engine and let it idle.
- 3. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode.
- Touch "Qu" on CONSULT screen to increase "PURG VOL CONT/V" opening to 100%.
- 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

- Start engine and warm it up to normal operating temperature.
- Stop engine.
- 3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP ser-
- 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-708, "System Diagram".

< DTC/CIRCUIT DIAGNOSIS > [VQ25HR FOR USA AND CANADA]	
Is the inspection result normal? YES >> GO TO 13.	А
NO >> Repair or reconnect the hose.	
13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-933, "Component Inspection".	EC
Is the inspection result normal?	
YES >> GO TO 14.	С
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to <u>FL-14. "Exploded View"</u> .	
14. CHECK FUEL TANK TEMPERATURE SENSOR	D
Refer to EC-878, "Component Inspection".	D
Is the inspection result normal?	
YES >> GO TO 15. NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-6, "Removal and Installation".	Е
15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR	
Refer to EC-948, "Component Inspection".	_
Is the inspection result normal?	F
YES >> GO TO 16.	
NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".	G
16. CHECK EVAP PURGE LINE	
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-708, "System Diagram".	Н
Is the inspection result normal?	
YES >> GO TO 17.	ı
NO >> Repair or reconnect the hose.	
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, kink, looseness and improper con-	
nection. For location, refer to <u>EC-1104, "Description"</u> .	ı
Is the inspection result normal?	
YES >> GO TO 19.	
NO >> Repair or replace hoses and tubes. Refer to <u>FL-11, "Exploded View"</u> .	\mathbb{N}
19. CHECK RECIRCULATION LINE	
Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.	Ν
Is the inspection result normal?	
YES >> GO TO 20.	0
NO >> Repair or replace hose, tube or fuel filler tube. Refer to <u>FL-11, "Exploded View"</u> .	
20. CHECK REFUELING EVAP VAPOR CUT VALVE	

YES >> GO TO 21.

Is the inspection result normal?

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-11, "Exploded View".

21. CHECK FUEL LEVEL SENSOR

Refer to MWI-56, "Component Inspection".

Refer to EC-1107, "Component Inspection".

Is the inspection result normal?

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> GO TO 22.

NO >> "Replace fuel level sensor unit and fuel pump". Refer to FL-6, "Removal and Installation".

22. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

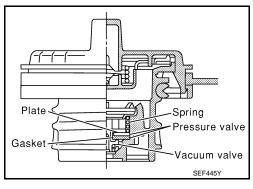
Component Inspection

INFOID:0000000007463289

2012 G Sedan

1. CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- Remove fuel filler cap. Refer to FL-6, "Removal and Installation".
- 3. Wipe clean valve housing.



- Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
- 5. 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.

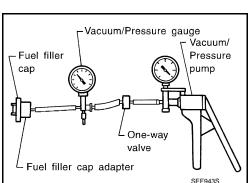
2. REPLACE FUEL FILLER CAP

Replace fuel filler cap. Refer to FL-6, "Removal and Installation".

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

>> INSPECTION END



P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

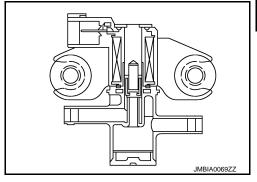
< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:0000000007463290

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty 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 INFOID:0000000007463291

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
	EVAP canister purge	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	EVAP control system pressure sensor EVAP canister purge volume control solenoid valve (The valve is stuck open.)	Н
P0443	volume control solenoid valve	B The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	EVAP canister vent control valve EVAP canister 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 before conducting the next test.

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

TESTING CONDITION:

- Perform "DTC CONFIRMATION PROCEDURE" 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 5 to 60°C (41 to 140°F).
- Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.

Do you have CONSULT

YES >> GO TO 2.

NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE A

(I) With CONSULT

- Turn ignition switch ON.
- Check that the following condition are met. FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
- Start engine and wait at least 60 seconds.
- Check 1st trip DTC.

IS 1st trip DTC detected?

OK >> Go to EC-930, "Diagnosis Procedure".

NG >> GO TO 3.

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P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

3.perform dtc confirmation procedure b

(P)With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 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.
- Turn ignition switch ON.
- Select "PURG VOL CN/V P1444" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.
- 7. Touch "START".
- 8. Start engine and let it idle until "TESTING" on CONSULT changes to "COMPLETED". (It will take approximately 10 seconds.)

If "TESTING" is not displayed after 5 minutes, retry from step 2.

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

>> INSPECTION END

NG >> Go to EC-930, "Diagnosis Procedure".

f 4.PERFORM DTC CONFIRMATION PROCEDURE A

- 1. Turn ignition switch ON.
- Set voltmeter probes to ECM harness connector terminals.

	ECM		
Connector	+	_	Voltage (V)
Connector	Terminal	Terminal	
M107	106 (Fuel tank temperature sensor signal)	128 (Sensor ground)	3.1 - 4.0

- Start engine and wait at least 60 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-930, "Diagnosis Procedure". YES

NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE B

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 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.
- Start engine and let it idle for at least 20 seconds.
- Check 1st trip DTC.

Is 1st trip DTC displayed?

YES >> Go to EC-930, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

 ${f 1}.$ CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

INFOID:0000000007463292

- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE IVO25HR FOR USA AND CANADAL

< DTC/CIRCUIT DIAG	NOSIS >			[VQ25HR FOR USA AND CANADA]	
			_	<u> </u>	
EVAP canister purge volum		Ground	Voltage		Α
Connector	Terminal			_	
F7	1	Ground	Battery volta	<u>je</u>	EC
Is the inspection result	normal?				
YES >> GO TO 3. NO >> GO TO 2.					
2. DETECT MALFUNC	TIONING PART				
Check the following.	7110111110171111				
Harness connectors E	E106, M6				
Harness connectors N				and a sector of a sector of the sector of th	
				me control solenoid valve and IPDM E/R me control solenoid valve and ECM	Е
riamoco for opon or o	more bottwoon E v/ ti	carnoto	i pargo vola	ne definition deficitle valve and Leivi	
>> Repair ope	n circuit or short to g	ground o	r short to po	ower in harness or connectors.	
_	_	-	•	OLENOID VALVE OUTPUT SIGNAL CIRCUIT	F
FOR OPEN AND SHOP					
1. Turn ignition switch	OFF.				
2. Disconnect ECM ha		. ,			
Check the continuit ECM harness conn		ınıster pı	urge volume	control solenoid valve harness connector and	
LOW Harricos domin					-
EVAP canister purge volum	ne control solenoid valve		ECM	Out to	
Connector	Terminal	Connec	tor Terminal	Continuity	
F7	2	F101	21	Existed	
4. Also check harness	s for short to ground	and sho	ort to power.		
Is the inspection result	normal?				
YES >> GO TO 5.					
NO >> GO TO 4.					ŀ
4.DETECT MALFUNC	TIONING PART				r
Check the following.Harness connectors F	5104 5 10 5				
		caniste	r purge volu	me control solenoid valve and ECM	Ĺ
·			. 0		
>> Repair ope	n circuit or short to g	ground o	r short to po	ower in harness or connectors.	[\
5. CHECK EVAP CON	TROL SYSTEM PRI	ESSURE	E SENSOR	CONNECTOR	1\
	control system press				
2. Check connectors					ľ
Water should n	ot exist.				
Is the inspection result					
15 IIIE IIISPECIIOII IESUIL	<u>HUHHAH!</u>				

YES >> GO TO 6.

>> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-948, "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 7.

YES-2 >> Without CONSULT: GO TO 8.

>> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View". NO

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P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

7.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- 1. Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.
- 4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. 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-933, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

>> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View". NO

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-939, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

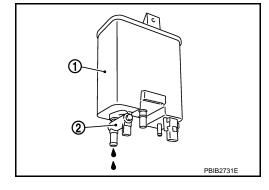
NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

11. CHECK IF EVAP CANISTER SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to FL-14, "Exploded View".
- 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.



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 2.1 kg (4.6 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

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P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

>> Repair hose or replace EVAP canister. Refer to FL-16, "Removal and Installation".

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

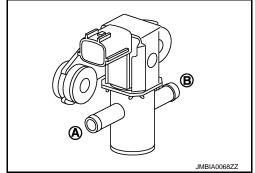
Component Inspection

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- 1. Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- Turn ignition switch ON.
- Select "PURG VOL C/V" in "ACTIVE TEST" mode with CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL CONT/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

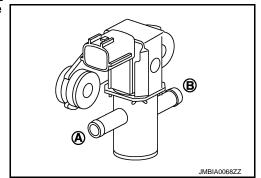
- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the 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

>> Replace EVAP canister purge volume control solenoid NO valve. Refer to FL-14, "Exploded View".



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P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

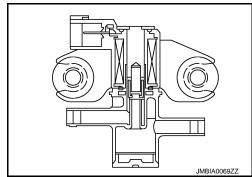
< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:000000007463294

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty 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.	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 solenoid 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 solenoid 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

- 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-934, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463296

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Turn ignition switch ON.

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge vol- ume control solenoid valve		Ground	Voltage	
Connector	Terminal			
F7	1	Ground	Battery voltage	

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Is the inspection result normal?

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

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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 or 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.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

	EVAP canister purge vol- ume control solenoid valve		⊢ (: \/	
Connector	Terminal	Connector Terminal		
F7	2	F101	21	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 5.

YES-2 >> Without CONSULT: GO TO 6.

NO >> GO TO 4.

N

4. DETECT MALFUNCTIONING PART

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 or short to ground or short to power in harness or connectors.

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- Reconnect all harness connectors disconnected.
- Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 7.

NO >> GO TO 6.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-936, "Component Inspection".

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P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View".

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

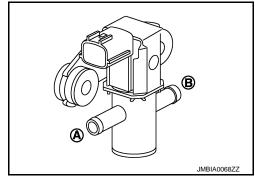
INFOID:0000000007463297

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- Turn ignition switch ON.
- 5. Select "PURG VOL C/V" in "ACTIVE TEST" mode with CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL CONT/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

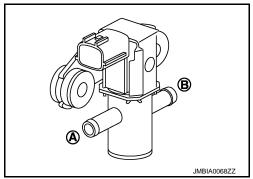
Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed



Without CONSULT

- 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. Refer to <u>FL-14, "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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INFOID:0000000007463300

P0447 EVAP CANISTER VENT CONTROL VALVE

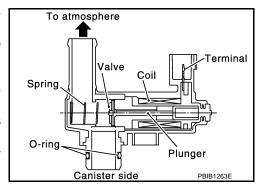
Description INFOID:0000000007463298

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 valve 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 No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent control 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

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.
- 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 wait at least 8 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-937, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1.INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

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

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

(P)With CONSULT

- 1. Turn ignition switch OFF and then turn ON.
- 2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 3. Touch "ON/OFF" on CONSULT screen.
- 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		
B253	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 E25, F30
- Harness connectors F103, M116
- Harness connectors B1, M7
- Harness connectors B254, B332
- Harness connectors B39, B331
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit or 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 canister vent control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B253	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 connectors B254, B332
- Harness connectors B39, B331
- Harness for open or short between EVAP canister vent control valve and ECM

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

7.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 8.

NO >> Clean the rubber tube using an air blower.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-939, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- Remove EVAP canister vent control valve from EVAP canister. Refer to FL-14, "Exploded View".
- Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

YES >> Replace EVAP canister vent control valve. Refer to <u>FL-14, "Exploded View"</u>.

NO >> GO TO 2.

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2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

(P)With CONSULT

- 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.

Check new O-ring is installed properly.

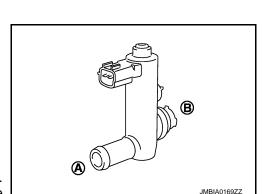
VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

♥Without CONSULT

- 1. Disconnect EVAP canister vent control valve harness connector.
- 2. Check air passage continuity and operation delay time under the following conditions.

Check new O-ring is installed properly.



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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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 >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE-III

(II) With CONSULT

- 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.

Check new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

⋈Without CONSULT

- 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.

Check new O-ring is installed properly.

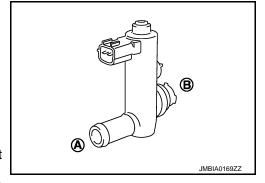
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to FL-14. "Exploded View".



< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P0448 EVAP CANISTER VENT CONTROL VALVE

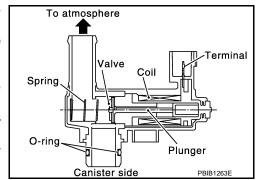
Description INFOID:0000000007463302

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 valve 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 INFOID:0000000007463303

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	 EVAP canister vent control valve EVAP control system pressure sensor and the circuit Blocked rubber tube to EVAP canister vent control valve EVAP canister is saturated with water 	Н

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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- Turn ignition switch ON and wait at least 5 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and let it idle for at least 1 minute.
- Repeat next procedures three times.
- Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

Never exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.
- Repeat next procedure 20 times.
- Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.

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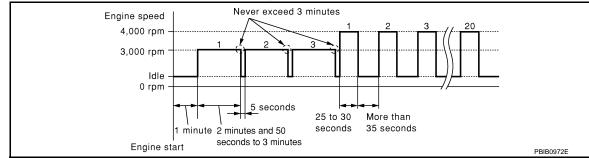
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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Fully released accelerator pedal and keep engine idle for at least 35 seconds.



6. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-942, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463304

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-939, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

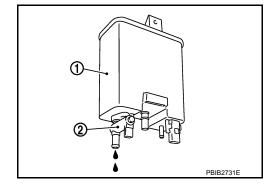
3. CHECK IF EVAP CANISTER SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to <u>FL-14</u>, "<u>Exploded View</u>".
- 2. Check if water will drain from the EVAP canister (1).

2 : EVAP canister vent control valve

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 2.1 kg (4.6 lb).

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

${f 5.}$ DETECT MALFUNCTIONING PART

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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. Refer to FL-16, "Removal and Installation".

6. 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 7.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-948, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-14. "Exploded View"</u>.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

- Turn ignition switch OFF.
- Remove EVAP canister vent control valve from EVAP canister. Refer to FL-14, "Exploded View".
- Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

YES >> Replace EVAP canister vent control valve. Refer to <u>FL-14</u>, "Exploded View".

NO >> GO TO 2.

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2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

(P)With CONSULT

- 1. Reconnect harness connectors disconnected.
- Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Check air passage continuity and operation delay time.
 Check new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed



♥Without CONSULT

- 1. Disconnect EVAP canister vent control valve harness connector.
- 2. Check air passage continuity and operation delay time under the following conditions.

Check 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 >> GO TO 3.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

(P)With CONSULT

- 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.

Check new O-ring is installed properly.

VENT CONTROL/V Condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

⋈Without CONSULT

- 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.

Check new O-ring is installed properly.

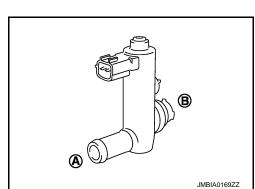
Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".



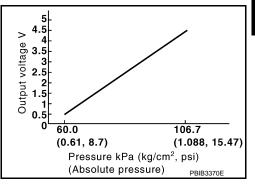
< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:0000000007463306

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 INFOID:0000000007463307

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451	EVAP control system pressure sensor performance	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.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Battery current sensor Accelerator pedal position sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

Never remove fuel filler cap during DTC confimation 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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- (P)With CONSULT>>GO TO 2.
- Without CONSULT>>GO TO 5.

2.perform dtc confirmation procedure

Start engine and wait at least 40 seconds.

NOTE:

Do not depress accelerator pedal even slightly.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-946, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

(P)With CONSULT

- 1. Select "EVAP DIAG READY" in "DATA MONITOR" mode of "ENGINE".
- 2. Let it idle until "OFF" of "EVAP DIAG READY" changes to "ON".

NOTE:

It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".

3. Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

- 4. Turn ignition switch ON.
- 5. Select "EVAP LEAK DIAG" in "DATA MONITOR" mode of "ENGINE".
- 6. Check that "EVAP LEAK DIAG" indication.

Which is displayed on CONSULT?

CMPLT>> GO TO 4.

YET >> 1. Perform DTC CONFIRMATION PROCEDURE again.

2. GO TO 1.

4. PERFORM DTC CONFIRMATION PROCEDURE-3

(P)With CONSULT

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-946, "Diagnosis Procedure".

NO >> INSPECTION END

5. PERFORM DTC CONFIRMATION PROCEDURE-4

With GST

1. Start engine and let it idle for least 40 seconds.

NOTE:

Do not depress accelerator pedal even slightly.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-946, "Diagnosis Procedure".

NO >> GO TO 6.

6.PERFORM DTC CONFIRMATION PROCEDURE-5

- 1. Let it idle for at least 2 hours.
- Turn ignition switch OFF and wait at least 90 minutes.

NOTE:

Never turn ignition switch ON during 90 minutes.

- 3. Turn ignition switch ON.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-946, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463308

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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?

>> GO TO 3. YES

>> Repair or replace harness connector. NO

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch ON.
- Check the voltage between EVAP control system pressure sensor harness connector and ground.

	trol system e sensor	Ground	Voltage (V)
Connector	Terminal		
B252	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	46	CKP sensor (POS)	F2	1	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102	64	EVT control position sensor (bank 2)	F63	1	
			Battery current sensor	E21	1
	103	APP sensor	E112	6	
M107	107	EVAP control system pressure sensor	B252	3	
		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.

CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-905, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-911, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to <u>EC-1004, "Component Inspection"</u>.)
- Battery current sensor (Refer to <u>EC-1034, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-1111, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-1065, "Component Inspection".

Is the inspection result normal?

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> GO TO 9. NO >> GO TO 7.

7.replace accelerator pedal assembly

- 1. Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1065, "Special Repair Requirement".

>> INSPECTION END

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-948, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-14. "Exploded View"</u>.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463309

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Refer to FL-14, "Exploded View".

Always replace O-ring with a new one.

- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. Turn ignition switch ON and check output voltage between ECM harness connector terminals under the following conditions.

ECM			Condition		
Connector	Connector + -		Condition [Applied vacuum kPa (kg/cm ² , psi)]	Voltage (V)	
Connector	Terminal	Terminal	[, [, []		
M107	102	112	Not applied	1.8 - 4.8	
IVITOT	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.
- 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. Refer to FL-14, "Exploded View".

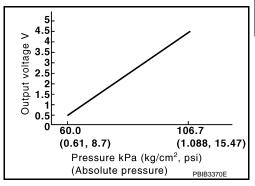
< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description INFOID:0000000007463310

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 INFOID:0000000007463311

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low input	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.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Battery current sensor Accelerator pedal position 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.

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

(P)With CONSULT

- 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.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT.
- 7. Check 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

- Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector terminals under the following conditions.

ECM					
Connector	+	_			
Connector	Terminal	Terminal			
M107	106 (Fuel tank temperature sensor signal)	128			

- 3. Check 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-950, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463312

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- 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.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch ON.
- Check the voltage between EVAP control system pressure sensor harness connector and ground.

	trol system e sensor	Ground	Voltage (V)
Connector	Connector Terminal		
B252	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 4.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- 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 pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B252	3	M107	107	Existed

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M7
- Harness connectors B254, B332
- Harness connectors B39, B331
- Harness for open between ECM and EVAP control system pressure sensor

>> Repair open circuit.

$\mathsf{6}.$ 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	46	CKP sensor (POS)	F2	1	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102	64	EVT control position sensor (bank 2)	F63	1	
			Battery current sensor	E21	1
	103	APP sensor	E112	6	
M107	107	EVAP control system pressure sensor	B252	3	
		Refrigerant pressure sensor	E77	3	

Is the inspection result normal?

YES >> GO TO 7.

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

7. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-905, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-911, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to <u>EC-1004, "Component Inspection".</u>)
- Battery current sensor (Refer to <u>EC-1034, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-1111, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to EC-1065, "Component Inspection".

Is the inspection result normal?

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YES >> GO TO 15. NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1065, "Special Repair Requirement".

>> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and short

- 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 pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B252	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 connectors B254, B332
- Harness connectors B39, B331
- Harness for open or short between EVAP control system pressure sensor and ECM
 - >> Repair open circuit or 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

Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B252	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.

13. DETECT MALFUNCTIONING PART

Check the following.

- · Harness connectors B1, M7
- Harness connectors B254, B332
- Harness connectors B39, B331
- Harness for open or short between EVAP control system pressure sensor and ECM

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

14. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-953, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

15. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463313

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Turn ignition switch OFF.

2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Refer to FL-14, "Exploded View".

Always replace O-ring with a new one.

3. Install a vacuum pump to EVAP control system pressure sensor.

4. 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	[, the man radiation in a (tigrain , poi/]		
M107	102	112	Not applied	1.8 - 4.8	
IVITO7	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.
- 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. Refer to FL-14, "Exploded View".

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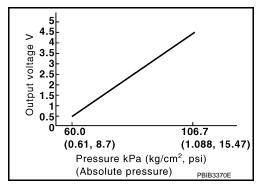
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Description INFOID:000000007463314

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



INFOID:0000000007463315

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high input	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.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) EVAP control system pressure sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Battery current sensor Accelerator pedal position sensor Refrigerant 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.
- 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

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- Start engine and warm it up to normal operating temperature. 1.
- 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.
- Select "DATA MONITOR" mode with CONSULT.
- Check that "FUEL T/TMP SE" is more than 0°C (32°F).
- Start engine and wait at least 20 seconds.
- 9. Check 1st trip DTC.

- 1. Start engine and warm it up to normal operating temperature.
- Set voltmeter probes to ECM harness connector terminals under the following conditions.

ECM		Ground
Connector	+	_
Connector	Terminal	Terminal
M107	106 (Fuel tank temperature sensor signal)	128

- Check that the voltage is less than 4.2 V.
- Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and wait at least 20 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-955, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK CONNECTOR

- Disconnect EVAP control system pressure sensor harness connector.
- Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

- Turn ignition switch ON.
- Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control syster	EVAP control system pressure sensor		
Connector	Terminal	Ground	Voltage (V)
B252	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 4.

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4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

- 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 pressure sensor		EC	М	Continuity
Connector	Terminal	Connector	Terminal	Continuity
B252	3	M107	107	Existed

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M7
- Harness connectors B254, B332
- Harness connectors B39, B331
- 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.

EC	М	Sensor				
Connector Termin		Name	Connector	Terminal		
F101	46	CKP sensor (POS)	F2	1		
		CMP sensor (PHASE) (bank 2)	F18	1		
F102	64	EVT control position sensor (bank 2)	F63	1		
		Battery current sensor	E21	1		
	103	APP sensor	E112	6		
M107	107	EVAP control system pressure sensor	B252	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-905, "Component Inspection".)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-911, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1004, "Component Inspection".)
- Battery current sensor (Refer to EC-1034, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-1111, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to EC-1065, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 20.

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NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1065, "Special Repair Requirement".

>> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and short

- 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	ECM		Continuity		
Connector	Terminal	Connector	Terminal	Continuity	
B252	1	M107	112	Existed	

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 connectors B254, B332
- Harness connectors B39, B331
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or 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 pressure sensor		EC	M	Continuity
Connector	Terminal	Connector	Terminal	Continuity
B252	2	M107	102	Existed

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 B1. M7
- Harness connectors B254, B332
- Harness connectors B39, B331
- Harness for open or short between EVAP control system pressure sensor and ECM

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

14. CHECK RUBBER TUBE

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- Disconnect rubber tube connected to EVAP canister vent control valve.
- 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. Refer to <u>FL-11</u>, "Exploded View".

15. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-939, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP canister vent control valve. Refer to FL-14, "Exploded View".

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-958, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.

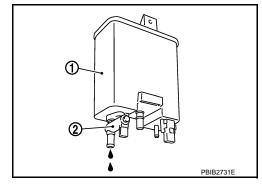
NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

17. CHECK IF EVAP CANISTER SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to <u>FL-14</u>, "<u>Exploded View</u>".
- 2. Check if water will drain from the EVAP canister (1).
 - 2 : EVAP canister vent control valve

Does water drain from EVAP canister?

YES >> GO TO 18. NO >> GO TO 20.



18. 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 2.1 kg (4.6 lb).

Is the inspection result normal?

YES >> GO TO 20. NO >> GO TO 19.

19. 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. Refer to FL-16, "Removal and Installation".

20. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463317

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

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- 1. Turn ignition switch OFF.
- 2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. Refer to FL-14, "Exploded View".

Always replace O-ring with a new one.

- 3. Install a vacuum pump to EVAP control system pressure sensor.
- 4. 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)	
	Terminal	Terminal	[/tppiica vacadiii ki a (kg/ciii , psi/j		
M107	102	112	Not applied	1.8 - 4.8	
IVITO	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.
- 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. Refer to <u>FL-14, "Exploded View"</u>.

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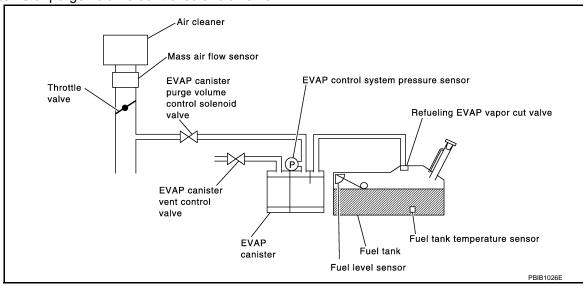
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DTC Logic

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 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 Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing or damaged. EVAP control system pressure sensor 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 come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.
- Use only a genuine NISSAN rubber tube as a replacement.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

CAUTION:

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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.	А
1. Turn ignition switch OFF and wait at least 10 seconds.	
3. Turn ignition switch OFF and wait at least 10 seconds.	EC
NOTE: Check that EVAD becomes are connected to EVAD conjeter number values control coloneid value properly.	
Check that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.	С
Will CONSULT be used? YES >> GO TO 2. NO >> GO TO 4.	
2. PERFORM DTC CONFIRMATION PROCEDURE	D
 With CONSULT 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. 	Е
 Open engine hood before conducting the following procedures. Tighten fuel filler cap securely until ratcheting sound is heard. Turn ignition switch ON. 	F
 Turn ignition switch OFF and wait at least 10 seconds. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT. Check that the following conditions are met. 	G
COOLAN TEMP/S: 0 - 70°C (32 - 158°F) INT/A TEMP SE: 0 - 60°C (32 - 140°F) 6. Select "EVP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.	Н
Follow the instruction displayed. NOTE: If the engine speed cannot be maintained within the range displayed on the CONSULT screen, go to EC-631. "BASIC INSPECTION: Special Repair Requirement".	I
Which is displayed on CONSULT screen?	
OK >> INSPECTION END. NG >> GO TO 3.	J
3.check dtc	K
Check DTC.	
Which DTC is detected?	
P0455 >> Go to EC-962, "Diagnosis Procedure". P0442 >> Go to EC-924, "Diagnosis Procedure".	L
4. PERFORM DTC CONFIRMATION PROCEDURE	D. //
With GST	M
NOTE: Be sure to read the explanation of Driving Pattern in <u>EC-642</u> , " <u>SRT Set Driving Pattern</u> " before driving vehicle.	K.I
1. Start engine.	Ν
Drive vehicle according to Driving Pattern.	
3. Stop vehicle.	0
4. Turn ignition switch OFF and wait at least 10 seconds.	0
5. Turn ignition switch ON.	
6. Turn ignition switch OFF and wait at least 10 seconds.7. Turn ignition switch ON.	Р
8. Check 1st trip DTC.	
Is 1st trip DTC detected?	
YES-1 >> P0455: Go to EC-962, "Diagnosis Procedure".	
YES-2 >> P0442: Go to EC-924, "Diagnosis Procedure".	
YES-3 >> P0441: Go to <u>EC-920, "Diagnosis Procedure"</u> .	
NO >> INSPECTION END	

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Diagnosis Procedure

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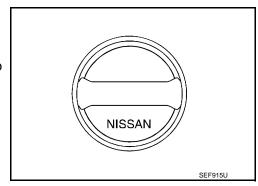
1. CHECK FUEL FILLER CAP DESIGN

- 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. Refer to FL-6, "Removal and Installation".



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-964, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one. Refer to FL-6, "Removal and Installation".

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-708, "System Diagram".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or reconnect the hose.

6.CLEAN EVAP PURGE LINE

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>FL-14</u>, "<u>Exploded View</u>".
- EVAP canister vent control valve.
 Refer to <u>EC-964, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-14, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS > [VQ25HR FOR USA AND CANADA	-1
8. CHECK FOR EVAP LEAK	
Refer to EC-1166, "Inspection".	
Is there any leak in EVAP line?	
YES >> Repair or replace malfunctioning part. NO-1 >> With CONSULT: GO TO 9.	
NO-2 >> With GONSULT: GO TO 10.	
9. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION	
®With CONSULT	_
 Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP so vice port. 	r-
2. Start engine and let it idle.	
 Select "PURG VOL CONT/V" in "ACTIVE TEST" mode. Touch "Qu" on CONSULT 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 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 so vice port.	r-
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-708 , "System Diagram". Is the inspection result normal?	
YES-1 >> With CONSULT: GO TO 12.	
YES-2 >> Without CONSULT: GO TO 13.	
NO >> Repair or reconnect the hose.	
12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	

- Start engine.
- 2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

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Does engine speed vary according to the valve opening?

YES >> GO TO 14. NO >> GO TO 13.

$13. {\sf check\ evap\ canister\ purge\ volume\ control\ solenoid\ valve}$

Refer to EC-933, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View".

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14. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-878, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-6, "Removal and Installation".

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-948, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".

16. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to <u>EC-1104</u>, "<u>Description</u>".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace hoses and tubes. Refer to FL-11, "Exploded View".

17. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 18.

NO >> Repair or replace hose, tube or fuel filler tube. Refer to FL-11, "Exploded View".

18. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1107, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 19.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-11, "Exploded View".

19. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

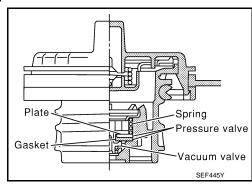
Component Inspection

INFOID:0000000007463320

2012 G Sedan

1. CHECK FUEL FILLER CAP

- 1. Turn ignition switch OFF.
- Remove fuel filler cap. Refer to FL-6, "Removal and Installation".
- 3. Wipe clean valve housing.



< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.

5. 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

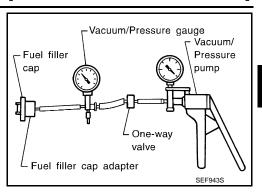
NO >> GO TO 2.

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap. Refer to <u>FL-6, "Removal and Installation"</u>. CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

>> INSPECTION END



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DTC Logic

DTC DETECTION LOGIC

NOTE:

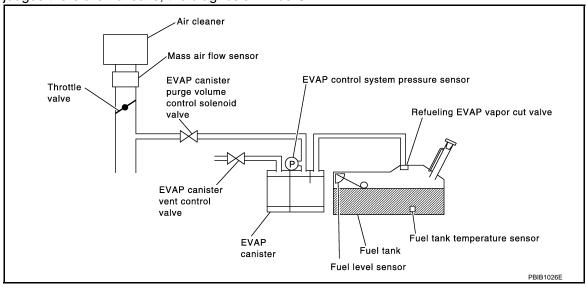
If DTC P0456 is displayed with DTC P0442, first perform the trouble diagnosis for DTC P0456.

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure.

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 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 does not 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 Fuel tank temperature sensor O-ring of EVAP canister vent control valve is missing 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 solenoid valve

CAUTION:

- Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.
- If the fuel filler cap is not tightened properly, the MIL may come on.

PU456 EVAP CONTROL 515	
12.10,011.011.011.01.00.00	/Q25HR FOR USA AND CANADA]
Use only a genuine NISSAN rubber tube as a replacement.	Д
DTC CONFIRMATION PROCEDURE	F
1.INSPECTION START	
Will CONSULT be used?	EC
Will CONSULT be used?	_
YES >> GO TO 2. NO >> GO TO 4.	
2.PRECONDITIONING	
 With CONSULT If DTC Confirmation Procedure has been previously conducted, alw 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. 	ays perform the following procedure
NOTE: After repair, check that the hoses and clips are installed properly. TESTING CONDITION:	F
 Open engine hood before conducting following procedure. If any of following conditions are met just before the DTC confirmation for more than 1 hour. Fuel filler cap is removed. Fuel is refilled or drained. EVAP component parts is/are removed. Before performing the following procedure, confirm that battery to Check that EVAP hoses are connected to EVAP canister purge verly. 	voltage is more than 11 V at idle.
	I
>> GO TO 3. 3. PERFORM DTC CONFIRMATION PROCEDURE	
 Turn ignition switch ON and select "DATA MONITOR" mode with Control of the control	ONSULI.
FUEL T/TMP SE: 0 - 35°C (32 - 95°F) INT A/TEMP SE: More than 0°C (32°F)	L
If NG, turn ignition switch OFF and leave the vehicle in a cool place fuel until the output voltage condition of the "FUEL LEVEL SE" me the vehicle for more than 1 hour. Then start from step 1).	(soak the vehicle) or refilling/draining
3. Turn ignition switch OFF and wait at least 10 seconds.	11

- Turn ignition switch ON.
- Select "EVP V/S LEAK P0456/P1456" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT.

Follow the instruction displayed.

NOTE:

If the engine speed cannot be maintained within the range displayed on CONSULT screen, go to EC-631, "BASIC INSPECTION: Special Repair Requirement".

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Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-968, "Diagnosis Procedure".

4.PERFORM COMPONENT FUNCTION CHECK

₩ Without CONSULT

Perform component function check. Refer to EC-968, "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.

EC-967 Revision: 2013 February 2012 G Sedan

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-968, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007463322

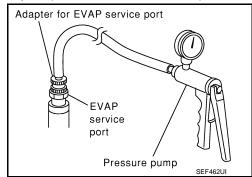
1.PERFORM COMPONENT FUNCTION CHECK

N Without CONSULT

CAUTION:

- Do not use compressed air, doing so may damage the EVAP system.
- Do not start engine.
- Do not exceeded 4.12 kPa (0.042 kg/cm², 0.6 psi).
- 1. Attach the EVAP service port adapter securely to the EVAP service port (commercial service tool).
- 2. Set the pressure pump and a hose.
- 3. Also set a vacuum gauge via 3-way connector and a hose.
- 4. Turn ignition switch ON.
- 5. Connect GST and select Service \$08.
- 6. Using Service \$08 control the EVAP canister vent control valve (close).
- 7. Apply pressure and check 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-968, "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.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Restart engine and let it idle for 90 seconds.
- 7. Keep engine speed at 2,000 rpm for 30 seconds.
- 8. Turn ignition switch OFF.

NOTE:

For more information, refer to GST Instruction Manual.

>> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463323

1. CHECK FUEL FILLER CAP DESIGN

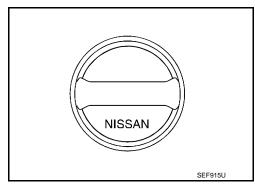
- 1. Turn ignition switch OFF.
- 2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Replace with genuine NISSAN fuel filler cap. Refer to FL-6, "Removal and Installation".



< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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-971, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one. Refer to FL-6, "Removal and Installation".

5.CHECK FOR EVAP LEAK

Refer to EC-1166, "Inspection".

Is there any leak in EVAP line?

>> Repair or replace malfunctioning part.

NO >> GO TO 6.

6. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

EVAP canister vent control valve is installed properly.

Refer to FL-14, "Exploded View".

EVAP canister vent control valve.

Refer to EC-939, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-14, "Exploded View".

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

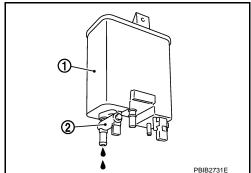
- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to FL-14, "Exploded View".
- Check if water will drain from EVAP canister (1).
 - 2 : EVAP canister vent control valve

Does water drain from the EVAP canister?

YES >> GO TO 8.

NO-1 >> With CONSULT: GO TO 10.

NO-2 >> Without CONSULT: 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 2.1 kg (4.6 lb).

Is the inspection result normal?

Revision: 2013 February

YES-1 >> With CONSULT: GO TO 10.

YES-2 >> Without CONSULT: GO TO 11.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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. Refer to FL-16, "Removal and Installation".

10.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(I) With CONSULT

- 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 screen to increase "PURG VOL C/V" opening to 100%.
- 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

- 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 14. NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-708. "System Diagram".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-933, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View".

14. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-878, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-6, "Removal and Installation".

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-948, "Component Inspection".

P0456 EVAP CONTROL SYSTEM	
< DTC/CIRCUIT DIAGNOSIS > [VQ25HR FOR USA AND CANADA]	
Is the inspection result normal?	
YES >> GO TO 16. NO >> Replace EVAP control system pressure sensor. Refer to FL-14, "Exploded View".	
16. CHECK EVAP PURGE LINE	
	E
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to <u>EC-708</u> , "System Diagram".	
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, kink, looseness and improper con-	
nection. For location, refer to EC-1104, "Description".	
Is the inspection result normal?	
YES >> GO TO 19. NO >> Repair or replace hoses and tubes. Refer to <u>FL-11</u> , " <u>Exploded View</u> ".	
19.check recirculation line	
Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and	
improper connection.	
Is the inspection result normal?	
YES >> GO TO 20. NO >> Repair or replace hose, tube or fuel filler tube. Refer to <u>FL-11, "Exploded View"</u> .	
20. CHECK REFUELING EVAP VAPOR CUT VALVE	
Refer to EC-1107, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 21.	
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-14, "Exploded View"</u> .	
21. CHECK FUEL LEVEL SENSOR	
Refer to MWI-56, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 22. NO >> Replace "fuel level sensor unit and fuel pump". Refer to FL-6, "Removal and Installation".	
22. CHECK INTERMITTENT INCIDENT	
Refer to GI-43, "Intermittent Incident".	
>> INSPECTION END	

1. CHECK FUEL FILLER CAP

Component Inspection

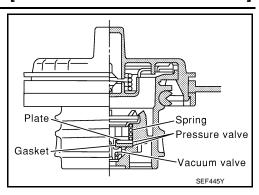
Turn ignition switch OFF.
Remove fuel filler cap. Refer to FL-6, "Removal and Installation".

INFOID:0000000007463324

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.

5. 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?

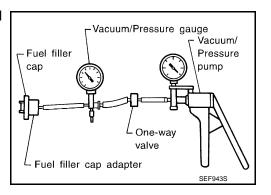
YES >> INSPECTION END NO >> GO TO 2.

NO >> GO TO 2. 2.REPLACE FUEL FILLER CAP

Replace fuel filler cap. Refer to FL-6, "Removal and Installation".

CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

>> INSPECTION END



P0460 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P0460 FUEL LEVEL SENSOR

Description INFOID:0000000007463325

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 through 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:0000000007463326

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 EC-994, "DTC Logic".

When the vehicle is parked, naturally the fuel level in the fuel tank is 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	G
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being 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	Н

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and wait maximum of 2 consecutive minutes.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-973, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to MWI-55, "Diagnosis Procedure".

2.CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

EC-973 Revision: 2013 February

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INFOID:0000000007463327

2012 G Sedan

P0460 FUEL LEVEL SENSOR

[VQ25HR FOR USA AND CANADA]

P0461 FUEL LEVEL SENSOR

Description INFOID:0000000007463328

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 through 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:000000007463329

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 EC-994, "DTC Logic".

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	G
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 distance.	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	Н

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-975, "Component Function Check".

Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-976, "Diagnosis Procedure".

Component Function Check

1.PRECONDITIONING

When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-6, "Removal and Installation".

TESTING CONDITION:

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT?

YES >> GO TO 2.

NO >> GO TO 3.

2.PERFORM COMPONENT FUNCTION CHECK

(P)With CONSULT

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.

Prepare a fuel container and a spare hose.

EC-975 2012 G Sedan Revision: 2013 February

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P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 2. Release fuel pressure from fuel line, refer to EC-1165, "Inspection".
- 3. Remove the fuel feed hose on the fuel level sensor unit. Refer to FL-6, "Removal and Installation".
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
- 6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT.
- 7. Check "FUEL LEVEL SE" output voltage and note it.
- 8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT.
- 9. 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.
- 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 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-976, "Diagnosis Procedure".

3.perform component function check

®Without CONSULT

NOTE:

Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 $\,\ell$ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

- 1. Prepare a fuel container and a spare hose.
- Release fuel pressure from fuel line. Refer to <u>EC-1165</u>, "Inspection".
- Remove the fuel feed hose on the fuel level sensor unit. Refer to FL-6, "Removal and Installation".
- 4. Connect a spare fuel hose where the fuel feed hose was removed.
- 5. Turn ignition switch ON.
- 6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
- 7. 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.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-976, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463331

1. CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to MWI-55, "Diagnosis Procedure".

2. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

P0462, P0463 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P0462, P0463 FUEL LEVEL SENSOR

Description INFOID:0000000007463332

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 through 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:0000000007463333

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 EC-994, "DTC Logic".

This diagnosis indicates the former, to detect open or short circuit malfunction.

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.

- 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.

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

- Turn ignition switch ON and wait at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-977, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

 ${f 1}$.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2. NO >> Go to MWI-55, "Diagnosis Procedure".

2.CHECK INTERMITTENT INCIDENT

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INFOID:000000007463334

P0462, P0463 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Refer to GI-43, "Intermittent Incident".

[VQ25HR FOR USA AND CANADA]

P0500 VSS

Description INFOID:0000000007463335

ECM receives vehicle speed signals from two different paths via CAN communication line: One is from the ABS actuator and electric unit (control unit) via the combination unit and the other is from TCM.

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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-994</u>, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	At 20 km/h (13 MPH), ECM detects the following status continuously for 5 seconds or more: The difference between a vehicle speed calculated by a output speed sensor transmitted from TCM to ECM via CAN communication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).	Harness or connector (The CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM Output speed 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 10 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine.
- 2. Shift the selector lever to D range and wait at least for 2 seconds.
- 3. Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more.

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.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-979, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463337

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-149, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.

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NO >> Perform trouble shooting relevant to DTC indicated.

 $2.\mathsf{CHECK}\ \mathsf{DTC}\ \mathsf{WITH}\ \mathsf{``ABS}\ \mathsf{ACTUATOR}\ \mathsf{AND}\ \mathsf{ELECTRIC}\ \mathsf{UNIT}\ (\mathsf{CONTROL}\ \mathsf{UNIT})"$

Check DTC with "ABS actuator and electric unit (control unit)". Refer to <u>BRC-27</u>, "CONSULT Function". Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble shooting relevant to DTC indicated.

3.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Check DTC with "unified meter and A/C amp.". Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Perform trouble shooting relevant to DTC indicated.

4. CHECK OUTPUT SPEED SENSOR

Check output speed sensor. Refer to TM-165, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace or replace error-detected parts.

5. CHECK WHEEL SENSOR

Check wheel sensor. Refer to BRC-45, "DTC Logic".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-43, "Intermittent Incident".

NO >> Replace or replace error-detected parts.

[VQ25HR FOR USA AND CANADA]

P0506 ISC SYSTEM

Description INFOID:0000000007463338

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:0000000007463339

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 system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuator Intake 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.

- 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.

If the target idle speed is out of the specified value, perform EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement", 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

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and run it for at least 1 minute at idle speed.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-981, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

${f 1}$.CHECK INTAKE AIR LEAK

- Start engine and let it idle.
- Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 2.

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EC-981

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INFOID:0000000007463340

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

2.REPLACE ECM

- 1. Stop engine.
- Replace ECM. Refer to <u>EC-655</u>, "Component Parts Location".

 Go to <u>EC-634</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

P0507 ISC SYSTEM

Description INFOID:0000000007463341

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:0000000007463342

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 actuator Intake air leak PCV system

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

If the target idle speed is out of the specified value, perform EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement", 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

- 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.
- Turn ignition switch OFF and wait at least 10 seconds.
- Start engine and run it for at least 1 minute at idle speed.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-983, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.

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P0507 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

NO >> Repair or replace malfunctioning part.

2. CHECK INTAKE AIR LEAK

- Start engine and let it idle.
- Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 3.

3. REPLACE ECM

- Stop engine.
- Replace ECM. Refer to <u>EC-655</u>, "Component Parts Location".
 Go to <u>EC-634</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

P050A, P050B, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P050A, P050B, P050E COLD START CONTROL

Description

ECM controls ignition timing and engine idle speed when engine is started with pre-warming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

INFOID:0000000007768551

DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P050A, P050B or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P050A	Cold start idle air control system performance	ECM does not control engine idle speed properly when engine is started with pre-warming up condition.	
P050B	Cold start ignition timing performance	ECM does not control ignition timing properly when engine is started with pre-warming up condition.	 Lack of intake air volume Fuel injection system ECM
P050E	Cold start engine exhaust temperature too low	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	

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.
- 2. Turn ignition switch ON.
- 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

(P)With CONSULT

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT.
- Check the indication of "COOLAN TEMP/S".

With GST

Follow the procedure "With CONSULT" above.

Is the value of "COOLAN TEMP/S" between 15°C (59°F) and 36°C (97°F)?

YES >> GO TO 3.

NO-1 [If it is below 15°C (59°F)]>>Warm up the engine until the value of "COOLAN TEMP/S" reaches 15°C (59°F) or more. Retry from step 1.

NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

(P)With CONSULT

- Set the select lever in N range.
- 2. Start the engine and warm up in idle with the value of "COOLAN TEMP/S" between 15°C (59°F) and 36°C (97°F) for more than 15 seconds.
- Check 1st trip DTC.

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EC-985

P050A, P050B, P050E COLD START CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-986, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007768552

1. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-638, "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
- · Clogging of throttle body

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part

3.check fuel injection system function

Perform DTC Confirmation Procedure for DTC P0171. Refer to EC-867, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Go to EC-868, "Diagnosis Procedure" for DTC P0171.

f 4.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- Erase DTC.
- 3. Perform DTC Confirmation Procedure.

See EC-985, "DTC Logic".

Is the 1st trip DTC P050A, P050B or P050E displayed again?

YES >> GO TO 5.

NO >> INSPECTION END

5.REPLACE ECM

- Replace ECM.
- 2. Go to EC-634, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

P0550 PSP SENSOR

Description INFOID:0000000007463347

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 INFOID:0000000007463348

DTC DETECTION LOGIC

NOTE:

If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-995, "DTC Logic".

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

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.
- 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.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-987, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK PSP SENSOR POWER SUPPLY CIRCUIT

- Disconnect power steering pressure (PSP) sensor harness connector.
- Turn ignition switch ON. 2.
- Check the voltage between PSP sensor harness connector and ground. 3.

PSP s	sensor	Ground	Voltage (V)	
Connector	Terminal	Ground	voitage (v)	
F35	3	Ground	Approx. 5	

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< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

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

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 s	ensor	EC	Continuity	
Connector	Terminal	al Connector 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 or 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	EC	Continuity	
Connector Terminal		Connector	Terminal	Continuity
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 or short to ground or short to power in harness or connectors.

5. CHECK PSP SENSOR

Refer to EC-988, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace PSP sensor. Refer to <u>ST-56, "2WD : Exploded View"</u> (2WD models) or <u>ST-58, "AWD : Exploded View"</u> (AWD models).

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463350

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	Being turned	0.5 - 4.5	
1 102	07	90	Steering wheel	Not being turned	0.4 - 0.8	

P0550 PSP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace power steering pressure sensor. Refer to <u>ST-56, "2WD : Exploded View"</u> (2WD models) or <u>ST-58, "AWD : Exploded View"</u> (AWD models).

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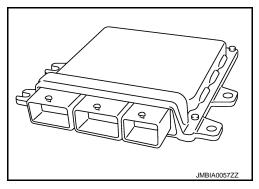
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P0603 ECM POWER SUPPLY

Description INFOID:000000007463351

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
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.] 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.
- 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. Turn ignition switch OFF and wait at least 5 minutes.
- 3. Turn ignition switch OFF, wait at least 10 seconds.
- Repeat steps 2 and 3 for five times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-990, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463353

1. CHECK ECM POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the voltage between ECM harness connector terminals under the following conditions.

P0603 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

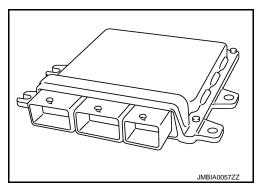
[VQ25HR FOR USA AND CANADA]

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-	+	-	_	Voltage	-	
Connector	Terminal	Connector	Terminal			EC
F102	93	M107	128	Battery voltage		
Is the inspe						
NO >>	GO TO 3. GO TO 2.					С
2.DETECT	Γ MALFUN	CTIONING	PART			D
Check the fHarness o15 A fuse	connectors	E25, F30				D
IPDM E/RHarness f	R harness c			nd battery		Е
>>	Repair or	replace har	ness or cor	nectors.		F
3.CHECK						
Refer to GI			<u>ent"</u> .			G
	GO TO 4.					
NO >> 4.PERFOR	•	replace har				Н
	nition switc			LDONL		
 Erase I Perform 		firmation P	ocedure.			I
See <u>EC</u> Is the 1st tr	C-990, "DTC in DTC P06	_	ed again?			J
YES >>	GO TO 5. INSPECT		o organic			
5.REPLAC		ION END				K
1. Replac	e ECM. Re	fer to EC-6	55, "Compo	onent Parts Loca	tion". CING CONTROL UNIT (ECM) : Special Repair	
	ement".	DDITIONA	LOLIVIOL	VVIILIV IXLI LI	TOTAL CONTINUE ONLY (EON). Openial Repair	L
>>	INSPECT	ION END				M
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P0605 ECM

Description INFOID:000000007463354

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
		A)	ECM calculation function is malfunctioning.	
P0605	Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM
		C)	ECM self shut-off function is malfunctioning.	

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

- 1. Turn ignition switch ON.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-993, "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.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-993, "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 ON.
- Repeat step 2 for 32 times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

P0605 ECM

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> Go to EC-993, "Diagnosis Procedure". NO >> INSPECTION END Α Diagnosis Procedure INFOID:0000000007463356 1. INSPECTION START EC Turn ignition switch ON. Erase DTC. 3. Perform DTC Confirmation Procedure. See EC-992, "DTC Logic". Is the 1st trip DTC P0605 displayed again? D YES >> GO TO 2. NO >> INSPECTION END 2.REPLACE ECM Е Replace ECM. Refer to EC-655, "Component Parts Location". Go to EC-634, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement". F >> INSPECTION END Н K M Ν Р

[VQ25HR FOR USA AND CANADA]

P0607 ECM

Description INFOID:000000007463357

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

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- Check DTC.

Is DTC detected?

YES >> Go to EC-994, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463359

1. INSPECTION START

- 1. Turn ignition switch ON.
- Erase DTC.
- 3. Perform DTC Confirmation Procedure.

See EC-994, "DTC Logic".

4. Check DTC.

Is the DTC P0607 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

- 1. Replace ECM. Refer to EC-655, "Component Parts Location".
- 2. Go to EC-634, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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INFOID:0000000007463361

P0643 SENSOR POWER SUPPLY

DTC Logic INFOID:0000000007463360

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	С
P0643	Sensor power supply circuit short	ECM detects a 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.] [EVT control position sensor (bank 1) circuit is shorted.] (PSP sensor circuit is shorted.) Accelerator pedal position sensor Throttle position sensor Camshaft position sensor (PHASE) (bank 1) Exhaust valve timing control position sensor (bank 1) Power steering pressure sensor	D E

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.
- Turn ignition switch ON. 2.
- 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

- Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-995, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect accelerator pedal position (APP) sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP s	ensor	Ground	Voltage (V)	
Connector Terminal		Giodila	voltage (v)	
E112	5	Ground	Approx. 5	

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F101 43		Electric throttle control actuator (bank 2)	F27	1		
FIUI	44	Electric throttle control actuator (bank 1)	F6	1		
	60	CMP sensor (PHASE) (bank 1)	F5	1		
F102		EVT control position sensor (bank 1)	F62	1		
		PSP sensor	F35	3		
M107	99	APP sensor	E112	5		

Is the inspection result normal?

YES >> GO TO 4.

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

4. CHECK COMPONENTS

Check the following.

- Camshaft position sensor (PHASE) (bank 1) (Refer to EC-911, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 1) (Refer to EC-1004, "Component Inspection".)
- Power steering pressure sensor (Refer to <u>EC-988, "Component Inspection".</u>)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning component.

5. CHECK TP SENSOR

Refer to EC-819, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.

6.replace electric throttle control actuator

- Replace electric throttle control actuator. Refer to <u>EM-30</u>, "<u>Exploded View</u>".
- 2. Go to EC-819, "Special Repair Requirement".

>> INSPECTION END

7. CHECK APP SENSOR

Refer to EC-1065, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1065, "Special Repair Requirement".

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

P0643 SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

>> INSPECTION END

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P0850 PNP SWITCH

Description INFOID:000000007463362

When the selector lever position is P or N, park/neutral position (PNP) signal from the TCM is sent to ECM.

DTC Logic

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 is not changed in the process of engine starting and driving.	Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.] TCM

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.

Will CONSULT be used?

YES >> GO TO 2. NO >> GO TO 4.

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2. CHECK PNP SIGNAL

(P)With CONSULT

- 1. Turn ignition switch ON.
- 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal	
N or P position	ON	
Except above position	OFF	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-999, "Diagnosis Procedure".

3.perform dtc confirmation procedure

- 1. Select "DATA MONITOR" mode with CONSULT.
- 2. Start engine and warm it up to normal operating temperature.
- Maintain the following conditions for at least 50 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	1,200 - 6,375 rpm
COOLAN TEMP/S	More than 70 °C (158 °F)
B/FUEL SCHDL	1.0 - 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?

P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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YES >> Go to EC-999, "Diagnosis Procedure".

NO >> INSPECTION END

4. PERFORM COMPONENT FUNCTION CHECK

W Without CONSULT

Perform component function check. Refer to EC-999. "Component Function Check".

NOTE:

Use component function check to 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-999, "Diagnosis Procedure".

Component Function Check

1. PERFORM COMPONENT FUNCTION CHECK

W Without CONSULT

- 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	109	128	Selector lever	P or N	Battery voltage	
IVITO7	109	120	Selector level	Except above	Approx. 0	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-999, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK DTC WITH TCM

Refer to TM-149, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2. CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

Does starter motor operate?

YES >> GO TO 3.

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NO >> Check DTC with BCM. Refer to <u>BCS-16, "COMMON ITEM : CONSULT Function (BCM - COM-MON ITEM)"</u>.

${f 3.}$ CHECK PNP SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect A/T assembly harness connector.
- Disconnect ECM harness connector.
- Check the continuity between A/T assembly harness connector and ECM harness connector.

A/T assembly		ECM		Continuity
Connector Terminal		Connector	Terminal	Continuity
F51	9	M107	109	Existed

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

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P0850 PNP SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is the inspection result normal?

YES >> GO TO 5. NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness connectors E106, M6
- Harness for open or short between A/T assembly and ECM
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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P1078, P1084 EVT CONTROL POSITION SENSOR

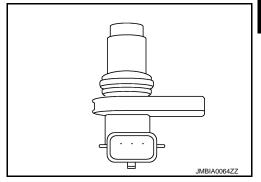
Description

Exhaust valve timing control position sensor detects the concave groove of the exhaust camshaft rear end.

This sensor signal is used for sensing a position of the exhaust camshaft.

This sensor uses a Hall IC.

Based on the position of the exhaust camshaft, ECM controls exhaust valve timing control magnet retarder to optimize the shut/open timing of exhaust valve for the driving condition.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1078 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-995, "DTC Logic".

Exhaust valve timing control position sensor (bank 1) circuit An excessively high or low voltage from the sensor is sent to ECM. Exhaust valve timing control position sensor (PASE) (bank 2) circuit Exhaust valve timing control position sensor (bank 2) circuit Exhaust valve timing control position sensor (bank 2) circuit Exhaust valve timing control position sensor (bank 2) circuit Exhaust valve timing control position sensor (bank 2) circuit Exhaust valve timing control position sensor (bank 2) circuit Exhaust valve timing control position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit.) Exhaust valve timing control position sensor (POS) circuit.	DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1084 Exhaust valve timing control position sensor (bank 2) circuit Exhaust valve timing control position sensor (bank 2) circuit Exhaust valve timing control position sensor (bank 2) circuit Exhaust valve timing control position sensor (bank 2) circuit Exhaust valve timing control position sensor circuit is shorted.) Exhaust valve timing control position sensor circuit is shorted.) Exhaust valve timing control position sensor circuit is shorted.) Exhaust valve timing control position sensor (POs) circuit is shorted. Exhaust valve timing control position sensor (POs) circuit is shorted. Exhaust valve timing control position sensor (POs) circuit is shorted. Exhaust valve timing control position sensor (POs) circuit is shorted. Exhaust valve timing control position sensor (POs) circuit is shorted. Exhaust valve timing control position sensor (POs) circuit is shorted. Exhaust valve timing control position sensor (POs) circuit is shorted. Exhaust valve timing control position sensor (POs) circuit is shorted. Exhaust valve timing control position sensor (POs) circuit is shorted. Exhaust valve timing control position sensor (POs) circuit is shorted.	P1078	control position sensor		 [EVT control position sensor (bank 1) circuit is open or shorted) Exhaust valve timing control position sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 1) Accumulation of debris to the signal pick-up
 Accelerator pedal position sens EVAP control system pressure Refrigerant pressure sensor 	P1084	control position sensor	, ,	[EVT control position sensor (bank 2) circuit is open or shorted) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Evance control system pressure sensor circuit is shorted.) (Evance control system pressure sensor circuit is shorted.) Exhaust valve timing control position sensor (bank 2) Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Battery current sensor Accelerator pedal position sensor EVAP control system pressure sensor Refrigerant pressure sensor Accumulation of debris to the signal pick-up

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.

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[VQ25HR FOR USA AND CANADA]

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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1002, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463368

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-I

- 1. Disconnect exhaust valve timing control position sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between exhaust valve timing control position sensor harness connector and ground.

DTC	EVT	control positi	Ground	Voltage (V)	
DIC	Bank	Connector	Terminal	Giodila	voltage (v)
P1078	1	F62	1	Ground	Approx. 5
P1084	2	F63	1	Ground	дриох. 3

Is the inspection result normal?

YES >> GO TO 8.

NO-1 >> P1078: Repair open circuit or short to ground or short to power in harness or connectors.

NO-2 >> P1084: GO TO 3.

3.check exhaust valve timing control position sensor power supply circuit-ii

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

EVT	EVT control position sensor		EVT control position sensor ECM			Continuity
Bank	Connector	Terminal	Connector	Terminal	Continuity	
2	F63	1	F102	64	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	46	CKP sensor (POS)	F2	1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102	64	EVT control position sensor (bank 2)	F63	1	
		Battery current sensor	E21	1	
	103	APP sensor	E112	6	
M107	M107	EVAP control system pressure sensor	B252	3	
		Refrigerant pressure sensor	E77	3	
s the insp	ection resi	ult normal?			

YES >> GO TO 5.

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

CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-905, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to <u>EC-911, "Component Inspection"</u>.)
- Battery current sensor (Refer to <u>EC-1034, "Component Inspection"</u>.)
- EVAP control system pressure sensor (Refer to <u>EC-948, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-1111, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-1065, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to EC-1065, "Special Repair Requirement".

>> INSPECTION END

8.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

DTC	EVT	EVT control position sensor		ECM		Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1078	1	F62	2	F102	88	Existed
P1084	2	F63	2	1 102	30	LAISIGU

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

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

 Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

DTC	EVT control position sensor		ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1078	1	F62	3	F102	58	Existed
P1084	2	F63	3	F 102	62	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

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

10. CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Refer to EC-1004, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning exhaust valve timing control position sensor. Refer to EM-47, "Exploded View.

11. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-905, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-96, "2WD : Exploded View"</u> (2WD models) or <u>EM-99, "AWD : Exploded View"</u> (AWD models).

12. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-911, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-68, "Exploded View".

13. CHECK CAMSHAFT (EXH)

Check the following;

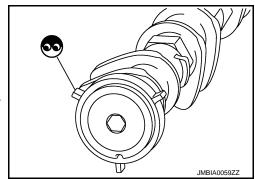
- · Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 14.

NO >> Remove of

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-68. <a href=""Exploded View".



14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463369

1. EXHAUST VALVE TIMING CONTROL POSITION SENSOR-I

- 1. Turn ignition switch OFF.
- 2. Disconnect exhaust valve timing control position sensor harness connector.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

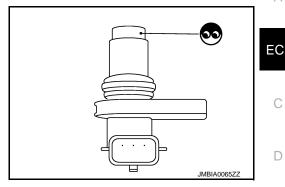
- Loosen the fixing bolt of the sensor.
- Remove the sensor. Refer to EM-47, "Exploded View".
- Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Replace malfunctioning exhaust valve timing control position sensor. Refer to EM-47, "Exploded View".



2.EXHAUST VALVE TIMING CONTROL POSITION SENSOR-II

Check resistance exhaust valve timing control position sensor terminals as shown below.

Terminals	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning exhaust valve timing control position sensor. Refer to EM-47, "Exploded View".

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P1148, P1168 CLOSED LOOP CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1148, P1168 CLOSED LOOP CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

DTC P1148 or P1168 is displayed with another DTC for A/F sensor 1.

Perform the trouble diagnosis for the corresponding DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148	Closed loop control function (bank 1)	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
P1168	Closed loop control function (bank 2)	The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	A/F sensor 1

Diagnosis Procedure

INFOID:0000000007463371

DTC P1148 or P1168 is displayed with DTC for A/F sensor 1.

When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1.Refer to <u>EC-1142</u>, "DTC Index".

P1211 TCS CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1211 TCS CONTROL UNIT

Description INFOID:0000000007463372

The malfunction information related to TCS is transferred through 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 INFOID:0000000007463373

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 a 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

- Start engine and let it idle for at least 60 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-1007, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

Go to TM-96, "Diagnosis Flow".

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P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1212 TCS COMMUNICATION LINE

Description INFOID:000000007463375

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-994, "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 shorted.) 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.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1008, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

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Go to TM-96, "Diagnosis Flow".

EC-1008 2012 G Sedan

INFOID:0000000007463377

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1217 ENGINE OVER TEMPERATURE

DTC Logic INFOID:0000000007463378

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 EC-994, "DTC Logic".

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will

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 shorted.) IPDM E/R Cooling fan control module Cooling fan motor Radiator hose Radiator Radiator cap Water pump Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-9, "Draining" and CO-10, <u>"Refilling"</u>. Also, replace the engine oil. Refer to <u>LU-11, "Draining"</u>and <u>LU-12, "Refilling"</u>.

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-18, "FOR NORTH AMERICA: Anti-Freeze Coolant Mixture Ratio".
- 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-1009, "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 EC-1010, "Diagnosis Procedure".

Component Function Check

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.

EC-1009 2012 G Sedan Revision: 2013 February

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

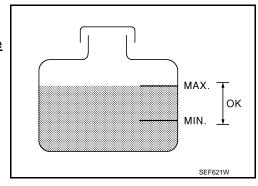
Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

<u>Is the coolant level in the reservoir tank and/or radiator below the proper range?</u>

YES >> Go to EC-1010, "Diagnosis Procedure".

NO >> GO TO 2.



2. PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-1010, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform component function check-iii

(I) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Check that cooling fan speed varies according to the percent.

♥Without CONSULT

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1010, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463380

1. CHECK COOLING FAN OPERATION

(II) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Check that cooling fan speed varies according to the percent.

Without CONSULT

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>".
- Check that cooling fan operates.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-1085, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-9, "Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose
- Radiator
- Water pump

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-13, "RADIATOR CAP: Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace radiator cap. Refer to CO-15, "Exploded View".

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-29, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat. Refer to CO-28, "Removal and Installation".

6.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-816, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".

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-18, "FOR NORTH AME ant Mixture Ratio"	ERICA : Anti-Freeze Cool-
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-9, "Inspection"
	4	Radiator cap	Pressure tester	107 kPa (1.1 kg/cm ² , 16 psi) (Limit)	CO-13, "RADIATOR CAP : Inspection"
ON* ²	5	Coolant leaks	Visual	No leaks	CO-9, "Inspection"
ON* ²	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-29, "Inspection"
ON* ¹	7	Cooling fan	CONSULT	Operating	EC-1085, "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 reservoir tank	Visual	No overflow during driving and idling	CO-9, "Inspection"
OFF*4	10	Coolant return from reservoir tank to radiator	Visual	Should be initial level in reservoir tank	CO-9, "Inspection"
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-116, "Inspection"
	12	Cylinder block and pistons	Visual	No scuffing on cylinder walls or piston	EM-128, "Inspection"

^{*1:} Turn the ignition switch ON.

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^{*2:} Engine running at 3,000 rpm for 10 minutes.

^{*3:} Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.

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For more information, refer to CO-7, "Troubleshooting Chart".

>> INSPECTION END

^{*4:} After 60 minutes of cool down time.

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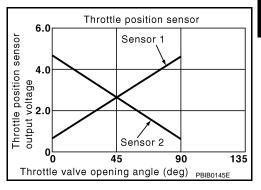
INFOID:0000000007463383

P1225, P1234 TP SENSOR

Description INFOID:0000000007463381

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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	uble diagnosis name DTC detecting condition	
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.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.

>> GO TO 2.

- 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-1013, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct. Refer to <u>EM-28, "Removal and Installation"</u>.

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P1225, P1234 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

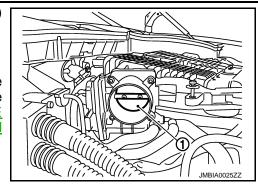
Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007463384

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

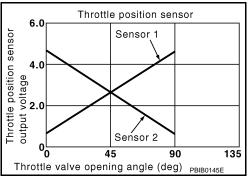
>> END

P1226, P1235 TP SENSOR

Description INFOID:0000000007463385

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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic INFOID:0000000007463386

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance (bank 1)	Closed throttle position learning is not performed	Electric throttle control actuator
P1235	Closed throttle position learning 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.

- 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.

TESTING CONDITION:

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

2.perform dtc confirmation procedure

Turn ignition switch ON.

>> GO TO 2.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Repeat steps 2 and 3 for 32 times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

Diagnosis Procedure

YES >> Go to EC-1015, "Diagnosis Procedure".

NO >> INSPECTION END

${f 1}$.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct. Refer to EM-28, "Removal and Installation".

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INFOID:0000000007463387

P1226, P1235 TP SENSOR

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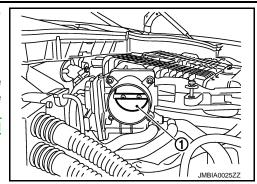
Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007463388

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description INFOID:0000000007463389

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:0000000007463390

DTC DETECTION LOGIC

NOTE:

If DTC P1233 or P2101 is displayed with DTC P1238, P1290, first perform the trouble diagnosis for DTC P1238, P2119. Refer to EC-1024, "DTC Logic".

If DTC P1233 or P2101 is displayed with DTC P2100, P2119, first perform the trouble diagnosis for DTC P1290, P2100. Refer to EC-1029, "DTC Logic".

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.

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

- Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1017, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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 follows.

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		E	СМ				
DTC		+	-	_	Condition	Voltage (V)	
	Connector Terminal Connector Terminal						
P1233	E102 52		F102 52	F102 52 M107 128		Ignition switch OFF	Approx. 0
1 1233	F 102	32	128		Ignition switch ON	Battery voltage	
P2101	F101 3	F404 2		120	Ignition switch OFF	Approx. 0	
P2101		3			Ignition switch ON	Battery voltage	

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 3.

3.check throttle control motor relay power supply circuit

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector E7.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM	E/R	EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E7 70		F101	25	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.

- Harness connectors E25, F30
- Harness connectors F104, F105
- Harness for open or short between ECM and IPDM E/R

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

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

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

DTC	IPDM E/R		ECM		Continuity
ы	Connector	Terminal	Connector	Terminal	Continuity
P1233		54	F102	52	Existed
P2101	E/	34	F101	3	Existed

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

<u>Is the inspection result normal?</u>

YES >> GO TO 7. NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- Harness for open or short between ECM and IPDM E/R
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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?

>> GO TO 8. YES

NO >> Replace 15 A fuse.

8 . CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

>> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation". YES

NO >> Repair or replace harness or connectors.

9.check throttle control motor output signal circuit for open or short

- Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- Disconnect ECM harness connector. 3.
- 4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
			5		49	Existed
P1233	2	F27	3	F102	50	Not existed
P1233	2	Γ21	6	- F102	49	Not existed
					50	Existed
			6		2	Existed
P2101	1	1 F6 -	О	5 F101	4	Not existed
			5		2	Not existed
					4	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace malfunctioning part.

10.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Remove the intake air duct. Refer to EM-28, "Removal and Installation".
- 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, and then perform throttle valve closed position learning. Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-1020, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 13.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

12. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunction electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000007463392

1. CHECK THROTTLE CONTROL MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect electric throttle control actuator harness connector.
- Check resistance between electric throttle control actuator terminals as follows.

Electric th	rottle control actuator	Resistance
Bank	Terminals	ixesisiance
1	1 and 2	Approx. 1 - 15 Ω [at 25°C (77°F)]
2	5 and 6	Αρρίολ: 1 - 13 52 [αι 23 Ο (77 1)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator. Refer to <u>EM-30, "Exploded View"</u>.
- 2. Go to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007463393

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

P1236, P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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INFOID:0000000007463396

P1236, P2118 THROTTLE CONTROL MOTOR

Description INFOID:0000000007463394

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:0000000007463395

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.

- 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.

>> GO TO 2.

2.perform dtc confirmation procedure

- Turn ignition switch ON and wait at least 2 seconds.
- Start engine and let it idle for 5 seconds. 2.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1021, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect ECM harness connector. 2.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Disconnect electric throttle control actuator harness connector.

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P1236, P2118 THROTTLE CONTROL MOTOR

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

DTC	Electric throttle control actuator			ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
			5		49	Existed
P1236	2	F27	3	F102	50	Not existed
F 1230	2	121	6	1102	49	Not existed
					50	Existed
		F6	6	6 F101	2	Existed
P2118	1				4	Not existed
	, , ,		5		2	Not existed
			5		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 malfunctioning part.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-1022, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

${f 5}.$ REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000007463397

1. CHECK THROTTLE CONTROL MOTOR

- Turn ignition switch OFF.
- Disconnect electric throttle control actuator harness connector.
- Check resistance between electric throttle control actuator terminals as follows.

Electric th	rottle control actuator	Resistance
Bank	Terminals	Nesisiance
1	1 and 2	Approx. 1 - 15 Ω [at 25°C (77°F)]
2 5 and 6		πρριολ. 1 - 10 s2 [at 23 C (11 1)]

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. Refer to EM-30, "Exploded View".
- 2. Go to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

P1236, P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

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>> INSPECTION END	А
Special Repair Requirement	
1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	EC
Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"	
>> GO TO 2.	С
2.PERFORM IDLE AIR VOLUME LEARNING	
Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"	D
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P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR [VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description INFOID:0000000074633995

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 the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic INFOID:000000007463400

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
	8 Electric throttle control		Electric throttle control A) Electric throttle control actuator does not function properly due to the return spring malfunction.	
P1238	actuator (bank 2)	B)	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
B0446	Electric throttle control	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	- Lieuno unome control actuator
actuator (bank 1)		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

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.

>> 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 and wait at least 3 seconds.
- 3. Shift selector lever to P position.
- 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 and wait at least 3 seconds.
- 7. Shift selector lever to P position.
- 8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 9. Check DTC.

Is DTC detected?

YES >> Go to EC-1025, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure for malfunction ${ t c}$

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Shift selector lever to D position and wait at least 3 seconds.
- 3. Shift selector lever to P position.

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

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[VQ25HR FOR USA AND CANADA]

Start engine and let it idle for 3 seconds.

Check DTC.

Is DTC detected?

YES >> Go to EC-1025, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

INFOID:0000000007463401

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

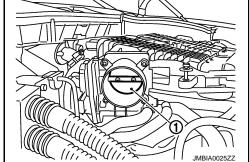
- Turn ignition switch OFF.
- Remove the intake air duct. Refer to EM-28, "Removal and Installation". 2.
- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".



2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007463402

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END M

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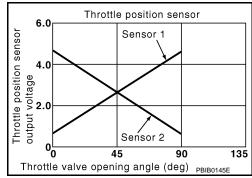
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P1239, P2135 TP SENSOR

Description INFOID:000000007463403

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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:0000000007463404

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-995, "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 and 2 circuit is open or shorted.)
P2135	Throttle position sensor (bank 1) circuit range/ performance	and TP sensor 2.	Electric throttle control actuator (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.
- 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-1026, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463405

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

P1239, P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

- Disconnect electric throttle control actuator harness connector.
- Turn ignition switch ON.
- Check the voltage between electric throttle control actuator harness connector and ground.

DTC	Electr	ic throttle cont	rol actuator	Ground	Voltage (V)
ыс	Bank	Connector	Terminal	Ground	voltage (v)
P1239	2	F27	1	Ground	Approx. 5
P2135	1	F6	1	Giodila	Αρρίολ. 3

Is the inspection result normal?

YES >> GO TO 3.

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

3.check throttle position sensor ground circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1239	2	F27	4	F101	48	Existed
P2135	1	F6	4	1 101	40	LAISIEU

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

Is the inspection result normal?

YES >> GO TO 4.

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

f 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	or ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1239	2	F27	2		31	
F 1239	2	121	3	F101	35	Existed
P2135	1	F6	2	1 101	30	LAISIGU
1 2133	Į.	10	3		34	

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

Is the inspection result normal?

YES >> GO TO 5.

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

5.check throttle position sensor

Refer to EC-819, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

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O.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".

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EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident"

>> INSPECTION END

Component Inspection

INFOID:0000000007463406

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
	30	40	Accelerator pedal: Fully released	More than 0.36
	[TP sensor 1 (bank 1)]	40	Accelerator pedal: Fully depressed	Less than 4.75
	31	48	Accelerator pedal: Fully released	More than 0.36
F101	[TP sensor 1 (bank 2)]	40	Accelerator pedal: Fully depressed	Less than 4.75
FIUI	34	40	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 1)]	40	Accelerator pedal: Fully depressed	More than 0.36
	35	48	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 2)]	40	Accelerator pedal: 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. Refer to EM-30, "Exploded View".
- Go to EC-1028, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007463407

${f 1}$.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description INFOID:0000000007463408

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:0000000007463409

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.

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

- Turn ignition switch ON and wait at least 2 seconds.
- Start engine and let it idle for 5 seconds.
- Check DTC. 3

Is DTC detected?

YFS >> Go to EC-1029, "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

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

Is DTC detected?

YFS >> Go to EC-1029, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

 ${f 1}$.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.

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INFOID:0000000007463410

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 3. Disconnect IPDM E/R harness connector E7.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM	E/R	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E7	70	F101	25	Existed

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 E25, F30
- Harness connectors F104, F105
- Harness for open or short between ECM and IPDM E/R

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

${f 3.}$ 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	EC	JM.	Continuity
БТО	Connector	Terminal	Connector	Terminal	Continuity
P1290			F102	52	
P2100	E7	54	F101	3	Existed
P2103	<i>□1</i>	54	F101	3	Existed
F2103			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 E25, F30
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or 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.

NO >> Replace 15 A fuse.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".

NO >> Repair or replace harness or connectors.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1550 BATTERY CURRENT SENSOR

Description INFOID:0000000007463411

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-12. "System Description".

CAUTION:

Do not 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 the battery discharge may occur.

DTC Logic INFOID:0000000007463412

DTC DETECTION LOGIC

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.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) 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.
- 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

- Start engine and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> Go to EC-1032, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463413

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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	Glound	voltage (v)	
E21	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

${f 3.}$ CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

- 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 current sensor		EC	ECM		
	Connector	Terminal	Connector	Terminal	Continuity	
	E21	1	F102	64	Existed	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open between battery current sensor and ECM

>> Repair open circuit.

5. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F101	46	CKP sensor (POS)	F2	1
		CMP sensor (PHASE) (bank 2)	F18	1
F102	64	EVT control position sensor (bank 2)	F63	1
		Battery current sensor	E21	1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

DTC/CIF	RCUIT DIA	AGNOSIS >			[VQZ5HF	FOR USA AND CANAI
EC	M		Sensor			
Connector	Terminal	Nam	ne	Connector	Terminal	
	103	APP sensor		E112	6	
M107	107	EVAP control system	pressure sensor	B252	3	
	107	Refrigerant pressure	sensor	E77	3	
YES >	> GO TO (> Repair s COMPO	hort to ground or s	hort to power in	n harness or co	onnectors.	
Cranksha Camshaf Exhaust EVAP co Refrigera s the inspe YES NO	aft position It position valve timin ntrol syste ant pressu ection resi > GO TO > Replace	em pressure senso re sensor (Refer to ult normal? 7. malfunctioning co	oank 2) (Refer t sensor (bank 2) r (Refer to <u>EC-9</u> <u>EC-1111, "Diac</u>	o <u>EC-911, "Co</u>) (Refer to <u>EC-</u> 948, "Compon	mponent Ir 1004, "Cor ent Inspect	spection".) nponent Inspection".)
.CHECK			ion"			
		Component Inspectult normal?	<u>.iUII</u> .			
•	> GO TO					
	> GO TO 8					
.REPLA	CE ACCE	LERATOR PEDAL	ASSEMBLY			
. Replac	ce acceler	ator pedal assemb	ly. Refer to ACC	C-3, "Removal	and Install	ation".
. Go to !	EC-1065.	"Special Repair Re	<u>equirement"</u> .			
	INIODEO	TION END				
_		TION END			D ODEN 44	ID OLIODT
		Y CURRENT SEN	SOR GROUND	CIRCUIT FOR	R OPEN AI	ID SHORT
	nition swi	tch OFF. 1 harness connecto	\r			
				or harness co	nnector and	ECM harness connector.
		•				
Battery curr	ent sensor	ECM	Continuity			
Connector	Terminal	Connector Termina				
E21	2	F102 95	Existed			
l. Also cl	neck harn	ess for short to gro	und and short t	o power.		
		ult normal?				
•	O TO	11.				
	> GO TO	10.				
NO >						
NO >		UNCTIONING PAI	RT			
NO >	CT MALF	UNCTIONING PAI	RT			
NO >> 10.DETE Check the Harness	ECT MALF following. connector	rs F30, E25 or short between ba				

>> Repair open circuit or short to ground or short to power in harness or connectors. **11.**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.

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[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Battery current sensor		ECM		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 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

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

13. CHECK BATTERY CURRENT SENSOR

Refer to EC-1034, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463414

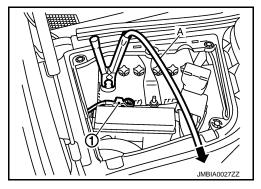
1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 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 under the following conditions.

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.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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P1551, P1552 BATTERY CURRENT SENSOR

Description INFOID:0000000007463415

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-12, "System Description".

CAUTION:

Do not 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 the battery discharge may occur.

DTC Logic

DTC DETECTION 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 ar shorted)
P1552	Battery current sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	or shorted.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Accelerator pedal position sensor EVAP control system 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.
- 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 with ignition switch ON

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 10 seconds.
- Check 1st trip DTC.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is 1st trip DTC detected?

YES >> Go to EC-1036, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463417

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- 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	Glound	voltage (v)	
E21	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 3.

3.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

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

Battery curr	ent sensor	E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E21	1	F102	64	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open between battery current sensor and ECM

>> Repair open circuit.

5. 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	46	CKP sensor (POS)	F2	1
		CMP sensor (PHASE) (bank 2)	F18	1
F102	64	EVT control position sensor (bank 2)	F63	1
		Battery current sensor	E21	1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

	CM	Sensor			
Connector	Terminal	Name	Connector	Terminal	
	103	APP sensor	E112	6	
M107	107	EVAP control system pressure sensor	B252	3	
	107	Refrigerant pressure sensor	E77	3	
s the insp	ection res	ult normal?			
	> GO TO				
`	•	short to ground or short to power in	harness or co	onnectors.	
O.CHECK	СОМРО	NENTS			
Check the		(DOO) (D. (.) EO 005		e: " " \	
		n sensor (POS) (Refer to <u>EC-905, "</u> sensor (PHASE) (bank 2) (Refer to			nn")
		ng control position sensor (bank 2)			
		em pressure sensor (Refer to EC-9			
•	-	re sensor (Refer to EC-1111, "Diag	nosis Proced	ure".)	
•		ult normal?			
	> GO TO ' > Replace	nalfunctioning component.			
_	APP SE	<u> </u>			
		Component Inspection".			
-	oction resistant section resistant resistant section resistant section resistant section resistant	ult normal?			
	> GO TO :				
•		LERATOR PEDAL ASSEMBLY			
		ator pedal assembly. Refer to ACC	-3 "Removal	and Installation"	
		"Special Repair Requirement".	o, Removal	and motanation .	
>	> INSPEC	TION END			
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>> Repair open circuit or short to ground or short to power in harness or connectors.

11. 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.

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Battery curr	ent sensor	EC	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 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

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

13. CHECK BATTERY CURRENT SENSOR

Refer to EC-1046, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463418

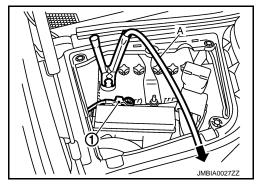
1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 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 under the following conditions.

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.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1553 BATTERY CURRENT SENSOR

Description INFOID:0000000007463419

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-12. "System Description".

CAUTION:

Do not 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 the battery discharge may occur.

DTC Logic INFOID:0000000007463420

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1553	Battery current sensor performance	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.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) 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.
- 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

- Start engine and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> Go to EC-1040, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463421

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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	Connector Terminal		voltage (v)	
E21	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

${f 3.}$ CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

- 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 current sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E21	1	F102	64	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open between battery current sensor and ECM

>> Repair open circuit.

5. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F101	46	CKP sensor (POS)	F2	1
		CMP sensor (PHASE) (bank 2)	F18	1
F102 64 EV		EVT control position sensor (bank 2)	F63	1
	Battery current sensor		E21	1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

	CM		Sensor			
Connector	Terminal		Name	Connector	Terminal	
	103	APP sensor		E112	6	
M107	407	EVAP control sy	stem pressure sensor	B252	3	
	107	Refrigerant pres	ssure sensor	E77	3	
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Exhaust	valve timii	ng control posi	tion sensor (bank 2)	(Refer to EC-	1004, "Com	ponent Inspection".)
			ensor (Refer to <u>EC-9</u>			<u>on"</u> .)
_	-	-	er to <u>EC-1111, "Diag</u>	<u>inosis Proced</u>	<u>ure"</u> .)	
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>> Repair open circuit or short to ground or short to power in harness or connectors.

11. 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.

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

Battery current sensor		ECM		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 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- · Harness for open or short between battery current sensor and ECM

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

13. CHECK BATTERY CURRENT SENSOR

Refer to EC-1046, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463422

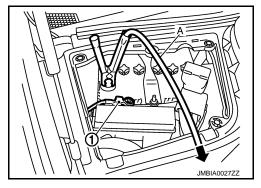
1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 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 under the following conditions.

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.

< DTC/CIRCUIT DIAGNOSIS >

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INFOID:0000000007463425

P1554 BATTERY CURRENT SENSOR

Description INFOID:0000000007463423

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-12, "System Description".

CAUTION:

Do not 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 the battery discharge may occur.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	Harness or connectors (Battery current sensor circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Accelerator pedal position sensor EVAP control system pressure sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-1043, "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 EC-1044, "Diagnosis Procedure".

Component Function Check

1.PRECONDITIONING

TESTING CONDITION:

• Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

 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

(P)With CONSULT

- 1. Start engine and let it idle.
- 2. Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT.
- 3. Check "BAT CUR SEN" indication for 10 seconds.
 - "BAT CUR SEN" should be above 2,300 mV at least once.

♥Without CONSULT

- 1. Start engine and let it idle.
- 2. Check the voltage between ECM harness connector terminals as follows.

	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-1044, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463426

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- 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 9.

NO >> GO TO 3.

${f 3.}$ CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

- 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 current sensor		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E21	1	F102	64	Existed

Is the inspection result normal?

P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> GO TO 5. NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open between battery current sensor and ECM

>> 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	46	CKP sensor (POS)	F2	1	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102	F102 64	EVT control position sensor (bank 2)	F63	1	
	Battery current sensor	E21	1		
	103	APP sensor	E112	6	
M107		EVAP control system pressure sensor	B252	3	
107	Refrigerant pressure sensor	E77	3		

Is the inspection result normal?

YES >> GO TO 6.

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

6. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-905. "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to <u>EC-911, "Component Inspection"</u>.)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1004, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-958, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-1111, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

.CHECK APP SENSOR

Refer to EC-1065, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 8.

8. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to <u>EC-1065</u>, "Special Repair Requirement".

>> INSPECTION END

9. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

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P1554 BATTERY CURRENT SENSOR

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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 11. NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

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

11. 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	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 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

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

13. CHECK BATTERY CURRENT SENSOR

Refer to EC-1046. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463427

1. CHECK BATTERY CURRENT SENSOR

- Turn ignition switch OFF.
- 2. Reconnect harness connectors disconnected.

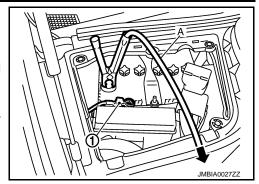
P1554 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 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 under the following conditions.

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 $\underline{\text{PG-3}}$, $\underline{\text{"How to Handle Battery"}}$.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1564 ASCD STEERING SWITCH

Description INFOID.000000007463428

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 EC-690, "System Description" for the ASCD function.

DTC Logic INFOID:000000007463429

DTC DETECTION LOGIC

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-992, "DTC Logic".

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

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.
- 2. Turn ignition switch ON.
- 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. Check DTC.

Is DTC detected?

YES >> Go to EC-1048, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463430

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK ASCD STEERING SWITCH CIRCUIT

(II) With CONSULT

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

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- 1. Turn ignition switch ON.
- 2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT.
- 3. Check each item indication under the following conditions.

Monitor item	Condition	Condition	
MAIN SW	MAIN switch	Pressed	ON
WAIN SW	WAIN SWILCH	Released	OFF
CANCEL SW	CANCEL switch	Pressed ON	
CANCLL SW	CANCLE SWILLI	Released	OFF
RESUME/ACC SW	RESUME/ACCEL-	Pressed	ON
RESONIE/ACC SW	ERATE switch	Released	OFF
SFT SW	SET/COAST switch	Pressed	ON
SLI SVV	SET/COAST SWICH	Released	OFF

W Without CONSULT

- 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	Terminal	
			MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 1
M107	101 (ASCD steering switch signal)	108	SET/COAST switch: Pressed	Approx. 2
	(/ 1000 clooming owner digital)		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.

3.check ascd steering switch ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Disconnect combination switch (spiral cable) harness connector.
- 4. Check the continuity between combination switch (spiral cable) and ECM harness connector.

	Combination sw	EC	CM	Continuity	
-	Connector	Terminal	Connector	Terminal	Continuity
	M303	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 or short to ground or short to power in harness or connectors.

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

${f 5.}$ CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch (spiral cable) and ECM harness connector.

Combination switch (spiral cable)		EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
M303	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 (spiral cable)

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

7. CHECK ASCD STEERING SWITCH

Refer to EC-1050, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ASCD steering switch. Refer to <u>SR-10</u>, "Exploded View".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463431

1. CHECK ASCD STEERING SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect combination switch (spiral cable) harness connector.
- 3. Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.

Combination switch (spiral cable)		Condition	Resistance (Ω)
Connector	Terminals		
		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. 1,490
		All ASCD steering switches: Released	Approx. 3,980

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to SR-10, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1572 ASCD BRAKE SWITCH

Description INFOID:0000000007463432

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 this input of two kinds (ON/OFF signal).

Refer to EC-690, "System Description" for the ASCD function.

DTC Logic INFOID:0000000007463433

DTC DETECTION LOGIC

NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-992, "DTC Logic".
- 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 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
B4550	1000	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	В)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	 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.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

(P)With CONSULT

- Start engine (VDC switch OFF).
- Select "DATA MONITOR" mode with CONSULT.
- 3. Press MAIN switch and check that CRUISE is indicated on the information display on the combination meter.
- 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.

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< DTC/CIRCUIT DIAGNOSIS >

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position

Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-1052, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure

(P)With CONSULT

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.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-1052, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463434

1.CHECK OVERALL FUNCTION-I

(II) With CONSULT

- 1. Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition	Indication	
DDAKE SWA	Brake pedal	Slightly depressed	OFF
DIVARL SWI	втаке редаі	Fully released	ON

W Without CONSULT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as follows.

ECM						
Connector	+	+ – Condition		ondition	Voltage (V)	
Connector	Terminal	Terminal				
M107	126	128	Brake pedal	Slightly depressed	Approx. 0	
IVITO7	(ASCD brake switch signal)	120	brake pedar	Fully released	Battery voltage	

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

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

2. CHECK OVERALL FUNCTION-II

(P) With CONSULT

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW2 Brake pedal	Slightly depressed		ON
	Fully released	OFF	

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

ECM						
Connector	+	_	Condition		Voltage (V)	
Connector	Terminal Term					
M107	122	128	Brake pedal	Slightly depressed	Battery voltage	
(Stop lamp switch signal)		120	Diake pedai	Fully released	Approx. 0	

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 8.

3.check ascd brake switch power supply circuit

- Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD brake switch		Ground	Voltage
Connector Terminal		Giodila	voltage
E109	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5. NO

>> GO TO 4.

f 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

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E109	2	M107	126	Existed

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

Is the inspection result normal?

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< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 7. NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- · Harness for open or short to between ASCD brake switch and ECM
 - >> Repair open circuit or short to ground in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to EC-1055, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ASCD brake switch. Refer to BR-18, "Exploded View".

8.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 Terminal		Orouna	voltage
E119	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. 7)
- Harness for open or short between stop lamp switch and battery
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

10.check stop lamp switch input signal circuit for open and short

- 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
E119	2	M107	122	Existed

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.

- Fuse block (J/B) connectors E103, M2
- · Harness for open or short between ECM and stop lamp switch
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

12. CHECK STOP LAMP SWITCH

Refer to EC-1055, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace stop lamp switch. Refer to <u>BR-18</u>, "Exploded View".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

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	C	Continuity	
1 and 2	Brake pedal	Fully released	Existed
T dild 2	I aliu 2 Biake peuai	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

- Adjust ASCD brake switch installation. Refer to BR-19, "Inspection and Adjustment".
- 2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 Brake	Brake pedal	Fully released	Existed
	brake pedar	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to <u>BR-18</u>, "<u>Exploded View</u>".

Component Inspection (Stop Lamp Switch)

1.CHECK STOP LAMP SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2 Brake pedal	Brake nedal	Fully released	Not existed
	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 BR-7, "Inspection and Adjustment".
- Check the continuity between stop lamp switch terminals under the following conditions.

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Terminals	C	Continuity	
1 and 2	Brako podal	Fully released	Not existed
i anu z	Brake pedal	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-18</u>. "Exploded View".

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1574 ASCD VEHICLE SPEED SENSOR

Description INFOID:0000000007463437

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 ASCD control. Refer to EC-690, "System Description" for ASCD functions.

INFOID:0000000007463438

DTC Logic

DTC DETECTION LOGIC

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 EC-979, "DTC Logic".
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-992, "DTC Logic".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-994, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574	ASCD vehicle speed sensor	ECM detects a difference between 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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine (VDC switch OFF).
- Drive the vehicle at more than 40 km/h (25 MPH).

CAUTION:

Always drive vehicle at a safe speed.

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.

Check DTC.

Is DTC detected?

YES >> Go to EC-1057, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-149, "Diagnosis Description".

Is the inspection result normal?

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P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

 $2.\mathsf{CHECK}$ DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to BRC-27, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

 ${\bf 3.}$ CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

>> INSPECTION END

P1715 INPUT SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

P1715 INPUT SPEED SENSOR

Description INFOID:0000000007463440

ECM receives input speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

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DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P1715 is displayed with DTC UXXXX first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-902, "DTC Logic".
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to EC-907, "DTC Logic".
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-992, "DTC Logic".
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-994, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input speed signal is different from the theoretical value calculated by ECM from output speed sensor signal and engine rpm signal.	Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (Input speed sensor circuit is open or shorted) TCM

Diagnosis Procedure

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-149, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to TM-273, "Removal and Installation".

>> INSPECTION END

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P1805 BRAKE SWITCH

Description INFOID:000000007463443

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 driving.

DTC Logic

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 extremely long time while the vehicle is driving.	Harness or connectors (Stop lamp switch circuit is open or shorted.) Stop lamp switch

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 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 EC-1060, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463445

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 lam	p switch	Ground	Voltage	
Connector Terminal		Giodila	voltage	
E119	1	Ground	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/CII	RCUIT DI <i>l</i>	AGNOSIS >		[VQ25HR FOR USA AND CANADA]	
Harness	for open o	or short between st	op lamp swit	ch and battery	
					Α
4		•	•	r short to power in harness or connectors.	
				CIRCUIT FOR OPEN AND SHORT	EC
		lamp switch harne harness connected			
				harness connector and ECM harness connector.	
					С
Stop lan	np switch	ECM	Continuity		
Connector	Terminal	Connector Terminal			D
E119	2	M107 122	Existed		
		ess for short to gro	und and sho	rt to power.	Е
	ection resu > GO TO 6				
	> GO TO 5				
5.DETEC	T MALFUI	NCTIONING PART			F
Check the					
• Fuse blo	ck (J/B) co	nnector E103, M2			G
 Harness 	for open o	or short between E	CM and stop	lamp switch	
	> Popoir o	non circuit or chart	to ground o	r chart to nawar in harnage or connectors	
_	-	pen circuit of short .MP SWITCH	to ground of	r short to power in harness or connectors.	Н
1			ion (Otom Lor	one Contaball	
	ection resu	Component Inspect	ion (Stop Lar	np Switch).	- 1
	> GO TO 7				
			Refer to <u>BR-</u>	18, "Exploded View".	J
7.CHECK	(INTERMI	TTENT INCIDENT	•		
Refer to G	I-43, "Inter	mittent Incident".			
					K
>	> INSPEC	TION END			
Compor	nent Insp	ection (Stop La	amp Switc	ch) INFOID:0000000007463446	L
	-	` .	·	,	
I .CHECk	K STOP LA	MP SWITCH-I			
	gnition swit	tch OFF. Iamp switch harne	ce connoctor		N
				terminals under the following conditions.	
			·	Q	Ν
Terminals		Condition	Continuity	_	
1 and 2	Brake peda	Fully released	Not existed		
1 allu 2	biake peda	Slightly depressed	Existed	_	0
Is the insp	ection resu	ult normal?		_	
YES >	> INSPEC	TION END			

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

- 1. Adjust stop lamp switch installation. Refer to BR-19, "Inspection and Adjustment".
- 2. Check the continuity between stop lamp switch terminals under the following conditions.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Terminals	С	Continuity	
1 and 2	Brako podal	Fully released	Not existed
i anu z	Brake pedal	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-18</u>. "Exploded View".

Accelerator pedal position sensor

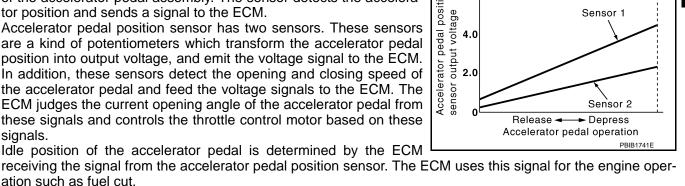
Sensor 1

P2122, P2123 APP SENSOR

Description INFOID:0000000007463447

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 potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals 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.



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DTC Logic INFOID:0000000007463448

DTC DETECTION LOGIC

NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-995, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position 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 position 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 before conducting the next test.

- 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.

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

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1063, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

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INFOID:0000000007463449

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?
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 so	ensor	Ground	Voltage (V)	
Connector Terminal		Giodila	vollage (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 or 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 or short to ground or short to power in harness or connectors.

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 sensor		APP sensor ECM		Continuity
	Connector	Terminal	Connector	Terminal	Continuity
	E112	3	M107	97	Existed

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M6, E106
- · Harness for open or short between ECM and accelerator pedal position sensor

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

8.CHECK APP SENSOR

Refer to EC-1065, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to EC-1065, "Special Repair Requirement".

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463450

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals under the following conditions.

ECM						
Connector	+	_	Condition		Voltage (V)	
Connector	Terminal	Terminal				
	97 (APP sensor 1) 98 (APP sensor 2)	100	- Accelerator pedal	Fully released	0.45 - 1.0	
M107				Fully depressed	4.4 - 4.8	
WITOT		104	Accelerator pedar	Fully released	0.22 - 0.50	
				Fully depressed	2.1 - 2.5	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace accelerator pedal assembly

- Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation"</u>.
- 2. Go to EC-1065, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007463451

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-637, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

>> GO TO 2.

${\bf 2.} {\tt PERFORM\ THROTTLE\ VALVE\ CLOSED\ POSITION\ LEARNING}$

Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

Release -

Accelerator pedal position sensor

Accelerator pedal operation

Sensor 1

Sensor 2

→ Depress

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P2127, P2128 APP SENSOR

Description INFOID:0000000007463452

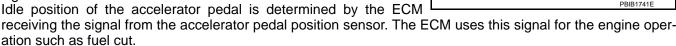
position

Accelerator pedal positi
sensor output voltage
c c b

6.0

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 potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals 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



DTC Logic INFOID:0000000007463453

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	Harness or connectors (APP sensor 2 circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.]
			[CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.)
P7178 I find sensor 7 circuit high	n excessively high voltage from the APP senor 2 is sent to ECM.	 (Refrigerant pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 2) Crankshaft position sensor (POS) 	
		Camshaft position sensor (PHASE) (bank 2)	
		Exhaust valve timing control position sensor (bank 2)	
			Battery current 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.

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

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-1068, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463454

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- Check the voltage between APP sensor harness connector and ground.

APP se	ensor	Ground	Voltage (V)
Connector	Terminal	Glound	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.
- 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	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 APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM Sens		Sensor		
Connector	Terminal	Name	Connector	Terminal
F101	46	CKP sensor (POS)	F2	1

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102 64	EVT control position sensor (bank 2)	F63	1		
		Battery current sensor	E21	1	
	103	APP sensor	E112	6	
M107	107	EVAP control system pressure sensor	B252	3	
	107	Refrigerant pressure sensor	E77	3	

<u>Is the inspection result normal?</u>

YES >> GO TO 6.

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

O.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-905, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-911, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1004, "Component Inspection".)
- Battery current sensor (Refer to EC-1034, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-948. "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-1111, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning component.

7 .CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

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

APP sensor		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E112	2	M107	104	Existed

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. 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 or short to ground or short to power in harness or connectors.

9.check app sensor 2 input signal circuit for open and short

Check the continuity between APP sensor harness connector and ECM harness connector.

•	APP sensor		EC	Continuity	
	Connector	Terminal	Connector	Terminal	Continuity
	E112	1	M107	98	Existed

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

Is the inspection result normal?

YES >> GO TO 11. EC

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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 or short to ground or short to power in harness or connectors.

11. CHECK APP SENSOR

Refer to EC-1070, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

12. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Installation"</u>.
- 2. Go to EC-1070, "Special Repair Requirement".

>> INSPECTION END

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007463455

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals under the following conditions.

ECM						
Connector	+ -		Condition		Voltage (V)	
Terminal Terminal						
	97 (APP sensor 1)	100	- Accelerator pedal	Fully released	0.45 - 1.0	
M107				Fully depressed	4.4 - 4.8	
WITO	98 (APP sensor 2)	104	Accelerator pedar	Fully released	0.22 - 0.50	
	98 (AFF Sellsol 2)			Fully depressed	2.1 - 2.5	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to EC-1076, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007463456

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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Refer to EC-637, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

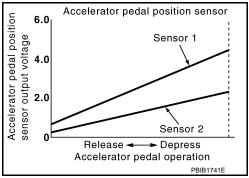
>> GO TO 2. EC 2. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement". C >> GO TO 3. 3.perform idle air volume learning D Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement". >> END Е F Н K L M Ν 0 Р

P2138 APP SENSOR

Description INFOID:000000007463457

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 potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals 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 the engine operation 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 EC-995, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position 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.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 2) Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Battery current 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.

- 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.

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

>> 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-1073, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463459

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1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP se	ensor	Ground	Voltage (V)	
Connector	Terminal	Cround	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 or 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.
- 2. Check the voltage between APP sensor harness connector and ground.

APP se	ensor	Ground	Voltage (V)	
Connector Terminal		Ground	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.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

APP sensor		ECM		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
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit.

7. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F101	46	CKP sensor (POS)	F2	1
	CMP sensor (PHASE) (bank 2)	F18	1	
F102	64	EVT control position sensor (bank 2)	F63	1
	Battery current sensor	E21	1	
	103	APP sensor	E112	6
M107	107	EVAP control system pressure sensor	B252	3
		107	Refrigerant pressure sensor	E77

Is the inspection result normal?

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 <u>EC-905, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-911, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1004, "Component Inspection".)
- Battery current sensor (Refer to <u>EC-1034, "Component Inspection".)</u>
- EVAP control system pressure sensor (Refer to EC-948, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-1111, "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.
- Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
F112	4	M107	100	Existed	
E112	2	IVITO7	104	Existed	

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

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is the inspection result normal? Α YES >> GO TO 11. NO >> GO TO 10. 10. DETECT MALFUNCTIONING PART EC Check the following. Harness connectors M6, E106 · Harness for open or short between ECM and accelerator pedal position sensor >> Repair open circuit or short to ground or short to power in harness or connectors. 11. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT D Check the continuity between APP sensor harness connector and ECM harness connector. Е APP sensor **ECM** Continuity Connector Terminal Connector **Terminal** 3 97 M107 E112 Existed 1 98 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 Н Check the following. Harness connectors M6, E106 Harness for open or short between ECM and accelerator pedal position sensor >> Repair open circuit or short to ground or short to power in harness or connectors. 13. CHECK APP SENSOR Refer to EC-1075, "Component Inspection". Is the inspection result normal? YES >> GO TO 15. NO >> GO TO 14. 14. REPLACE ACCELERATOR PEDAL ASSEMBLY Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation". Go to EC-1076, "Special Repair Requirement". >> INSPECTION END 15. CHECK INTERMITTENT INCIDENT N Refer to GI-43, "Intermittent Incident". >> INSPECTION END Component Inspection INFOID:0000000007463460 1. CHECK ACCELERATOR PEDAL POSITION SENSOR Turn ignition switch OFF. Reconnect all harness connectors disconnected.

3. Turn ignition switch ON.

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

P2138 APP SENSOR

[VQ25HR FOR USA AND CANADA]

ECM						
Connector +		-	Condition		Voltage (V)	
Connector	Terminal	Terminal				
	97 (APP sensor 1)	100		Fully released	0.45 - 1.0	
M107	37 (Al 1 3ell301 1)		Accelerator pedal	Fully depressed	4.4 - 4.8	
WITO7	09 (ADD concor 2)	104	Accelerator pedar	Fully released	0.22 - 0.50	
	98 (APP sensor 2)			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. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1076, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007463461

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-637, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-637, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

3.perform idle air volume learning

Refer to EC-638, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

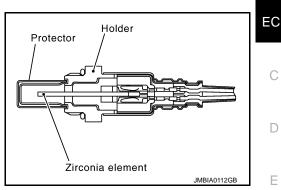
>> END

Description INFOID:0000000007463462

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.



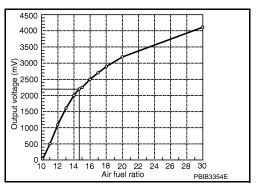
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Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic INFOID:0000000007463463

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	ŀ
P2A00	Air fuel ratio (A/F) sensor 1 (bank 1) circuit range/performance	The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period.	Heated oxygen sensor 2	l
P2A03	Air fuel ratio (A/F) sensor 1 (bank 2) circuit range/performance	The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.	Fuel pressureFuel injectorIntake air leaksExhaust gas leaks	ľ

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.
- 2. Turn ignition switch ON.
- 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

Clear the mixture ratio self-learning value. Refer to EC-640, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 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 1 minute under no load.
- 6. Let engine idle for 1 minute.
- 7. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
- 8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1078, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463464

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2

Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to EM-35, "Exploded View".

>> GO TO 3.

3.CHECK FOR EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- Listen for an exhaust gas leak before the three way catalyst 2.

Is exhaust gas detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

4.CHECK FOR INTAKE AIR LEAK

- Start engine and run it at idle.
- 2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 5.

5. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- Clear the mixture ratio self-learning value. Refer to <u>EC-640, "MIXTURE RATIO SELF-LEARNING VALUE 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-868, "Diagnosis Procedure"</u> or <u>EC-872, "Diagnosis Procedure"</u>.

NO >> GO TO 6.

6. CHECK HARNESS CONNECTOR

- Turn ignition switch OFF.
- Disconnect A/F sensor 1 harness connector.
- 3. Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace harness connector.

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7.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.

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

DTC	A/F sensor 1			Ground	Voltage
ыс	Bank	Connector	Terminal	Glound	voltage
P2A00	1	F66	4	Ground	Battery voltage
P2A03	2	F67	4	Giodila	battery voltage

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- 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.

$9.\mathsf{CHECK}$ A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 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
P2400	P2A00 1 F66	1		57	<u> </u>	
F 2A00		1 00	2	F102	61	Existed
P2A03	.03 2 F67	1	F 102	65	Existed	
FZAUS		2			66	

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	Connector	Connector Terminal		Continuity
P2A00	1	F66	1	Ground	Not existed
F 2A00	ı	1 00	2		
P2A03	2	F67	1	Giodila	NOT EXISTED
F 2A03	2	107	2		

DTC	EC	CM	Ground	Continuity
DIC	Connector	Terminal		Continuity
P2A00	F102	57		Not existed
		61	Ground	
P2A03	1 102	65	Oround	
		66		

5. Also check harness for short to power.

Is the inspection result normal?

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YES >> GO TO 10.

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

10.CHECK A/F SENSOR 1 HEATER

Refer to EC-784, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 13.

11. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-849, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View".

12. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace malfunctioning part.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-35. "Exploded View".

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).

Will CONSULT be used?

YES >> GO TO 14.

NO >> GO TO 15.

14.CONFIRM A/F ADJUSTMENT DATA

(P)With CONSULT

- 1. Turn ignition switch ON.
- Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

Is "0.000" displayed?

YES >> INSPECTION END

NO >> GO TO 15.

15. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to <u>EC-640, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement"</u>.

Will CONSULT be used?

YES >> GO TO 16.

NO >> INSPECTION END

16.CONFIRM A/F ADJUSTMENT DATA

(I) With CONSULT

- 1. Turn ignition switch ON.
- Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT.
- 3. Make sure that "0.000" is displayed on CONSULT screen.

>> INSPECTION END

ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

ASCD BRAKE SWITCH

Description INFOID:0000000007463465

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 this input of two kinds (ON/OFF signal).

Refer to EC-690, "System Description" for the ASCD function.

Component Function Check

CHECK ASCD BRAKE SWITCH FUNCTION

(II) With CONSULT

- 1. Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition	Indication	
BRAKE SW1	Brake pedal	Slightly depressed	OFF
DIVARL SWI	Brake pedal	Fully released	ON

W Without CONSULT

- 1. Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as follows.

ECM					
Connector	+	_	Condition		Voltage (V)
Connector	Terminal Terminal				
M107	126	128	Brake pedal	Slightly depressed	Approx. 0
IVI TO 7	(ASCD brake switch signal)	120	Diake pedal	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1081, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector. 2.
- Turn ignition switch ON.
- Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ake switch	Ground	Voltage
Connector Terminal		Ground	voltage
E109	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E103
- 10 A fuse (No. 3)

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Harness for open or short between ASCD brake switch and fuse

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ASCD BRAKE SWITCH

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

${f 3.}$ CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		ECM		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 5. NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- · Harness for open or short between ECM and ASCD brake switch

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

5. CHECK ASCD BRAKE SWITCH

Refer to EC-1082, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace ASCD brake switch. Refer to <u>BR-18</u>, "Exploded View".

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000007463468

1. CHECK ASCD BRAKE SWITCH-I

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
i and 2	brake pedar	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

- 1. Adjust ASCD brake switch installation. Refer to BR-19. "Inspection and Adjustment".
- 2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
1 and 2	brake pedar	Slightly depressed	Not existed

ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to BR-18, "Exploded View".

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ASCD INDICATOR

Description INFOID:000000007463469

The ASCD operation status is indicated by two indicators (CRUISE and SET on the information display) on the 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-690, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000007463470

1. CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE	Ignition switch: ON	MAIN switch: Pressed at the 1st time →at the 2nd time	$ON \to OFF$
057	MAIN switch: ON	ASCD: Operating	ON
SET	When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1084, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463471

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-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.check intermittent incident

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-113, "Removal and Installation".

NO >> Repair or replace malfunctioning part.

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INFOID:0000000007463473

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COOLING FAN

Description INFOID:000000007463472

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

1. CHECK COOLING FAN FUNCTION

® With CONSULT

- 1. Turn ignition switch ON.
- Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Check that cooling fan speed varies according to the percent.

W Without CONSULT

- 1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-9, "Diagnosis Description".
- 2. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-1085</u>, "<u>Diagnosis Procedure</u>".

Diagnosis Procedure

1. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan control module harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module harness connector and ground.

Cooling fan control module		Ground	Voltage
Connector Terminal		Ciodila	vollage
E37	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK COOLING FAN CONTROL MODULE GROUND CIRCUIT

- Turn ignition switch OFF.
- Check the continuity between cooling fan control module harness connector and ground.

Cooling fan co	ontrol module	Ground	Continuity
Connector Terminal		Ground	Continuity
E37	1	Ground	Existed

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.

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3.CHECK IPDM E/R GROUND CIRCUIT

- 1. Disconnect IPDM E/R harness connectors.
- 2. Check the continuity between IPDM E/R harness connector and ground.

IPDM	E/R	Ground	Continuity
Connector Terminal		Ground	Continuity
E5	12	Ground	Existed
E6	41	Giodila	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.
- Check the continuity between IPDM E/R harness connector and cooling fan control module harness connector.

IPDM E/R		Cooling fan control module		Continuity
Connector	Terminal	Connector Terminal		Continuity
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 or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT

- 1. Reconnect all harness connectors disconnected.
- Disconnect cooling fan control module harness connectors.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module harness connectors and ground.

Cooling fan d	ontrol module	Ground	Voltage	
Connector Terminal		Glound	vollage	
E301	4	Ground	Battery voltage	
E302	6	Glound	Dattery Voltage	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace cooling fan control module. Refer to CO-19, "Exploded View".

6.CHECK COOLING FAN MOTORS -1 AND -2

Refer to EC-1087, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace cooling fan motor. Refer to CO-19, "Exploded View".

7. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF.
- 2. Disconnect cooling fan relay harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan relay harness connector and ground.

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Cooling t	fan relay			
Connector	Terminal	Ground	Voltage	
E17 -	1	Ground	Battery voltag	ge
s the inspe	ection resi	ult norma	12	
YES >>	> GO TO 9	9.		
3.DETEC	T MALFU	NCTION	NG PART	
Check the				
• 10 A fuse	(No. 42)			
 IPDM E/F 50 A fusil 			or E7	
			etween coolii	ng fan relay and fuse
				ng fan relay and battery
_	•	•		ground or short to power in harness or connectors.
9.CHECK	COOLIN	G FAN C	ONTROL MO	DDULE POWER SUPPLY CIRCUIT-III
1. Turn ig	nition swi	tch OFF.		
			rness connec	
3. Check	the contir	nuity betw	veen cooling	fan relay harness connector and IPDM E/R harness connector.
Cooling f	_		DM E/R	Continuity
Connector	Terminal	Connecto		<u> </u>
E17	2	E6	42	Existed
4. Check connec		nuity betw	een cooling	fan relay harness connector and cooling fan control module harness
Cooling f	an relay	Cooling fa	an control modul	e
Connector	Terminal	Connect	or Terminal	— Continuity
E17	5	E37	3	Existed
5. Also ch	neck harn	ess for sh	nort to around	d and short to power.
ls the inspe			•	
YES >>	> GO TO	10.	<u> </u>	
NO >>	> Repair c	pen circu	uit or short to	ground or short to power in harness or connectors.
10.снес	CK COOL	ING FAN	RELAY	
Refer to E0	C-1088. "C	Compone	nt Inspection	(Cooling Fan Relay)".
Is the inspe		-	•	
•	> GO TO		<u> </u>	
NO >>	> Replace	cooling f	an relay. Ref	er to EC-655, "Component Parts Location".
11. CHEC	K INTER	MITTENT	INCIDENT	
Perform GI	-43, "Inte	rmittent lı	ncident".	
Is the inspe				
-				PCS-31, "Removal and Installation".
			harness con	

Component Inspection (Cooling Fan Motor)

>> Repair or replace harness connectors.

1. CHECK COOLING FAN MOTOR

Turn ignition switch OFF.

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COOLING FAN

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- 2. Disconnect cooling fan control module harness connectors.
- 3. Supply cooling fan control module harness connector terminals with battery voltage and check operation.

	Cool	ing fan contro				
	Motor	Connector	Terminal		Operation	
IVIOIOI		Connector	(+)	(-)		
	1	E301	4	5	Cooling fan operates.	
	2	E302	6	7	Cooling fair operates	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan motor. Refer to CO-19, "Exploded View".

Component Inspection (Cooling Fan Relay)

INFOID:0000000007463476

1. CHECK COOLING FAN RELAY

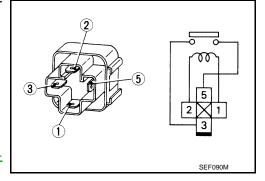
- 1. Turn ignition switch OFF.
- 2. Remove cooling fan relay. Refer to EC-655, "Component Parts Location".
- 3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan relay. Refer to <u>EC-655</u>, "Component Parts Location".



ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

ELECTRICAL LOAD SIGNAL

Description INFOID:0000000007463477

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line.

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Component Function Check

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- Turn ignition switch ON.
- 2. Connect CONSULT and select "DATA MONITOR" mode.
- Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition	Indication	
LOAD SIGNAL	Rear window defogger switch	ON	ON
LOAD SIGNAL	rteal willdow delogger switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-1089, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Co	Indication	
LOAD SIGNAL	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-1089, "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
TILATER TAN 6W	Tieater fair control switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1089, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-1089, "Component Function Check".

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 DEF-3, "Work Flow"

ELECTRICAL LOAD SIGNAL

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>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-4, "Work Flow".

>> INSPECTION END

4. CHECK HEATER FAN CONTROL SYSTEM

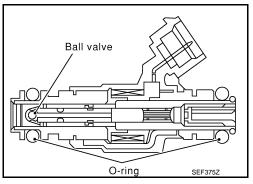
Refer to HAC-4, "Work Flow".

>> INSPECTION END

FUEL INJECTOR

Description INFOID:0000000007463480

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

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Go to EC-1091, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

(P)With CONSULT

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Check that each circuit produces a momentary engine speed drop.

®Without CONSULT

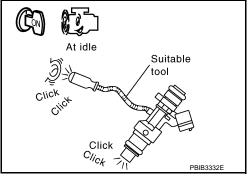
- Start engine.
- Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1091, "Diagnosis Procedure".



Diagnosis Procedure

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect fuel injector harness connector.
- Turn ignition switch ON.
- Check the voltage between fuel injector harness connector and ground.

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	Fuel injecto	Ground	Voltage		
Cylinder	Connector			Voltage	
1	F71	1			
2	F72	1		Battery voltage	
3	F73	1	Ground		
4	F74	1	Ground		
5	F75	1			
6	F76	1			

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- IPDM E/R harness connector E7
- 10 A fuse (No. 44)
- Harness for open or short between fuel injector and fuse

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

$3. \mathsf{CHECK}$ FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between fuel injector harness connector and ECM harness connector.

	Fuel injector	•	EC	Continuity		
Cylinder	Connector	Terminal	Connector	Terminal	Continuity	
1	F71	2		89		
2	F72	2	F102	85	Existed	
3	F73	2		81		
4	F74	2		90	LAISIEU	
5	F75	2		86		
6	F76	2		82		

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

Check the following.

- Harness connectors F106, F107
- Harness for open or short between fuel injector and ECM
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL INJECTOR

Refer to EC-1093, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning fuel injector. Refer to EM-38, "Removal and Installation".

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".

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

Component Inspection

INFOID:0000000007463483

1. CHECK FUEL INJECTOR

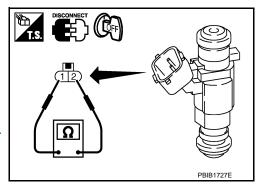
- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.
- 3. Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	11.1 - 14.5 Ω [at 10 - 60°C (60 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector. Refer to <u>EM-38</u>, <u>"Removal and Installation"</u>.



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FUEL PUMP

Description INFOID:000000007463484

Sensor	Input signal to ECM	ECM Function	Actuator	
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓	
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 start ability. 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.	
Except as shown above	Stops.	

Component Function Check

INFOID:0000000007463485

1.CHECK FUEL PUMP FUNCTION

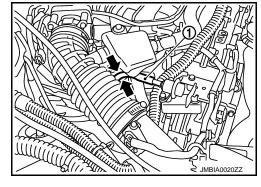
- 1. Turn ignition switch ON.
- Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END

NO >> EC-1094, "Diagnosis Procedure".



INFOID:0000000007463486

Diagnosis Procedure

1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

- 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	СМ	Ground	Voltage	
Connector	Terminal			
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

[VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

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

IPDI	M E/R	Ground	Voltage	
Connector	Connector Terminal		voltage	
E7	77	Ground	Battery voltage	

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Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 10.

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3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- Harness connectors F104, F105
- Harness for open or short between IPDM E/R and ECM

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>> Repair open circuit or 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 (main)" harness connector.
- Turn ignition switch ON.
- 5. Check the voltage between "fuel level sensor unit and fuel pump (main)" harness connector and ground.

Fuel level sensor unit and fuel pump (main)		Ground	Voltage	
Connector	Terminal	Ground	voltage	
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 15 A FUSE

Turn ignition switch OFF.

- 2. Disconnect 15 A fuse (No. 41) from IPDM E/R.
- Check 15 A fuse.

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Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuse.

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6. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

- Disconnect IPDM E/R harness connector.
- 2. Check the continuity between IPDM E/R harness connector and "fuel level sensor unit and fuel pump (main)" harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump (main)		(magin)		Continuity
Termina	Connector	Connector Terminal				
13	E5	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.

1. DETECT MALFUNCTIONING PART

< DTC/CIRCUIT DIAGNOSIS >

Check the following.

- Harness connectors E117, B9
- IPDM E/R harness connector E5
- Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump (main)"

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

8. CHECK FUEL PUMP GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- Check the continuity between "fuel level sensor unit and fuel pump (main)" harness connector and ground.

Fuel level sensor u (ma	Ground	Continuity	
Connector	Terminal		
B22	3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

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

9.CHECK FUEL PUMP

Refer to EC-1096, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace fuel pump. Refer to FL-6, "Removal and Installation".

10. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".

NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:0000000007463487

1. CHECK FUEL PUMP

- Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 3. Check resistance between "fuel level sensor unit and fuel pump (main)" terminals as follows.

Terminals	Resistance
1 and 3	0.2 - 5.0 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump (main)". Refer to FL-6, "Removal and Installation".

IGNITION SIGNAL

Description INFOID:0000000007463488

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

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

>> Go to EC-1097, "Diagnosis Procedure".

2.CHECK IGNITION SIGNAL FUNCTION

(P)With CONSULT

- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Check that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YFS >> INSPECTION END

NO >> Go to EC-1097, "Diagnosis Procedure".

3.CHECK IGNITION SIGNAL FUNCTION

W Without CONSULT

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		
	11				
	12			50mSec/div	
E404	15	N4407	400		
F101	16	M107	128	=	
	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-1097, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check the voltage between ECM harness connector terminals under the following conditions.

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< DTC/CIRCUIT DIAGNOSIS >

Connector	+	-	Voltage
Connector	Terminal	Terminal	
M107	125	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-769, "Diagnosis Procedure".

2.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

- 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		Ground	vollage
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

- Turn ignition switch OFF.
- 2. Disconnect IPDM E/R harness connector.
- 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 EC-769, "Diagnosis Procedure".

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit or 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.
- Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity
Connector	Terminal	Oround	Continuity
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.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

6. CHECK CONDENSER

Refer to EC-1101, "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.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal	Giodila	voltage
1	F11	3		
2	F12	3		
3	F13	3	Ground	Battery voltage
4	F14	3		
5	F15	3		
6	F16	3		

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E25, F30
- Harness for open or short between ignition coil and harness connector F30

>> Repair or replace harness or connectors.

9. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal	Giodila	Continuity
1	F11	2		
2	F12	2		Existed
3	F13	2	Ground	
4	F14	2	Ground	
5	F15	2		
6	F16	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.

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

10.CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between ignition coil harness connector and ECM harness connector.

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Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F11	1	F101	20	
2	F12	1		16	
3	F13	1		12	Existed
4	F14	1		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 connector F104, F105
- Harness for open or short between ignition coil and ECM

>> Repair or replace harness or connectors.

12. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-1100, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to <u>EM-47</u>, "Removal and Installation".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000007463491

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

- Turn ignition switch OFF.
- 2. Disconnect ignition coil harness connector.
- 3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance [at 25°C (77°F)]	
1 and 2	Except 0 or $\infty\Omega$	
1 and 3	Except 0 Ω	
2 and 3	Except 0 s2	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to <u>EM-47, "Removal and Installation"</u>.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

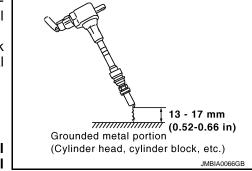
1. Turn ignition switch OFF.

- Reconnect all harness connectors disconnected.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 5. After engine stalls, crank it two or three times to release all fuel pressure.
- 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. Refer to EM-47, "Removal and Installation".
- 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:

- Do not approach to the spark plug and the ignition coil within 0.5 m (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END

> >> Replace malfunctioning ignition coil with power transistor. Refer to EM-47, "Removal and Installation".

Component Inspection (Condenser)

1. CHECK CONDENSER

NO

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- Check resistance between condenser terminals as follows.

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

>> INSPECTION END YES

NO >> Replace condenser.

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INFORMATION DISPLAY (ASCD)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

INFORMATION DISPLAY (ASCD)

Description INFOID:000000007463493

The ASCD operation status is indicated by two indicators (CRUISE and SET on the information display) on the 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. The set speed is also displayed on the information display.

SET indicator is displayed during ASCD control.

When the canceling conditions come into effect, the CRUISE and SET indications on the information display disappear.

Component Function Check

INFOID:0000000007463494

1. CHECK INFORMATION DISPLAY

- 1. Start engine.
- 2. Press MAIN switch on ASCD steering switch.
- 3. Drive the vehicle at more than 40 km/h (25 MPH)

CAUTION:

Always drive vehicle at a safe speed.

- 4. Press SET/COAST switch.
- Check that the readings of the speedometer show the same values as the set speed indicated in the information display while driving the vehicle on a flat road.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1102, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007463495

1. CHECK DTC

Check that DTC UXXXX, P0500 or P1574 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO-1 >> Perform trouble diagnosis for DTC UXXXX.

NO-2 >> Perform trouble diagnosis for DTC P0500. Refer to <u>EC-979</u>, "<u>Diagnosis Procedure</u>".

NO-3 >> Perform trouble diagnosis for DTC P1574. Refer to EC-1057, "Diagnosis Procedure".

2.CHECK DTC WITH "UNITIED MATER & A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis relevant to DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-113, "Removal and Installation".

NO >> Repair or replace.

MALFUNCTION INDICATOR LAMP

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

MALFUNCTION INDICATOR LAMP

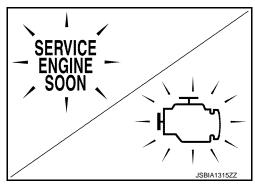
Description INFOID:0000000007463496

The Malfunction Indicator Lamp (MIL) is located on the combination meter

The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to <u>EC-748</u>, "<u>DIAGNOSIS DESCRIPTION</u>: <u>Malfunction Indicator Lamp (MIL)</u>".



Component Function Check

1. CHECK MIL FUNCTION

- 1. Turn ignition switch ON.
- Check that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1103, "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-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-113, "Removal and Installation".

NO >> Repair or replace malfunctioning part.

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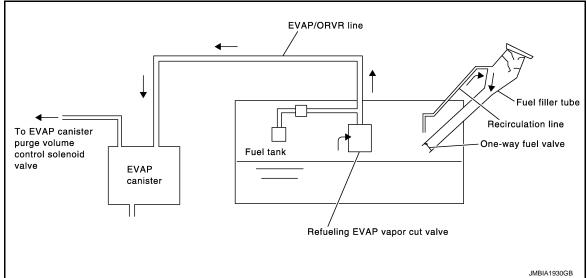
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Description INFOID:000000007463498



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is 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.
- Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.
- Be sure to furnish the workshop with a CO2 fire extinguisher.

CAUTION:

- 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 EC-1165, "Inspection".
- Disconnect battery ground cable.
- · Always replace O-ring when the fuel gauge retainer is removed.
- Do not kink or twist hose and tube when they are installed.
- Do not tighten hose and clamps excessively to avoid damaging hoses.
- · After installation, run engine and check for fuel leaks at connection.
- Do not 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

INFOID:0000000007463500

1. CHECK ORVR FUNCTION

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.

Is any symptom present?

YES >> Go to EC-1104, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007463501

1.INSPECTION START

Check whether the following symptoms are present.

A: Fuel odor from EVAP canister is strong.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

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

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to <u>FL-14</u>. "<u>Exploded View</u>".
- Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

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

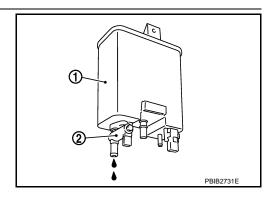
3.CHECK IF EVAP CANISTER SATURATED WITH WATER

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 4. NO >> GO TO 6.



4. REPLACE EVAP CANISTER

Replace EVAP canister with a new one. Refer to FL-14, "Exploded View".

>> 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. Refer to FL-11, "Exploded View".

6.CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1107, "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-11, "Removal and Installation".

7. CHECK EVAP CANISTER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to FL-14, "Exploded View".
- Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.1 kg (4.6 lb).

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 9.

8. CHECK IF EVAP CANISTER SATURATED WITH WATER

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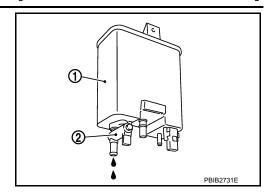
[VQ25HR FOR USA AND CANADA]

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 9. NO >> GO TO 11.



9. REPLACE EVAP CANISTER

Replace EVAP canister with a new one. Refer to FL-16, "Removal and Installation".

>> 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. Refer to FL-11, "Exploded View".

11. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace hoses and tubes. Refer to <u>FL-11</u>, "Exploded View".

12. CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace fuel filler tube. Refer to FL-11, "Exploded View".

13. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1107, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-11, "Removal and Installation".

14. CHECK FUEL FILLER TUBE

Check fuel filler 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. Refer to FL-14, "Exploded View".

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. Refer to FL-11, "Removal and Installation".

16. CHECK ONE-WAY FUEL VALVE-II

- 1. Check that fuel is drained from the tank.
- Remove fuel filler tube and hose. Refer to <u>FL-11, "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Check one-way fuel valve for operation as follows.
 When a stick is inserted, the valve should open, when removing stick it should close.

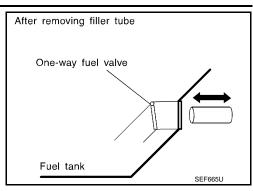
Do not drop any material into the tank.

Is the inspection result normal?

YES >> INSPECTION END

NO

>> Replace fuel filler tube or replace one-way fuel valve with fuel tank. Refer to <u>FL-11</u>, "Removal and Installation".



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Component Inspection

1.INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

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

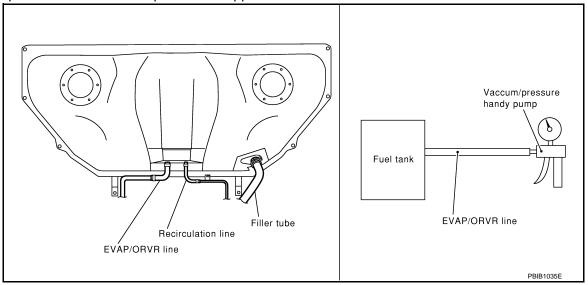
2. CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT

- 1. Turn ignition switch OFF.
- Remove fuel tank. Refer to <u>FL-11, "Removal and Installation"</u>.
- 3. Drain fuel from the tank as follows:
- Remove fuel feed hose located on the fuel gauge retainer. Refer to <u>EM-38</u>, "Exploded View".
- 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.
- 4. 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 EVAP vapor cut valve for being stuck to open as follows.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit. Refer to FL-5, "Exploded View".

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [-13.3 kPa (-0.136 kg/cm², -1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



Is the inspection result normal?

YES >> INSPECTION END

ON BOARD REFUELING VAPOR RECOVERY (ORVR) [VQ25HR FOR USA AND CANADA]

< DTC/CIRCUIT DIAGNOSIS >

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-11, "Exploded View".

3.CHECK REFUELING EVAP VAPOR CUT VALVE

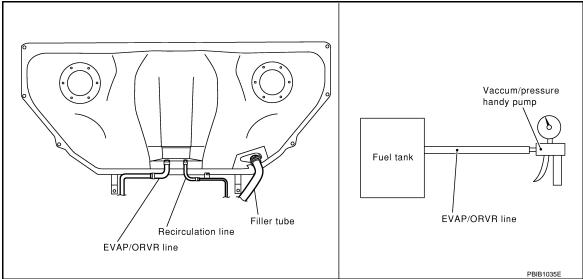
⋈Without CONSULT

- 1. Turn ignition switch OFF.
- Remove fuel tank. Refer to <u>FL-11</u>, "<u>Removal and Installation</u>".
- 3. Drain fuel from the tank as follows:
- Remove fuel gauge retainer. Refer to FL-5, "Exploded View".
- Drain fuel from the tank using a handy pump into a fuel container.
- 4. 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 EVAP vapor cut valve for being stuck to open as follows.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit. Refer to <u>FL-5. "Exploded View"</u>.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [–13.3 kPa (–0.136 kg/cm², –1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



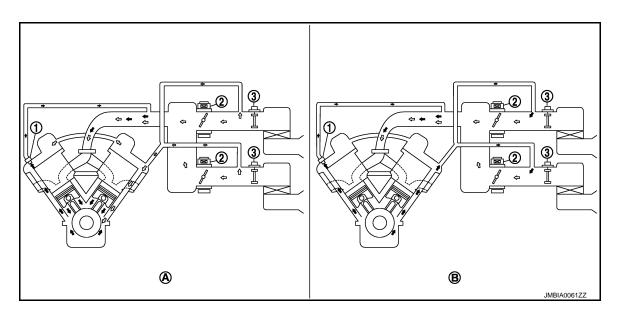
Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-11, "Exploded View".

POSITIVE CRANKCASE VENTILATION

Description INFOID:0000000007463503



- 1. PCV valve
- A. Normal condition
- : Fresh air
- : Blow-by air

- 2. Electric throttle control actuator
- B. Hi-load condition

Mass air flow sensor

This system returns blow-by gas to the intake manifold.

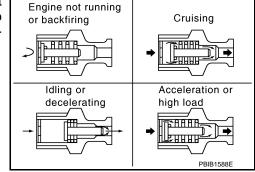
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

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 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

1. CHECK PCV VALVE

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POSITIVE CRANKCASE VENTILATION

< DTC/CIRCUIT DIAGNOSIS >

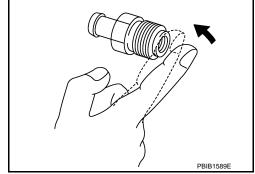
[VQ25HR FOR USA AND CANADA]

With engine running at idle, remove PCV valve from rocker cover. Refer to <u>EM-47</u>, "<u>Exploded View</u>". 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

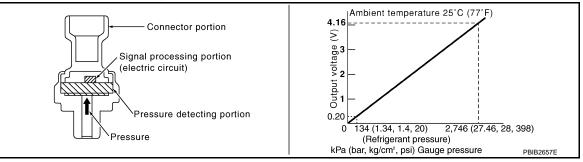
NO >> Replace PCV valve. Refer to EM-47, "Exploded View".



REFRIGERANT PRESSURE SENSOR

Description INFOID:0000000007463505

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

1. CHECK REFRIGERANT PRESSURE SENSOR FUNCTION

- Start engine and warm it up to normal operating temperature.
- Turn A/C switch and blower fan switch ON.
- Check the voltage between ECM harness connector terminals under the following conditions.

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-1111, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn A/C switch and blower fan switch OFF.
- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect refrigerant pressure sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pr	essure sensor	Ground	Voltage (V)	
Connector Terminal		Cround	voltage (v)	
E77 3		Ground	Approx. 5	

Is the inspection result normal?

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

EC-1111 Revision: 2013 February 2012 G Sedan

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REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M6, E106
- Harness for open or short between ECM and refrigerant pressure sensor
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

4.check refrigerant pressure sensor ground circuit for open and short

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

Refrigerant pre	essure sensor	EC	CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
E77	1	M107	112	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.

DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M6, E106
- Harness for open or short between ECM and refrigerant pressure sensor
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pre	essure sensor	EC	CM	Continuity
Connector Terminal		Connector	Terminal	Continuity
E77	2	M107	105	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.

- Harness connectors M6, E106
- Harness for open or short between ECM and refrigerant pressure sensor

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to <u>HA-50, "REFRIGERANT PRESSURE SENSOR: Removal and Installation"</u>.

NO >> Repair or replace malfunctioning part.

SNOW MODE SWITCH

Description INFOID:0000000007801468

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 by 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 be accelerated immediately than the original pedal in due to avoid the vehicle slip. In other words, ECM controls the rapid engine torque change by controlling the electric throttle control actuator operating speed.

Component Function Check

CHECK SNOW MODE SWITCH FUNCTION

NOTE:

If DTC UXXXX are displayed, first perform the trouble diagnosis for DTC UXXXX.

- Turn ignition switch ON.
- Select "SNOW MODE SW" in "DATA MONITOR" mode with CONSULT.
- Check "SNOW MODE SW" indication under the following conditions.

Monitor item	Condition		Indication
SNOW MODE SW	Snow mode switch	ON ON	
SIVOW WODE SW	Show mode switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-1113, "Diagnosis Procedure".

2.check snow mode indicator function

- Turn ignition switch ON.
- Check the snow mode indicator in the snow mode switch under the following condition.

Condition	Snow mode indicator	
Snow mode switch	ON	ON
Show mode switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1113, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK SNOW MODE SWITCH OVERALL FUNCTION-I

Confirm the malfunctioning circuit (snow mode switch or snow mode indicator). Refer to EC-1113. "Component Function Check".

Which circuit is related to the incident?

Snow mode switch>>GO TO 2.

Snow mode indicator>>GO TO 7.

2.CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

Revision: 2013 February

NO >> Go to MWI-4. "Work flow".

3.CHECK SNOW MODE SWITCH POWER SUPPLY CIRCUIT

Turn ignition switch OFF.

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2012 G Sedan

SNOW MODE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

- 2. Disconnect snow mode switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between snow mode switch harness connector and ground.

Snow mo	ode switch	Ground	Voltage
Connector Terminal		Ground	voltage
M139	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 E106, M6
- IPDM E/R harness connector E7
- 10 A fuse (No. 43)
- Harness for open or short between snow mode switch and fuse

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

5. CHECK SNOW MODE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect "unified meter and A/C amp." harness connector.
- 3. Check the continuity between snow mode switch harness connector and "unified meter and A/C amp." harness connector.

Snow mode switch		Unified meter and A/C amp.		Continuity
Connector Terminal		Connector	Terminal	Continuity
M139	4	M66	23	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.

$\mathsf{6}.$ DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between snow mode switch and "unified meter and A/C amp."
 - >> Repair open circuit or short to ground or short to power.

7.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace ground connection.

8. CHECK SNOW MODE INDICATOR LAMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between snow mode switch harness connector and ground.

Snow mod	de switch	Ground	Continuity	
Connector Terminal		Oround	Continuity	
M139	2	Ground	Existed	

2. Also check harness for short to power.

SNOW MODE SWITCH

DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

< DTC/CIR	CUIT DIAGNOSIS >		[VQ25HR FOR USA AND CANADA]
Is the inspe	ection result normal?		
	GO TO 10.		
_	• GO TO 9.		
J.DETECT	T MALFUNCTIONING I	PART	
Check the f			
Harness t	or open or snort betwe	en snow mode switch and	ground
~~	Penair open circuit or	short to power in harness	or connectors
	Kepali open circuit of K SNOW MODE SWIT	-	or connectors.
· · · · · · · · · · · · · · · · · · ·	C-1115, "Component Insection result normal?	spection.	
•	GO TO 11.		
		witch. Refer to IP-33, "A/T	MODELS: Exploded View".
	K INTERMITTENT INC		
	-43, "Intermittent Incide		
10101 to <u>01</u>	_io, intomittone morac		
>>	INSPECTION END		
Omnone	ent Inspection		
Jonnpone	siit iiispection		INFOID:0000000007801471
1.check	SNOW MODE SWITCH	Н	
1. Turn igi	nition switch OFF.		
2. Disconi	nect snow mode switch		
3. Check	the continuity between	snow mode switch termina	als under the following conditions.
Terminals	Condition	Continuity	
Terrimais	ON	Existed	
1 and 4	Snow mode switch OFF		
la 4la a ila ana a		Not Existed	
	ection result normal? INSPECTION END.		
		switch. Refer to IP-33. "A/T	MODELS: Exploded View".
		<u> </u>	

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

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 TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	m Condition		Values/Status		
ENG SPEED	Run engine and compare CONSULT value with the tachometer indication.				
MAS A/F SE-B1	AS A/F SE-B1 See <u>EC-761, "Description"</u> .				
MAS A/F SE-B2	See EC-761, "Description".				
B/FUEL SCHDL	See EC-761, "Description".				
A/F ALPHA-B1	See EC-761, "Description".				
A/F ALPHA-B2	See EC-761, "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)	Revving engine from idle to 3,000 rp 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 (B2)	Revving engine from idle to 3,000 rp 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 to 3,000 rp met. Engine: After warming up After keeping engine speed betwee idle for 1 minute under no load	$LEAN \longleftrightarrow RICH$			
HO2S2 MNTR (B2)	Revving engine from idle to 3,000 rp met. Engine: After warming up After keeping engine speed betwee idle for 1 minute under no load	$LEAN \longleftrightarrow RICH$			
VHCL SPEED SE	Turn drive wheels and compare CO tion.	Almost the same speed as speedometer indication			
BATTERY VOLT	Ignition switch: ON (Engine stopped)	11 - 14 V			
ACCEL SENIA	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.0 V		
ACCEL SEN 1	(Engine stopped)	Accelerator pedal: Fully depressed	4.4 - 4.8 V		
400EL 0EN 0±1	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.0 V		
ACCEL SEN 2*1	(Engine stopped)	Accelerator pedal: Fully depressed	4.4 - 4.8 V		

PSEN 1-B1 Ignition switch: ON (Engine stopped) Selector lever: D Ignition switch: ON (Engine stopped) Selector lever: D Ignition switch: ON (Engine stopped) Selector lever: D Ignition switch: ON (Engine stopped) Selector lever: D Indicates fuel tank to ture INT/A TEMP SE Ignition switch: ON EVAP SYS PRES Ignition switch: ON Indicates intake air ature INT/A TEMP SE Ignition switch: ON Indicates intake air ature	empera- C temper-
Selector lever: D Accelerator pedal: Fully depressed Less than 4.75 V Ignition switch: ON (Engine stopped) Selector lever: D Accelerator pedal: Fully released More than 0.36 V Accelerator pedal: Fully depressed Less than 4.75 V FUEL T/TMP SE Ignition switch: ON Indicates fuel tank to ture INT/A TEMP SE Ignition switch: ON Indicates intake air ature EVAP SYS PRES Ignition switch: ON Accelerator pedal: Fully depressed Less than 4.75 V Indicates fuel tank to ture Accelerator pedal: Fully depressed Less than 4.75 V Accelerator pedal: Fully depressed Less than 4.75 V Accelerator pedal: Fully released More than 0.36 V Indicates fuel tank to ture Indicates intake air ature EVAP SYS PRES Ignition switch: ON Approx. 1.8 - 4.8 V Depending on fuel Indicates in take air ature Indicates intake air ature	empera- C temper- D evel of
TP SEN 2-B1*1 (Engine stopped) Selector lever: D Accelerator pedal: Fully depressed Less than 4.75 V FUEL T/TMP SE Ignition switch: ON INT/A TEMP SE Ignition switch: ON EVAP SYS PRES Ignition switch: ON Accelerator pedal: Fully depressed Less than 4.75 V Indicates fuel tank to ture Indicates intake air ature EVAP SYS PRES Ignition switch: ON Approx. 1.8 - 4.8 V Depending on fuel let	temper-
Selector lever: D Accelerator pedal: Fully depressed Less than 4.75 V FUEL T/TMP SE Ignition switch: ON INT/A TEMP SE Ignition switch: ON EVAP SYS PRES Ignition switch: ON Accelerator pedal: Fully depressed Indicates than 4.75 V Indicates fuel tank to ture Approx. 1.8 - 4.8 V Depending on fuel Indicates intake air sature Perpending on fuel Indicates intake air sature Output Depending on fuel Indicates intake air sature Indicates intake air sature Output Depending on fuel Indicates intake air sature Indicates intake air satur	temper-
INT/A TEMP SE Ignition switch: ON Indicates intake air ature EVAP SYS PRES Ignition switch: ON Approx. 1.8 - 4.8 V Depending on fuel I	temper-
EVAP SYS PRES Ignition switch: ON Approx. 1.8 - 4.8 V	evel of
Depending on fuel l	
ELIEL LEVEL SE Ignition switch: ON Depending on fuel I	
fuel tank	
START SIGNAL • Ignition switch: $ON \rightarrow START \rightarrow ON$ OFF $\rightarrow ON \rightarrow OFF$	
CLSD THL POS • Ignition switch: ON Accelerator pedal: Fully released ON	
(Engine stopped) Accelerator pedal: Slightly depressed OFF	F
AIR COND SIG. • Engine: After warming up, idle the	
AIR COND SIG engine Air conditioner switch: ON (Compressor operates.)	G
P/N POSI SW • Ignition switch: ON Selector lever: P or N ON	
Selector lever: Except above OFF	Н
PW/ST SIGNAL • Engine: After warming up, idle the Steering wheel: Not being turned OFF	
engine engine Steering wheel: Being turned ON	
Rear window defogger switch: ON and/or ON Lighting switch: 2nd position	
Rear window deforager switch and lighting	
switch: OFF	
IGNITION SW • Ignition switch: $ON \rightarrow OFF \rightarrow ON$ $ON \rightarrow OFF \rightarrow ON$	
HEATER FAN SW • Engine: After warming up, idle the Heater fan switch: ON ON	K
engine Heater fan switch: OFF OFF	
BRAKE SW • Ignition switch: ON Brake pedal: Fully released OFF	L
Brake pedal: Slightly depressed ON	
• Engine: After warming up • Selector lever: P or N	
INJ PULSE-B1 • Selector lever. F or N • Air conditioner switch: OFF • No load 2,000 rpm 1.9 - 2.9 msec	M
Engine: After warming up Idle 2.0 - 3.0 msec	N
• Selector lever: P or N • Air conditioner switch: OFF • No load • Selector lever: P or N • Air conditioner switch: OFF • No load	
Engine: After warming up Idle 12° - 16° BTDC	0
• Selector lever: P or N • Air conditioner switch: OFF • No load • Selector lever: P or N • Air conditioner switch: OFF • No load	
Engine: After warming up Idle 5% - 35% Salactor layer: B or N	—— Р ——
• Selector lever: P or N • Air conditioner switch: OFF • No load • Selector lever: P or N • Air conditioner switch: OFF • No load	
Engine: After warming up Idle 2.0 - 6.0 g/s	
MASS AIRFLOW • Selector lever: P or N • Air conditioner switch: OFF • No load 2,500 rpm 7.0 - 20.0 g/s	

Monitor Item	Co	ondition	Values/Status
PURG VOL C/V	Engine: After warming up Selector lever: P or N Air conditioner switch: OFF	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	_
	Engine: After warming up	Idle	–5° - 5°CA
INT/V TIM (B1)	Selector lever: P or NAir conditioner switch: OFFNo load	2,000 rpm	Approx. 0° - 30°CA
	Engine: After warming up	Idle	–5° - 5°CA
INT/V TIM (B2)	Selector lever: P or NAir conditioner switch: OFFNo load	2,000 rpm	Approx. 0° - 30°CA
	Engine: After warming up	Idle	–5° - 5°CA
EXH/V TIM B1	Selector lever: P or NAir conditioner switch: OFFNo load	Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA
	Engine: After warming up	Idle	–5° - 5°CA
EXH/V TIM B2	Selector lever: P or NAir conditioner switch: OFFNo load	Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA
	Engine: After warming up	Idle	0% - 2%
INT/V SOL (B1)	Selector lever: P or NAir conditioner switch: OFFNo load	2,000 rpm	Approx. 0% - 50%
• Engine: After warming up • Selector lever: P or N • Air conditioner switch: OFF • No load		Idle	0% - 2%
	Air conditioner switch: OFF	2,000 rpm	Approx. 0% - 50%
VTC DTY EX B1	 Engine: After warming up Selector lever: P or N Air conditioner switch: OFF No load 	Idle	0% - 2%
		Around 2,500 rpm while the engine speed is rising	Approx. 0% - 70%
	Engine: After warming up	Idle	0% - 2%
VTC DTY EX B2	Selector lever: P or NAir conditioner switch: OFFNo load	Around 2,500 rpm while the engine speed is rising	Approx. 0% - 70%
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B2	(Engine stopped) • Selector lever: D	Accelerator pedal: Fully depressed	Less than 4.75 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B2*1	(Engine stopped) • Selector lever: D	Accelerator pedal: Fully depressed	Less than 4.75 V
		Air conditioner switch: OFF	OFF
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	For 1 seconds after turning ignition Engine running or cranking	switch: 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 aft Engine: After warming up Keeping the engine speed between idle for 1 minute under no load 	er the following conditions are met. 3,500 and 4,000 rpm for 1 minute and at	ON
	Engine speed: Above 3,600 rpm		OFF

Monitor Item		Values/Status	
HO2S2 HTR (B2)	Engine speed: Below 3,600 rpm Engine: After warming up Keeping the engine speed between 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
VEHICLE SPEED	Turn drive wheels and compare tion.	CONSULT value with the speedometer indica-	Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: Running	Idle air volume learning has not been performed yet.	YET
IDE AV LLAKIV	- Linguis. Numing	Idle air volume learning has already been performed successfully.	CMPLT
SNOW MODE SW	Ignition switch: ON	Snow mode switch: ON	ON
	ignition switch. On	Snow mode switch: OFF	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 turned ON.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	Engine: After warming up, idle the (More than 140 seconds after state)		4 - 100%
A/F S1 HTR (B2)	Engine: After warming up, idle the (More than 140 seconds after state)	4 - 100%	
AC PRESS SEN	Engine: Idle Both A/C switch and blower fan	1.0 - 4.0 V	
VHCL SPEED SE	Turn drive wheels and compare tion.	Almost the same speed as the speedometer indication	
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
1017 til 4 O V V	iginion omisin on	MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
CANCLL SW	1 Igrittori Switch. Olv	CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
TLEOGNIL/ACC SVV	ignition system. On	RESUME/ACCELERATE switch: Released	OFF
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
	- Ignition switch. ON	SET/COAST switch: Released	OFF
BRAKE SW1	Ignition switch: ON	Brake pedal: Fully released	ON
DIVANE SWI	- Ignition Switch. ON	Brake pedal: Slightly depressed	OFF
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	- Igilillon Switch. ON	Brake pedal: Slightly depressed	ON
DIST SW	Ignition switch: ON	DISTANCE switch: Pressed	ON
DIO I 300	- Ignition Switch. ON	DISTANCE switch: Released	OFF
VHCL SPD CUT	Ignition switch: ON		NON
LO SPEED CUT	Ignition switch: ON		NON
AT OD MONITOR	Ignition switch: ON		OFF
AT OD CANCEL	Ignition switch: ON		OFF

Monitor Item	Co	ondition	Values/Status	
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON \to OFF$	
	MAIN switch: ON	ASCD: Operating	ON	
SET LAMP	When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF	
EXH V/T LEARN	Engine: Running	Exhaust Valve Timing Control Learning has not been performed yet.	YET	
EXII V/I LEAKIN	- Engine. Ruining	Exhaust Valve Timing Control Learning has not been performed yet.	CMPLT	
BAT CUR SEN	 Engine speed: Idle Battery: Fully charged*² Selector lever: P or N Air conditioner switch: OFF No load 		Approx. 2,600 - 3,500 mV	
AC EVA TEMP	Engine: Idle Both A/C switch and blower fan swi	itch: ON (compressor operates)	Changes according to instructed value from Unified meter and A/C amp.	
AC EVA TARGET	Engine: Idle Both A/C switch and blower fan swi	Changes according to instructed value from Unified meter and A/C amp.		
ALT DUTY	Engine: Idle	0 - 80%		
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%	
ALT DUTY SIG	Power generation voltage variable of	ON		
ALI DOTT SIG	Power generation voltage variable of	OFF		
THRTL STK CNT B1	This item is displayed but is not appropriately appro	olicable to this model.		
HO2 S2 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed re	esponse) is incomplete.	INCMP	
1102 02 DIAG1 (B1)	DTC P0139 self-diagnosis (delayed re	CMPLT		
HO2 S2 DIAG2 (B1)	DTC P0139 self-diagnosis (slow response	onse) is incomplete.	INCMP	
1102 32 DIAG2 (B1)	DTC P0139 self-diagnosis (slow respe	CMPLT		
HO2 S2 DIAG1 (B2)	DTC P0159 self-diagnosis (delayed re	INCMP		
1102 32 DIAG1 (B2)	HO2 S2 DIAG1 (B2) DTC P0159 self-diagnosis (delayed response) is complete.			
HO2 S2 DIAG2 (B2)	DTC P0159 self-diagnosis (slow response)	onse) is incomplete.	INCMP	
1102 32 DIAG2 (B2)	DTC P0159 self-diagnosis (slow respe	onse) is complete.	CMPLT	
EVAP LEAK DIAG	Ignition switch: ON	Indicates the condition of EVAP leak diagnosis.		
EVAP DIAG READY	Ignition switch: ON		Indicates the ready condition of EVAP leak diagnosis.	

^{*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".

Α

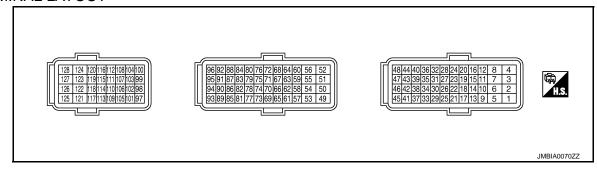
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TERMINAL LAYOUT



PHYSICAL VALUES

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.

	nal No. color)	Description		Condition	Value	G
+		Signal name	Input/ Output	Condition	(Approx.)	G
1 (G)	128 (B)	A/F sensor 1 heater (bank 1)	Output	[Engine is running]Warm-up conditionIdle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★ 50mSec/div 5V/div JMBIA0030GB	H
2 (P)	4 (V)	Throttle control motor (Open) (bank 1)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★ 500μSec/div 5V/div JMBIA0031GB	K
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14 V★ 500μSec/div 5V/div JMBIA0032GB	M N
3 (R)	128 (B)	Throttle control motor relay power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	
4 (V)	128 (B)	Throttle control motor (Close) (bank 1)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D Accelerator pedal: In the middle of releasing operation 	0 - 14 V★ 500μSec/div 5V/div JMBIA0033GB	Р

< ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
5 (W)	128 (B)	A/F sensor 1 heater (bank 2)	Output	[Engine is running]Warm-up conditionIdle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★ 50mSec/div 5V/div JMBIA0030GB
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
6 (SB)	128 (B)	Exhaust valve timing control magnet retarder (bank 1)	Output	[Engine is running]Warm-up conditionAround 2,500 rpm while the engine speed is rising	7 - 12 V★ 5V/div JMBIA0034GB
		trol madnet retarder (hank	Output	[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
7 (Y)	128 (B)			[Engine is running]Warm-up conditionAround 2,500 rpm while the engine speed is rising	7 - 12 V★ 5V/div JMBIA0034GB
8 (B)	_	ECM ground	_	_	_
11 (GR) 12 (L) 15 (LG)	100	Ignition signal No. 4 Ignition signal No. 3 Ignition signal No. 5		 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	0 - 0.2 V★ 50mSec/div 2V/div JMBIA0035GB
16 (G) 19 (BR)	128 (B)	Ignition signal No. 2 Ignition signal No. 6	Output	[Engine is running] • Warm-up condition	0.1 - 0.4 V★ 50mSec/div
20 (Y)		Ignition signal No. 1		Engine speed: 2,000 rpm	2V/div JMBIA0036GB

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	nal No. color)	Description		Condition	Value	•
+		Signal name	Input/ Output	Condition	(Approx.)	
17 84 (P) (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 5V/div JMBIA0037GB	
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)	-
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)	-
18 (W)	128 (B)	Intake valve timing control solenoid valve (bank 1)	Output	[Engine is running]	7 - 12 V★	
				Warm-up conditionEngine speed: 2,000 rpm	5V/div JMBIA1638GB	
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	-
(V) (B)			Output -	 [Engine is running] Engine speed: About 2,000 rpm (More than 100 seconds after starting engine) 	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div	
				[Ignition switch: ON] • For 1 second after turning ignition	10V/div JMBIA0040GB	
22 (R)	128 (B)	Fuel pump relay	Output	switch ON [Engine is running] [Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)	

Termir (Wire		Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
24 (SB)	128 (B)	ECM relay (Self shut-off)	Output	[Engine is running][Ignition switch: OFF]A few seconds after turning ignition switch OFF	0 - 1.5 V
(=-)	(-)			[Ignition switch: OFF]More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
25 (BG)	128 (B)	Throttle control motor relay	Output	[Ignition switch: $ON \rightarrow OFF$]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V
				[Ignition switch: ON]	0 - 1.0 V
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
29 (GR)	128 (B)	Intake valve timing control solenoid valve (bank 2)	Output	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	7 - 12 V★ 5V/div JMBIA1638GB
30	30 40 Throttle position sensor 1	Input	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully released	More than 0.36 V	
(B)	(R)	(bank 1)	mpat	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully depressed	Less than 4.75 V
31	48	Throttle position sensor 1	Input	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully released	More than 0.36 V
(R)	(B)	(bank 2)	mput	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully depressed	Less than 4.75 V
33 (LG)	84 (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 	50mSec/div 50mSec/div 5V/div JMBIA0037GB
				[Ignition switch: ON]Engine stopped[Engine is running]Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)

	nal No. color)	Description		O an alitica	Value
+		Signal name	Input/ Output	Condition	(Approx.)
34	40	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75 V
(G)	(R)	(bank 1)	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	More than 0.36 V
35	48	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	Less than 4.75 V
(W)	(B)	(bank 2)	mput	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully depressed	More than 0.36 V
				[Engine is running]	4.0 - 5.0 V★ 1mSec/div
37	47	Crankshaft position sensor		Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle	2V/div JMBIA0041GB
(W)) Input	[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0 V★ 1mSec/div 2V/div JMBIA0042GB	
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 (W)	40 (R)	Sensor power supply [Throttle position sensor (bank 1)]	_	[Ignition switch: ON]	5 V
46 (R)	47 (Y)	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)]	_	_	_

Termir (Wire		Description		Condition	Value				
+		Signal name	Input/ Output	Condition	(Approx.)				
49 (P)	128 (B)	Throttle control motor (Close) (bank 2)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D Accelerator pedal: In the middle of releasing operation 	0 - 14 V★ 500μSec/div 5V/div JMBIA0033GB				
50	128	Throttle control motor (Open) (bank 2)	Outpu		Throttle control motor	 Engine stopped Selector lever: D Accelerator pedal 			0 - 14 V★ 500µSec/div 5V/div JMBIA0031GB
(L)	(B)		Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14 V★ 500μSec/div 5V/div JMBIA0032GB				
52 (R)	128 (B)	Throttle control motor relay 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				
57 (L)	128 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	(11 - 14 V) 2.2 V				
58	88 (LG)	Exhaust valve timing control position sensor (bank 1)	Input -	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 - 5.0 V★ 20mSec/div 2V/div 2V/div 2V/div				
(GR)				[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	4.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0044GB				

	nal No. color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
59	96	Camshaft position sensor		 [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 2V/div JMBIA0045GB	C
(LG)	(P)	(PHASE) (bank 1)	Input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0046GB	F
60 (R)	96 (P)	Sensor power supply [Camshaft position sensor (PHASE) (bank 1), Exhaust valve timing control position sensor (bank 1), Power steering pressure sensor]	_	[Ignition switch: ON]	5 V	G
61 (P)	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.	I
62	88	Exhaust valve timing con-	la-ut	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 - 5.0 V★ 20mSec/div = 2V/div JMBIA0043GB	J
(G)	(LG)	trol position sensor (bank 2)	Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	4.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0044GB	IV N

Termin (Wire		Description		O an altition	Value	
+		Signal name	Input/ Output	Condition	(Approx.)	
63	92	Camshaft position sensor		 [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 2V/div JMBIA0045GB	
(L)	(R)	(PHASE) (bank 2)	Input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0046GB	
64 (BR)	92 (R)	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2), Battery current sensor]	_	[Ignition switch: ON]	5 V	
65 (V)	128 (B)	A/F sensor 1 (bank 2)	Input	[Ignition switch: ON]	2.2 V	
66 (LG)	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 (Y)	68 (P)	Intake air temperature sensor (bank 1)	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.	
68 (P)	_	Sensor ground [Mass air flow sensor (bank 1), Intake air temperature sensor (bank 1)]		_	_	
71 (BG)	84 (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)	72 (—)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V* ¹	
76 (GR)	84 (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	

Termin (Wire	ial No. color)	Description		0	Value
+		Signal name	Input/ Output	Condition	(Approx.)
77	68	Mass air flow sensor (bank	Input	[Engine is running]Warm-up conditionIdle speed	0.8 - 1.1 V
(L)	(P)	1)	Input	[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.4 - 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.
79	94	Mass air flow sensor (bank	Input	[Engine is running]Warm-up conditionIdle speed	0.8 - 1.1 V
(W)	(B)	2)	Input	[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.4 - 1.7 V
80	84	Heated oxygen sensor 2	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met Engine: after warming up 	0 - 1.0 V
(BR)	(B)	(bank 2)	Input	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
81 (P)		Fuel injector No. 3			BATTERY VOLTAGE (11 - 14 V)★
82 (V)		Fuel injector No. 6		[Engine is running]Warm-up conditionIdle speedNOTE:	50mSec/div
85 (GR)	128	Fuel injector No. 2		The pulse cycle changes depend- ing on rpm at idle	10V/div JMBIA0047GB
86 (BG)	(B)	Fuel injector No. 5	Output		BATTERY VOLTAGE (11 - 14 V)★
89 (L)		Fuel injector No. 1		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	50mSec/div
90 (BR)		Fuel injector No. 4		• Engine speed. 2,000 fpm	10V/div JMBIA0048GB
83 (Y)	94 (B)	Intake air temperature sensor (bank 2)	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
84 (B)	_	Sensor ground (Heated oxygen sensor 2, Engine coolant tempera- ture sensor, Engine oil tem- perature sensor)	_	_	_
87 (SB)	96 (P)	Power steering pressure sensor	Output	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5 V
(00)	(٢)	2011201		[Engine is running]Steering wheel: Not being turned	0.4 - 0.8 V

Termir (Wire	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
88 (LG)	_	Sensor ground [Exhaust valve timing control position sensor (bank 1), Exhaust valve timing control position sensor (bank 2)]	_	_	_
91 (G)	95 (W)	Battery current sensor	Input	 [Engine is running] Battery: Fully charged*² Idle speed 	2.6 - 3.5 V
92 (R)	_	Sensor ground [Camshaft position sensor (PHASE) (bank 2)]	_	[Engine is running]Warm-up conditionIdle speed	0 V
93 (R)	128 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
94 (B)	_	Sensor ground [Mass air flow sensor (bank 2), Intake air temperature sensor (bank 2)]	_	_	_
95 (W)	_	Sensor ground (Battery current sensor)	_	_	_
96 (P)	_	Sensor ground [Camshaft position sensor (PHASE) (bank 1), Power steering pressure sensor]	_	_	_
97	100	Accelerator pedal position	Input	[Ignition switch: ON] Engine stopped Accelerator pedal: Fully released	0.45 - 1.0 V
(R)	(W)	sensor 1		[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	4.4 - 4.8 V
98	104	Accelerator pedal position	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.22 - 0.50 V
(P)	(V)	sensor 2	mpat	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	2.1 - 2.5 V
99 (L)	100 (W)	Sensor power supply (Accelerator pedal position sensor 1)	_	[Ignition switch: ON]	5 V
100 (W)	_	Sensor ground (Accelerator pedal position sensor 1)	_	_	_
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
101 (SB)	108 (Y)	ASCD steering switch	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V
(03)	(1)			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V

Termin (Wire		Description		Con distant	Value
+		Signal name	Input/ Output	Condition	(Approx.)
102 (LG)	112 (V)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V
103 (GR)	104 (V)	Sensor power supply (Accelerator pedal position sensor 2)	_	[Ignition switch: ON]	5 V
104 (V)	_	Sensor ground (Accelerator pedal position sensor 2)	-	_	_
105 (L)	112 (V)	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
106 (W)	128 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
107 (GR)	112 (V)	Sensor power supply (EVAP control system pres- sure sensor, Refrigerant pressure sensor)	_	[Ignition switch: ON]	5 V
108 (Y)	_	Sensor ground (ASCD steering switch)	_	_	_
109 (G)	128 (B)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N [Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
,	()			Selector lever: Except above	0 V
110	128	Engine speed signal output	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)	Zigino oposa olginai caspat	Gupu	[Engine is running] • Engine speed is 2,000 rpm	1 V★ 10mSec/div 2V/div JMBIA0077GB
112 (V)	_	Sensor ground (EVAP control system pres- sure sensor, Refrigerant pressure sensor)	_	_	_
113 (P)	_	CAN communication line	Input/ Output	_	_
114 (L)	_	CAN communication line	Input/ Output	_	_
117 (V)	_	Data link connector	Input/ Output	_	_

	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
121 (LG)	128 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
122	128	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
(P)	(B)	Stop famp switch	Прис	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
123 (B) 124 (B)	_	ECM ground	_	[Engine is running] • Idle speed	Body ground
125 (R)	128 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
126	128	ASCD broke quitab	lanut	[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
(BR)	(BR) (B) ASCD brake switch Input		[Ignition switch: ON] • Brake pedal: Fully released	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.

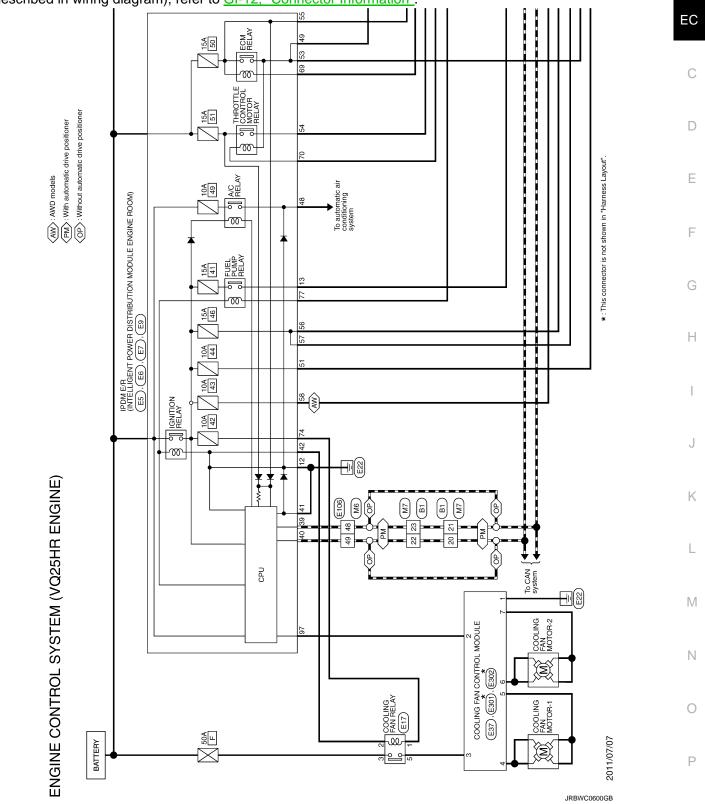
^{*2:} Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3. "How to Handle Battery".

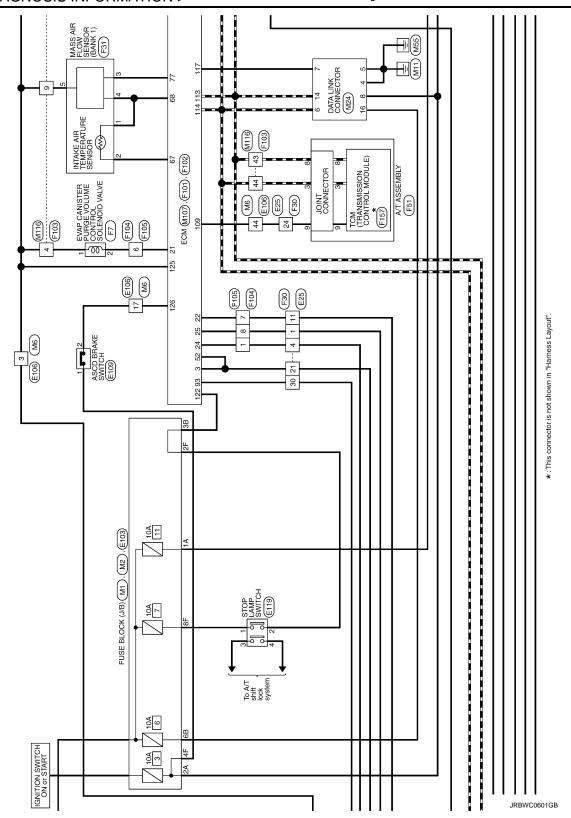
INFOID:0000000007463513

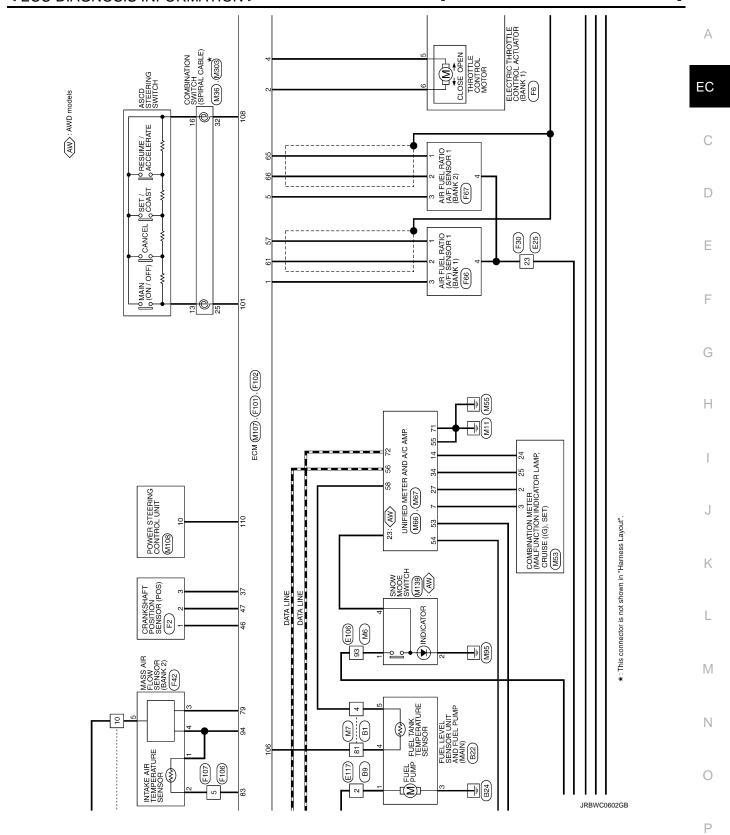
Α

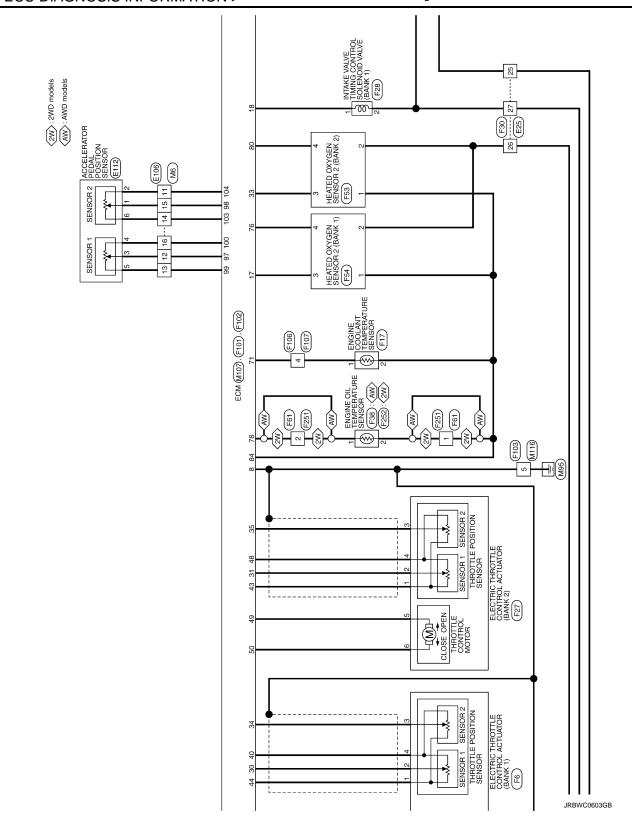
Wiring Diagram - ENGINE CONTROL SYSTEM -

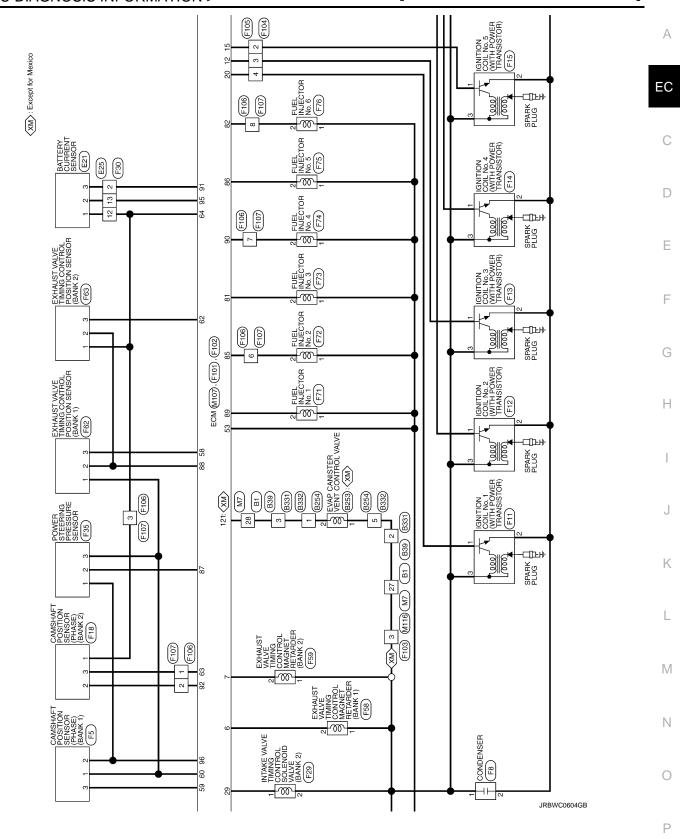
For connector terminal arrangements, harness layouts, and alphabets in a \bigcirc (option abbreviation; if not described in wiring diagram), refer to GI-12, "Connector Information".



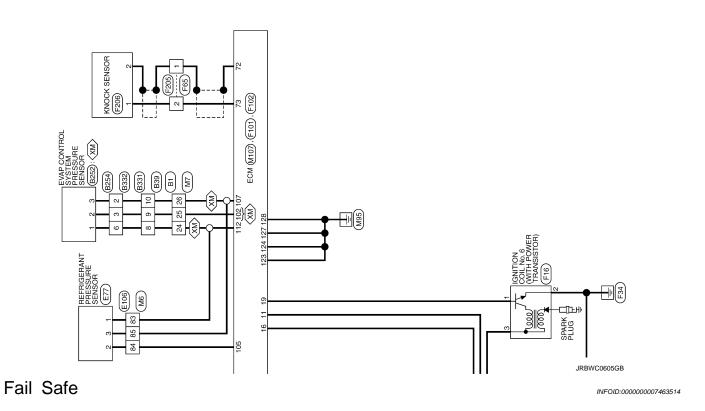








XM): Except for Mexico



NON DTC RELATED ITEM

Engine operating condition in fail-safe mode		Detected item	Remarks	Reference page		
Engine speed will not rise more than 2,500 rpm due to the fuel cut		Malfunction indic lamp circuit	when there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the	EC-1103		
			driver that engine control system malfunctions and MIL circuit is open by means of operating 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.			
TC RELA	TED ITE	M ected items	Engine operating condition in fail-safe mode			
P0011 P0021		ve timing control	The signal is not energized to the intake valve timing control solenoid valve are control does not function.	nd the valve		
P0014	Exhaust v	alve timing con-	The signal is not energized to the exhaust valve timing control magnet retarder magnet retarder control does not function.		ne signal is not energized to the exhaust valve timing control magnet retarder and agnet retarder control does not function.	
P0014						
		low sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.			

[VQ25HR FOR USA AND CANADA]

DTC No.	Detected items	Engine opera	ating condition in fail-safe mode				
P1236 P2118	Throttle control motor	ECM stops the electric throttle confixed opening (approx. 5 degrees)	trol actuator control, throttle valve is maintained at a by the return spring.				
P1238 P2119	Electric throttle control actuator	malfunction:)	ator does not function properly due to the return spring ctuator by regulating the throttle opening around the I 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 degrees or less.					
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vengine stalls. The engine can restart in N or P position, and engine speed will not exce					
P1290 P2100 P2103	Throttle control motor relay	•	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.				
P1805	Brake switch	ECM controls the electric throttle cosmall 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. So, the acceleration will be poor.					

DTC Inspection Priority Chart

INFOID:0000000007463515

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)	А
1	U0101 U1001 CAN communication line	
	 P0101 P0102 P0103 P010B P010C P010D Mass air flow sensor 	
	P0111 P0112 P0113 P0127 Intake air temperature sensor	EC
	P0116 P0117 P0118 P0125 Engine coolant temperature sensor P0100 P0	
	 P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor P0128 Thermostat function 	
	 P0128 Thermostat function P0181 P0182 P0183 Fuel tank temperature sensor 	
	P0196 P0197 P0198 Engine oil temperature sensor	C
	P0327 P0328 Knock sensor	
	P0335 Crankshaft position sensor (POS)	
	P0340 P0345 Camshaft position sensor (PHASE)	
	P0460 P0461 P0462 P0463 Fuel level sensor	
	P0500 Vehicle speed sensor	
	• P0605 P0607 ECM	Е
	P0643 Sensor power supply P0770 TOM	
	• P0700 TCM	
	 P0705 Transmission range switch P0850 Park/neutral position (PNP) switch 	
	P1550 P1551 P1552 P1553 P1554 Battery current sensor	F
	• P1610 - P1615 NATS	
	P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor	
2	P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater	G
	 P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater 	
	P0075 P0081 Intake valve timing control solenoid valve	
	P0078 P0084 Exhaust valve timing control magnet retarder	H
	P0130 P0131 P0132 P0133 P0150 P0151 P0152 P0153 P2A00 P2A03 Air fuel ratio (A/F) sensor 1	- 1
	P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2 P0444 FVAR control system pures flow manifesing.	
	 P0441 EVAP control system purge flow monitoring P0443 P0444 P0445 EVAP canister purge volume control solenoid valve 	
	P0447 P0448 EVAP canister purge volume control solehold valve P0447 P0448 EVAP canister vent control valve	
	P0451 P0452 P0453 EVAP control system pressure sensor	
	P0550 Power steering pressure sensor	
	P0603 ECM power supply	
	• P0710 P0717 P0720 P0729 P0730 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	
	P1078 P1084 Exhaust valve timing control position sensor	
	P1217 Engine over temperature (OVERHEAT) P1217 Engine over temperature (OVERHEAT)	K
	P1233 P2101 Electric throttle control function P1236 P3448 Throttle control mater	
	 P1236 P2118 Throttle control motor P1290 P2100 P2103 Throttle control motor relay 	
	P1805 Brake switch	
3	P0011 P0021 Intake valve timing control	
3	P0014 P0024 Exhaust valve timing control	
	P0171 P0172 P0174 P0175 Fuel injection system function	N
	• P0300 - P0306 Misfire	1 V
	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	
	P050A P050B P050E Cold start control P4449 P4469 Closed learn control	
	 P1148 P1168 Closed loop control P1211 TCS control unit 	C
	P1211 TCS control unit P1212 TCS communication line	
	P1212 TCS communication line P1238 P2119 Electric throttle control actuator	
	P1564 ASCD steering switch	
	P1572 ASCD brake switch	F
	P1574 ASCD vehicle speed sensor	

DTC Index

×:Applicable —: Not applicable

DTO	C*1					Davis	
CONSULT GST* ²	ECM* ³	(CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page
U0101	0101*5	LOST COMM (ECM)	_	1	×	В	EC-772
U1001	1001*5	CAN COMM CIRCUIT	_	2	_	_	EC-773
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing* ⁸	_	_
P0011	0011	INT/V TIM CONT-B1	×	2	×	В	EC-774
P0014	0014	EXH/V TIM CONT-B1	_	2	×	В	EC-778
P0021	0021	INT/V TIM CONT-B2	_	2	×	В	EC-774
P0024	0024	EXH/V TIM CONT-B2	_	2	×	В	EC-778
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	В	EC-782
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	В	EC-782
P0037	0037	HO2S2 HTR (B1)	_	2	×	В	EC-785
P0038	0038	HO2S2 HTR (B1)	_	2	×	В	EC-785
P0051	0051	A/F SEN1 HTR (B2)	_	2	×	В	EC-782
P0052	0052	A/F SEN1 HTR (B2)	_	2	×	В	EC-782
P0057	0057	HO2S2 HTR (B2)	_	2	×	В	EC-785
P0058	0058	HO2S2 HTR (B2)	_	2	×	В	EC-785
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	В	EC-788
P0078	0078	EX V/T ACT/CIRC-B1	_	2	×	В	EC-791
P0081	0081	INT/V TIM V/CIR-B2	_	2	×	В	EC-788
P0084	0084	EX V/T ACT/CIRC-B2	_	2	×	В	EC-791
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	В	EC-794
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-800
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	В	EC-800
P010B	010B	MAF SEN/CIRCUIT-B2	_	2	×	В	EC-794
P010C	010C	MAF SEN/CIRCUIT-B2	_	1	×	В	EC-800
P010D	010D	MAF SEN/CIRCUIT-B2	_	1	×	В	EC-800
P0111	0111	IAT SEN/CIRCUIT-B1	_	2	×	А	EC-806
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-808
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-808
P0116	0116	ECT SEN/CIRC	_	2	×	А	EC-811
P0117	0117	ECT SEN/CIRC	_	1	×	В	EC-814
P0118	0118	ECT SEN/CIRC	_	1	×	В	EC-814
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	В	EC-817
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	В	EC-817
P0125	0125	ECT SENSOR	_	2	×	В	EC-821
P0127	0127	IAT SENSOR-B1	_	2	×	В	EC-824
P0128	0128	THERMSTAT FNCTN	_	2	×	А	EC-826
P0130	0130	A/F SENSOR1 (B1)	_	2	×	Α	EC-829
P0131	0131	A/F SENSOR1 (B1)	_	2	×	В	EC-833

DT	C* ¹	14				Darmanant	Deferre	Λ
CONSULT GST*2	ECM*3	- Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group* ⁴	Reference page	А
P0132	0132	A/F SENSOR1 (B1)	_	2	×	В	EC-837	EC
P0133	0133	A/F SENSOR1 (B1)	×	2	×	А	EC-841	
P0137	0137	HO2S2 (B1)	×	2	×	А	EC-846	
P0138	0138	HO2S2 (B1)	×	2	×	А	EC-852	С
P0139	0139	HO2S2 (B1)	×	2	×	А	EC-860	
P0150	0150	A/F SENSOR1 (B2)	_	2	×	Α	EC-829	D
P0151	0151	A/F SENSOR1 (B2)	_	2	×	В	EC-833	
P0152	0152	A/F SENSOR1 (B2)	_	2	×	В	EC-837	
P0153	0153	A/F SENSOR1 (B2)	×	2	×	Α	EC-841	Е
P0157	0157	HO2S2 (B2)	×	2	×	Α	EC-846	•
P0158	0158	HO2S2 (B2)	×	2	×	Α	EC-852	
P0159	0159	HO2S2 (B2)	×	2	×	А	EC-860	· F
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	В	EC-867	•
P0172	0172	FUEL SYS-RICH-B1	_	2	×	В	EC-871	G
P0174	0174	FUEL SYS-LEAN-B2	_	2	×	В	EC-867	•
P0175	0175	FUEL SYS-RICH-B2	_	2	×	В	EC-871	
P0181	0181	FTT SENSOR	_	2	×	A and B	EC-875	Н
P0182	0182	FTT SEN/CIRCUIT	_	2	×	В	EC-880	
P0183	0183	FTT SEN/CIRCUIT	_	2	×	В	EC-880	
P0196	0196	EOT SENSOR	_	2	×	A and B	EC-883	
P0197	0197	EOT SEN/CIRC	_	2	×	В	EC-887	-
P0198	0198	EOT SEN/CIRC	_	2	×	В	EC-887	J
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	В	EC-890	
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	В	EC-890	K
P0227	0227	TP SEN 2/CIRC-B2	_	1	×	В	EC-817	
P0228	0228	TP SEN 2/CIRC-B2	_	1	×	В	EC-817	-
P0300	0300	MULTI CYL MISFIRE	_	1 or 2	×	В	EC-894	L
P0301	0301	CYL 1 MISFIRE	_	1 or 2	×	В	EC-894	
P0302	0302	CYL 2 MISFIRE	_	1 or 2	×	В	EC-894	M
P0303	0303	CYL 3 MISFIRE	_	1 or 2	×	В	EC-894	IVI
P0304	0304	CYL 4 MISFIRE	_	1 or 2	×	В	EC-894	-
P0305	0305	CYL 5 MISFIRE	_	1 or 2	×	В	EC-894	Ν
P0306	0306	CYL 6 MISFIRE	_	1 or 2	×	В	EC-894	•
P0327	0327	KNOCK SEN/CIRC-B1	_	2	_	_	EC-900	
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	_	EC-900	0
P0335	0335	CKP SEN/CIRCUIT	_	2	×	В	EC-902	•
P0340	0340	CMP SEN/CIRC-B1	_	2	×	В	EC-907	Р
P0345	0345	CMP SEN/CIRC-B2	_	2	×	В	EC-907	•
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	EC-913	-
P0430	0430	TW CATALYST SYS-B2	×	2	×	A	EC-913	-
P0441	0441	EVAP PURG FLOW/MON	×	2	×	A	EC-918	-
P0442	0442	EVAP SMALL LEAK	×	2	×	A	EC-923	-

DT	C*1	- Items				Permanent	Reference
CONSULT GST* ²	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	DTC group*4	page
P0443	0443	PURG VOLUME CONT/V	_	2	×	А	EC-929
P0444	0444	PURG VOLUME CONT/V	_	2	×	В	EC-934
P0445	0445	PURG VOLUME CONT/V	_	2	×	В	EC-934
P0447	0447	VENT CONTROL VALVE	_	2	×	В	EC-937
P0448	0448	VENT CONTROL VALVE	_	2	×	В	EC-941
P0451	0451	EVAP SYS PRES SEN	_	2	×	А	EC-945
P0452	0452	EVAP SYS PRES SEN	_	2	×	В	EC-949
P0453	0453	EVAP SYS PRES SEN	_	2	×	В	EC-954
P0455	0455	EVAP GROSS LEAK	_	2	×	А	EC-960
P0456	0456	EVAP VERY SML LEAK	×* ⁷	2	×	А	EC-966
P0460	0460	FUEL LEV SEN SLOSH	_	2	×	А	EC-973
P0461	0461	FUEL LEVEL SENSOR	_	2	×	В	EC-975
P0462	0462	FUEL LEVL SEN/CIRC	_	2	×	В	EC-977
P0463	0463	FUEL LEVL SEN/CIRC	_	2	×	В	EC-977
P0500	0500	VEHICLE SPEED SEN A* ⁶	_	2	×	В	EC-979
P0506	0506	ISC SYSTEM	_	2	×	В	EC-981
P0507	0507	ISC SYSTEM	_	2	×	В	EC-983
P050A	050A	COLD START CONTROL	_	2	×	А	EC-985
P050B	050B	COLD START CONTROL	_	2	×	А	EC-985
P050E	050E	COLD START CONTROL	_	2	×	А	EC-985
P0550	0550	PW ST P SEN/CIRC	_	2	_	_	EC-987
P0603	0603	ECM BACK UP/CIRCUIT	_	2	×	В	EC-990
P0605	0605	ECM	_	1 or 2	× or —	В	EC-992
P0607	0607	ECM	_	1	×	В	EC-994
P0643	0643	SENSOR POWER/CIRC	_	1	×	В	EC-995
P0705	0705	T/M RANGE SENSOR A	_	2	×	В	<u>TM-160</u>
P0710	0710	FLUID TENP SENSOR A	_	2	×	В	<u>TM-162</u>
P0717	0717	INPUT SPEED SENSOR A	_	2	×	В	<u>TM-163</u>
P0720	0720	OUTPUT SPEED SEN- SOR* ⁶	_	2	×	В	<u>TM-165</u>
P0729	0729	6GR INCORRECT RATIO	_	2	×	В	TM-169
P0730	0730	INCORRECT GR RATIO	_	2	×	В	<u>TM-171</u>
P0731	0731	1GR INCORRECT RA- TIO*9	_	2	×	В	<u>TM-173</u>
P0732	0732	2GR INCORRECT RATIO	_	2	×	В	<u>TM-175</u>
P0733	0733	3GR INCORRECT RATIO	_	2	×	В	<u>TM-177</u>
P0734	0734	4GR INCORRECT RATIO	_	2	×	В	<u>TM-179</u>
P0735	0735	5GR INCORRECT RATIO	_	2	×	В	<u>TM-181</u>
P0740	0740	TORQUE CONVERTER	_	2	×	В	<u>TM-183</u>
P0744	0744	TORQUE CONVERTER	_	2	×	В	<u>TM-185</u>
P0745	0745	PC SOLENOID A		2	×	В	<u>TM-187</u>

DT	C*1	14				Pormonon+	Deferre	^
CONSULT GST* ²	ECM*3	- Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group* ⁴	Reference page	Α
P0750	0750	SHIFT SOLENOID A	_	2	×	В	<u>TM-188</u>	EC
P0775	0775	PC SOLENOID B	_	2	×	В	TM-189	
P0780	0780	SHIFT	_	1	×	В	TM-190	
P0795	0795	PC SOLENOID C	_	2	×	В	TM-192	С
P0850	0850	P-N POS SW/CIRCUIT	_	2	×	В	EC-998	
P1078	1078	EXH TIM SEN/CIRC-B1	_	2	×	В	EC-1001	D
P1084	1084	EXH TIM SEN/CIRC-B2	_	2	×	В	EC-1001	
P1148	1148	CLOSED LOOP-B1	_	1	×	А	EC-1006	
P1168	1168	CLOSED LOOP-B2	_	1	×	А	EC-1006	Е
P1211	1211	TCS C/U FUNCTN	_	2	_	_	EC-1007	
P1212	1212	TCS/CIRC	_	2	_	_	EC-1008	
P1217	1217	ENG OVER TEMP	_	1	×	В	EC-1009	
P1225	1225	CTP LEARNING-B1	_	2	_	_	EC-1013	•
P1226	1226	CTP LEARNING-B1	_	2	_	_	EC-1015	G
P1233	1233	ETC FNCTN/CIRC-B2	_	1	×	В	EC-1017	•
P1234	1234	CTP LEARNING-B2	_	2	_	_	EC-1013	
P1235	1235	CTP LEARNING-B2	_	2	_	_	EC-1015	- H
P1236	1236	ETC MOT-B2	_	1	×	В	EC-1021	
P1238	1238	ETC ACTR-B2	_	1	×	В	EC-1024	
P1239	1239	TP SENSOR-B2	_	1	×	В	EC-1026	
P1290	1290	ETC MOT PWR-B2	_	1	×	В	EC-1029	•
P1550	1550	BAT CURRENT SENSOR	_	2	_	_	EC-1031	J
P1551	1551	BAT CURRENT SENSOR	_	2	_	_	EC-1035	•
P1552	1552	BAT CURRENT SENSOR	_	2	_	_	EC-1035	K
P1553	1553	BAT CURRENT SENSOR	_	2	_	_	EC-1039	
P1554	1554	BAT CURRENT SENSOR	_	2	_	_	EC-1043	•
P1564	1564	ASCD SW	_	1	_	_	EC-1048	L
P1572	1572	ASCD BRAKE SW	_	1	_	_	EC-1051	•
P1574	1574	ASCD VHL SPD SEN	_	1	_	_	EC-1057	M
P1610	1610	LOCK MODE	_	2	_	_	SEC-35	IVI
P1611	1611	ID DISCORD, IMMU-ECM	_	2	_	_	SEC-36	•
P1612	1612	CHAIN OF ECM-IMMU	_	2	_	_	SEC-38	N
P1614	1614	CHAIN OF IMMU-KEY	_	2	_	_	SEC-40	•
P1615	1615	DIFFERENCE OF KEY	_	2	_	_	SEC-43	
P1715	1715	IN PULY SPEED	_	2	_	В	EC-1059	- 0
P1730	1730	INTERLOCK	_	2	×	В	<u>TM-197</u>	•
P1734	1734	7GR INCORRECT RATIO	_	2	×	В	<u>TM-199</u>	Р
P1805	1805	BRAKE SW/CIRCUIT	_	2	_	_	EC-1060	
P2100	2100	ETC MOT PWR-B1	_	1	×	В	EC-1029	
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	В	EC-1017	
P2103	2103	ETC MOT PWR	_	1	×	В	EC-1029	
P2118	2118	ETC MOT-B1	_	1	×	В	EC-1021	-

DT	C*1	Items				Permanent	Reference
CONSULT GST* ²	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	DTC group*4	page
P2119	2119	ETC ACTR-B1	_	1	×	В	EC-1024
P2122	2122	APP SEN 1/CIRC	_	1	×	В	EC-1063
P2123	2123	APP SEN 1/CIRC	_	1	×	В	EC-1063
P2127	2127	APP SEN 2/CIRC	_	1	×	В	EC-1067
P2128	2128	APP SEN 2/CIRC	_	1	×	В	EC-1067
P2132	2132	TP SEN 1/CIRC-B2	_	1	×	В	EC-890
P2133	2133	TP SEN 1/CIRC-B2	_	1	×	В	EC-890
P2135	2135	TP SENSOR-B1	_	1	×	В	EC-1026
P2138	2138	APP SENSOR	_	1	×	В	EC-1072
P2713	2713	PC SOLENOID D	_	2	×	В	TM-207
P2722	2722	PC SOLENOID E	_	2	×	В	TM-208
P2731	2731	PC SOLENOID F	_	2	×	В	TM-209
P2807	2807	PC SOLENOID G	_	2	×	В	TM-210
P2A00	2A00	A/F SENSOR1 (B1)	_	2	×	А	EC-1077
P2A03	2A03	A/F SENSOR1 (B2)	_	2	×	А	EC-1077

^{*1: 1}st trip DTC No. is the same as DTC No.

Test Value and Test Limit

INFOID:0000000007768553

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

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. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

^{*2:} This number is prescribed by SAE J2012/ISO 15031-6.

^{*3:} In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

^{*4:} Refer to EC-647, "Description". "PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)".

^{*5:} The troubleshooting for this DTC needs CONSULT.

^{*6:} When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

^{*7:} SRT code will not be set if the self-diagnostic result is NG.

^{*8:} When the ECM is in the mode of displaying SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

^{*9:} When erasing this DTC, always use CONSULT or GST.

		Self-diagnostic test item		Test value and Test limit (GST display)			/-
Item	OBD- MID		DTC	TID	Unitand Scaling ID	Description	
			P0131	83H	овн	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	
			P0130	86H	0BH	Maximum sensor output voltage for test cycle	Е
			P0133	87H	04H	Response rate: Response ratio (lean to rich)	
			P0133	88H	04H	Response rate: Response ratio (rich to lean)	F
			P2A00	89H	84H	The amount of shift in air fuel ratio	
			P2A00	8AH	84H	The amount of shift in air fuel ratio	
		Air fuel ratio (A/F) sensor 1 (Bank 1)	P0130	8BH	0BH	Difference in sensor output voltage	
	01H		P0133	8CH	83H	Response gain at the limited frequency	ŀ
			P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1	
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1	
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1	,
HO2S			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1	
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1	ŀ
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1	
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1	ı
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1	
		Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle	
			P0137	08H	0CH	Maximum sensor output voltage for test cycle	1
	02H		P0138	80H	0CH	Sensor output voltage	,
			P0139	81H	0CH	Difference in sensor output voltage	
			P0139	82H	11H	Rear O2 sensor delay response diagnosis	F
		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	

1000	17 (0110	JOIO INFORMATION >			_	
Item		Self-diagnostic test item	DTC		e and Test mit	
	OBD-			(GST	display)	Description
	MID			TID	Unitand Scaling ID	Bosonphori
			P0151	83H	0BH	Minimum sensor output voltage for tes cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for tes cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			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
			P0150	8BH	0BH	Difference in sensor output voltage
	05H	Air fuel ratio (A/F) sensor 1	P0153	8CH	83H	Response gain at the limited frequence
		(Bank 2)	P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
HO2S			P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015C	92H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015D	93H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for tes cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for tes cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage

		Self-diagnostic test item		I	ue and Test imit	
Item	OBD-		DTC	(GST	display)	Description
	MID			TID	Unitand Scaling ID	Decempation
			P0420	80H	01H	O2 storage index
	21H	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust index value
	2111	(Bank1)	P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst
LYST			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 voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
		EGR function	P0400	80H	96H	Low flow faults: EGR temp change rate (short term)
	31H		P0400	81H	96H	Low flow faults: EGR temp change rate (long term)
EGR SYSTEM			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
		VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	35H		P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100A	84H	10H	VEL slow response diagnosis
VVT			P1090	85H	10H	VEL servo system diagnosis
SYSTEM			P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	36H	VVT Monitor (Bank2)	P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100B	84H	10H	VEL slow response diagnosis
			P1093	85H	10H	VEL servo system diagnosis

		JSIS INFORMATION >				
			DTC -	lii	e and Test mit	
Item	OBD-	Self-diagnostic test item		(GST display)		Description
	MID	,		TID	Unitand Scaling ID	
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	звн	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
EVAP			P0456	80H	05H	Leak area index (for more than 0.02 inch)
SYSTEM	3СН	EVAP control system leak (Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of 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 cu rent to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric cu rent to voltage
O2 SEN- SOR	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage
HEATER	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage
	71H	71H Secondary air system	P0411	80H	01H	Secondary air injection system incor- rect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insuff cient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
SEC- OND- ARY AIR			P2448	83H	01H	Secondary air injection system high airflow
			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
			P2444	86H	01H	Secondary air injection system pump stuck on
FUEL			P0171 or P0172	80H	2FH	Long term fuel trim
	81H	Fuel injection system function (Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped
			P117A	82H	03H	Cylinder A/F imbalance monitoring
SYSTEM			P0174 or P0175	80H	2FH	Long term fuel trim
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

	077	Self-diagnostic test item		Test value and Test limit (GST display)			
Item	OBD- MID		DTC	TID	Unitand Scaling ID	Description	
			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	
			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	
	A1H	Multiple cylinder misfires	P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder	
MISFIRE			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	

<u> </u>	7.0110	0515 INFORMATION >				THE TOTAL CONTROL OF THE CONTROL OF
		Self-diagnostic test item	DTC -	Test value and Test limit (GST display)		
Item	OBD- MID			TID	Unitand Scaling ID	Description
	A2H	No. 1 cylinder misfire	P0301	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	АЗН	No. 2 cylinder misfire	P0302	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
MIOEIDE			P0304	0CH	24H	Misfire counts for last/current driving cycles
MISFIRE	A6H	No. 5 cylinder misfire	P0305	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H A8H	No. 6 cylinder misfire No. 7 cylinder misfire	P0306	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
			P0307	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	А9Н	No. 8 cylinder misfire	P0308	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

Α

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table EC

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM														C
						NC					HIGH					D
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE I	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	E F
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА		Н
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1094	
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-1165	
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-1091	
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-708	
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-1109	J
	Incorrect idle speed adjustment						1	1	1	1		1			EC-631	K
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-1017, EC-1024	17
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-631	L
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1097	
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-769	
Mass ai	r flow sensor circuit	1			2										EC-794, EC-800	M
Engine	coolant temperature sensor circuit	'					3			3					EC-814, EC-821	Ν
Air fuel	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			EC-829, EC-833, EC-837, EC-841, EC-1077	0
Throttle	position sensor circuit						2			2					EC-817, EC-890, EC-1013, EC-1015, EC-1026	Р
Accelera	ator pedal position sensor circuit			3	2	1									EC-1063, EC-1067, EC-1072	
	sensor circuit			2								3			EC-900	

Revision: 2013 February EC-1153 2012 G Sedan

[VQ25HR FOR USA AND CANADA]

	SYMPTOM													
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/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 symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Engine oil temperature sensor			4		2						3			EC-883, EC-887
Crankshaft position sensor (POS) circuit	2	2												EC-902
Camshaft position sensor (PHASE) circuit	3	2												EC-907
Vehicle speed signal circuit		2	3		3						3			EC-979
Power steering pressure sensor circuit		2					3	3						EC-987
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-990, EC-992
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-788
Exhaust valve timing control magnet retarder circuit		3	2		1	3	2	2	3		3			EC-791
PNP signal circuit			3		3		3	3			3			EC-998
Refrigerant pressure sensor circuit		2				3			3		4			EC-1111
Electrical load signal circuit							3							EC-1089
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-4
ABS actuator and electric unit (control unit)			4											BRC-5

^{1 - 6:} The numbers refer to the order of inspection. (continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

SYMPTOM										A					
	ART (EXCP. HA)		/FLAT SPOT	ATION	R ACCELERATION				IDLE	EMPERATURE HIGH	ISUMPTION	UMPTION	R CHARGE)	Potoronoo	EC
	HARD/NO START/REST	ENGINE STALL	HESITATION/SURGING/	SPARK KNOCK/DETON	LACK OF POWER/POO	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO	OVERHEATS/WATER TE	EXCESSIVE FUEL CON	EXCESSIVE OIL CONSI	BATTERY DEAD (UNDE	page	E
ymptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	НА		F
Fuel tank	5													<u>FL-13</u>	
Fuel piping	Ŭ		5	5	5		5	5			5			<u>EM-43</u>	
Valve deposit Poor fuel (Heavy weight gasoline,	5	5	5	5	5		5	5			5	-		_ 	G
i i														FM-29	
															1
Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	_	5	5	_	5	_	5	5			5			EM-29	J
Electric throttle control actuator	5			5		5			5					<u>EM-30</u>	
Air leakage from intake manifold/ Collector/Gasket														EM-34	k
	1	1	1		1		1	1					1		
Generator circuit															1
Starter circuit	3										1			STR-2 (With GR8- 1200 NI), STR-5 (Without GR8-1200 NI)	IV
Signal plate	6													EM-128	N
PNP signal	4													EC-998	
Cylinder head	5	5	5	5	5		5	5			5			EM-116	C
Cylinder head gasket										4	_	3			
Piston Piston ring Connecting rod Bearing	6	6	6	6	6		6	6			6	4		EM-128	Ρ
	Fuel tank Fuel piping Vapor lock Valve deposit Poor fuel (Heavy weight gasoline, Low octane) Air duct Air cleaner Air leakage from air duct (Mass air flow sensor — electric throttle control actuator) Electric throttle control actuator Air leakage from intake manifold/Collector/Gasket Battery Generator circuit Starter circuit Signal plate PNP signal Cylinder head Cylinder head gasket Cylinder block Piston Piston ring Connecting rod	ymptom code Fuel tank Fuel piping Vapor lock Valve deposit Poor fuel (Heavy weight gasoline, Low octane) Air duct Air cleaner Air leakage from air duct (Mass air flow sensor — electric throttle control actuator) Electric throttle control actuator Air leakage from intake manifold/Collector/Gasket Battery Generator circuit Starter circuit 3 Signal plate PNP signal Cylinder head Cylinder head gasket Cylinder block Piston Piston ring Connecting rod Bearing	ymptom code Fuel tank Fuel piping Vapor lock Valve deposit Poor fuel (Heavy weight gasoline, Low octane) Air duct Air cleaner Air leakage from air duct (Mass air flow sensor — electric throttle control actuator) Electric throttle control actuator Air leakage from intake manifold/Collector/Gasket Battery Generator circuit Starter circuit Starter circuit Signal plate PNP signal Cylinder head Cylinder head gasket Cylinder block Piston Piston ring Connecting rod Bearing	Vapor lock Valve deposit Poor fuel (Heavy weight gasoline, Low octane) Air duct Air cleaner Air leakage from air duct (Mass air flow sensor — electric throttle control actuator) Electric throttle control actuator Air leakage from intake manifold/ Collector/Gasket Battery Generator circuit 3 1 1 1 1 1 1 1 1 1	Valve deposit	Vapor lock Valve deposit Poor fuel (Heavy weight gasoline, Low octane) Air duct Air cleaner Air leakage from air duct (Mass air flow sensor — electric throttle control actuator) Air leakage from intake manifold/ Collector/Gasket Battery Generator circuit 3 Signal plate Air cleaner Air leakage from intake manifold/ Collector/Gasket Air cleaner Air cleaner Air cleaner Air cleaner Air cleaner Air cle	Fuel tank	Starter circuit Starter ci	Signal plate	Signal plate	Manager Mana	H H H H H H H H H H	H H H H H H H H H H	H H H H H H H H H H	H A A A A A A A A A

[VQ25HR FOR USA AND CANADA]

							S١	/MPT	OM						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/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	АН	AJ	AK	AL	AM	НА	
Valve	Timing chain														EM-66
mecha- nism	Camshaft														<u>EM-73</u>
	Intake valve timing control	5	5	5	5	5		5	5			5			<u>EM-66</u>
	Exhaust valve timing control														<u>EM-66</u>
	Intake valve												3		EM-66
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			<u>EM-37</u> , <u>EX-6</u>
	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			EM-46, EM-98, EM-102, LU-18
	Oil level (Low)/Filthy oil														<u>LU-9</u>
Cooling	Radiator/Hose/Radiator cap														<u>CO-13</u> , <u>CO-13</u>
	Thermostat									5					<u>CO-29</u>
	Water pump	5	5	5	5	5		5	5		4	5			<u>CO-24</u>
	Water gallery		5		0				0		7				<u>CO-29</u>
	Cooling fan									_					<u>CO-20</u>
	Coolant level (Low)/Contaminated coolant									5					<u>CO-9</u>
IVIS (INFIN	NITI Vehicle Immobilizer System —	1	1												SEC-5

^{1 - 6:} The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

[VQ25HR FOR USA AND CANADA]

NORMAL OPERATING CONDITION

Description INFOID:000000007463519

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,400 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled. **NOTE:**

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-663</u>. "System Description".

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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:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never 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

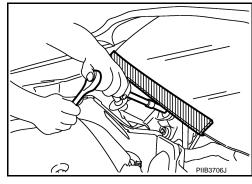
WARNING:

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the
 ignition ON or engine running, never 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

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions For Xenon Headlamp Service

INFOID:0000000007768557

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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.
- · 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.

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(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.

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

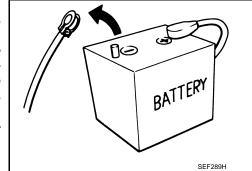
The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Be sure to 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 light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will
 cause the MIL to light up 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-107</u>, "<u>Description</u>".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube
 may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system,
 etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

General Precautions

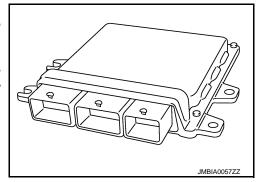
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.



- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

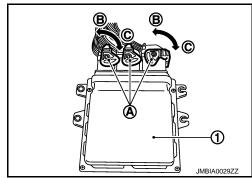
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be lost 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



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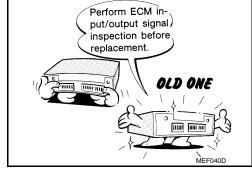
- When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.
 - 1. ECM
 - C. Loosen



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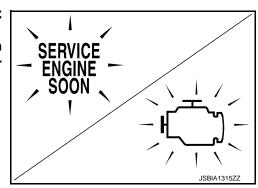
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
 - Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
 A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 0.1 m (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 <u>EC-1116</u>, "<u>Reference Value</u>".
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).



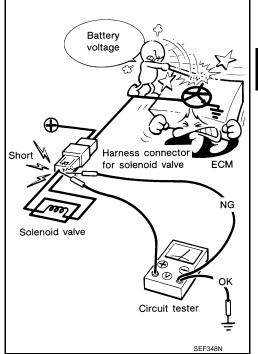
Break

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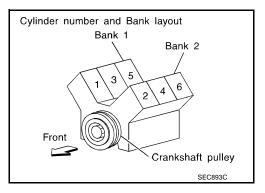
 After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Component Function Check.
 The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



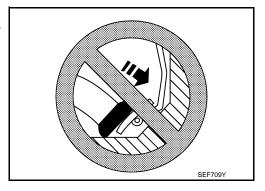
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
 - Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



- B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



- · Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.



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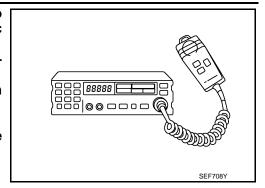
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PRECAUTIONS

< PRECAUTION >

[VQ25HR FOR USA AND CANADA]

- 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 0.2 m (8 in) away from the harness of electronic controls.
 - Do not 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.



[VQ25HR FOR USA AND CANADA]

PREPARATION

PREPARATION

Special Service Tools

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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	Checking fuel pressure

Commercial Service Tools

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INFOID:0000000007463526

	Description
	Locating the EVAP leak
S-NT703	Applying positive pressure through EVAP service port
S-NT704	
	Checking fuel tank vacuum relief valve opening pressure
S-NT815	
19 mm (0.75 in) More than	Removing and installing engine coolant temperature sensor
	S-NT704 S-NT815

PREPARATION

< PREPARATION >

[VQ25HR FOR USA AND CANADA]

Tool name (Kent-Moore No.)		Description
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	a Mating surface shave cylinder	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with antiseize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specifica- tion MIL-A-907)	S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

PERIODIC MAINTENANCE

FUEL PRESSURE

Inspection INFOID:0000000007463527

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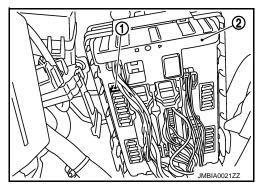
FUEL PRESSURE RELEASE

(P) With CONSULT

- 1. Turn ignition switch ON.
- Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
- Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.

₩ Without CONSULT

- 1. Remove fuel pump fuse (1) located in IPDM E/R (2).
- Start engine.
- 3. After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- 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 V36 models do not have fuel return system.
- Use Fuel Pressure Gauge Kit [SST:(J-44321)] to check fuel pressure.
- Release fuel pressure to zero. 1
- 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.
- Start engine and check for fuel leakage.
- 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". Refer to FL-6, "Removal and Installation". If NG, Repair or replace malfunctioning part.

Revision: 2013 February

EVAP LEAK CHECK

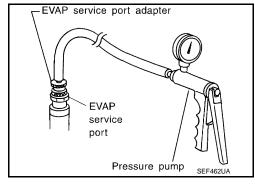
Inspection INFOID:000000007463528

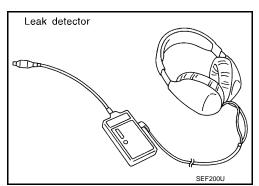
CAUTION:

- 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.
- Do not start engine.
- Improper installation of EVAP service port adapter (commercial service tool) to the EVAP service port may cause a leak.

(P) WITH CONSULT

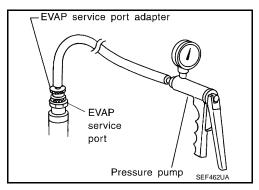
- To locate the EVAP leak, install EVAP service port adapter (commercial service tool) and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- 6. Remove EVAP service port adapter (commercial service tool) and hose with pressure pump.
- Locate the leak using a leak detector (commercial service tool).
 Refer to <u>EC-708</u>. "System Diagram".





M WITHOUT CONSULT

- To locate the EVAP leak, install EVAP service port adapter (commercial service tool) 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).
- 4. Remove EVAP service port adapter (commercial service tool) and hose with pressure pump.

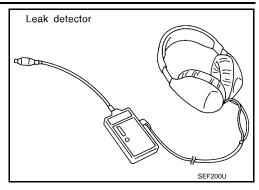


EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

[VQ25HR FOR USA AND CANADA]

5. Locate the leak using a leak detector (commercial service tool). Refer to <u>EC-708</u>, "System Diagram".



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SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[VQ25HR FOR USA AND CANADA]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Condition	Specification
No load* (in P or N position)	650 ± 50 rpm

^{*:} Under the following conditions

- · A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000007463530

Condition	Specification
No load* (in P or N position)	14 ± 2° BTDC

^{*:} 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

INFOID:0000000007463531

Condition	Specification (Using CONSULT or GST)
At idle	5 – 35%
At 2,500 rpm	5 – 35%

Mass Air Flow Sensor

INFOID:0000000007463532

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.7 – 1.1 V*
Mass air flow (Using CONSULT or GST)	2.0 – 6.0 g/sec at idle* 7.0 – 20.0 g/sec at 2,500 rpm*

^{*:} Engine is warmed up to normal operating temperature and running under no load.

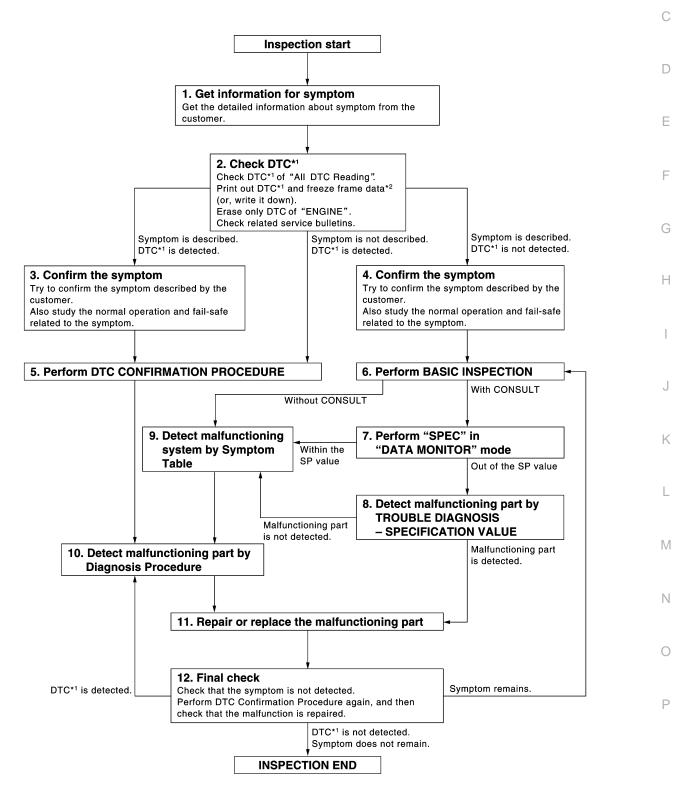
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BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

OVERALL SEQUENCE



JSBIA1812GB

- *1: Include 1st trip DTC.
- *2: Include 1st trip freeze frame data.

DETAILED FLOW

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 EC-1172. "Diagnostic Work Sheet".)

>> GO TO 2.

2. CHECK DTC

- 1. Check DTC of "All DTC Reading".
- 2. Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT or GST.)
- Erase only DTC of "ENGINE".
 - (R) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-1279, "CONSULT Function".
 - Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in EC-1275, "On Board Diagnosis Function".
- Turn ignition switch OFF.
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to <u>EC-1574, "Symptom Table"</u>.)
- 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-1578</u>, "<u>Description</u>" and <u>EC-1560</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 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-1578</u>, "Description" and <u>EC-1560</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 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-1562, "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.

DIAGNOSIS AND REPAIR WORK FLOW

[VQ25HR FOR MEXICO] < BASIC INSPECTION > If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIR-MATION PROCEDURE. Α Is DTC detected? YES >> GO TO 10. NO >> Check according to GI-43, "Intermittent Incident". EC 6. PERFORM BASIC INSPECTION Perform EC-1174, "BASIC INSPECTION: Special Repair Requirement". Do you have CONSULT? YES >> GO TO 7. NO >> GO TO 9. D 7.PERFORM SPEC IN DATA MONITOR MODE (P)With CONSULT Е 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 "SPEC" in "DATA MONITOR" mode of "ENGINE". Refer to EC-1287, "Component Function Check". Is the measurement value within the SP value? F YES >> GO TO 9. NO >> GO TO 8. $oldsymbol{\mathsf{S}}.\mathsf{DETECT}$ MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE Detect malfunctioning part according to EC-1288, "Diagnosis Procedure". Is a malfunctioning part detected? Н >> GO TO 11. YES NO >> GO TO 9. 9.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE Detect malfunctioning system according to EC-1574, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. 10.DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE 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 GI-46, "Circuit Inspection". Is a malfunctioning part detected? M YES >> GO TO 11. >> Monitor input data from related sensors or check voltage of related ECM terminals using CON-NO SULT. Refer to EC-1538, "Reference Value". Ν $11.\mathsf{REPAIR}$ OR REPLACE THE MALFUNCTIONING PART Repair or replace the malfunctioning part.

- Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
- 3. Check DTC. If DTC is displayed, erase it.
 - (R) With CONSULT: Refer to "How to Erase DTC and 1st Trip DTC" in EC-1279, "CONSULT Function".
 - Without CONSULT: Refer to "How to Erase Self-diagnostic Results" in <u>EC-1275</u>, "On <u>Board Diagnosis</u> <u>Function"</u>.

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>> GO TO 12.

12. FINAL CHECK

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DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[VQ25HR FOR MEXICO]

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.

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.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.

YES-2 >> Symptom remains: GO TO 6.

>> Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM and TCM (With CONSULT: Refer to "How to Read DTC and 1st Trip DTC" in EC-1279, "CONSULT Function", Without CONSULT: Refer to "How to Read Self-diagnostic Results" in EC-1275, "On Board Diagnosis Function").

Diagnostic Work Sheet

INFOID:0000000007742345

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 come on steady or blink and 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.

KEY POINTS

WHAT Vehicle & engine model
WHEN Date, Frequencies
WHERE..... Road conditions
HOW Operating conditions,
Weather conditions,
Symptoms

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DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[VQ25HR FOR MEXICO]

WORKSHEET SAMPLE

Customer name MR/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 ☐ 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 [ligh 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		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime		
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes		
Weather conditions		☐ Not affected		
	Weather	☐ Fine ☐ Raining ☐ Snowing	☐ Others [
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐] Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up		
		Engine speed 0 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		

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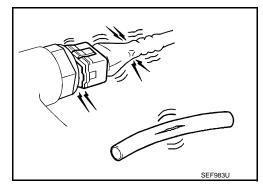
INSPECTION AND ADJUSTMENT BASIC INSPECTION

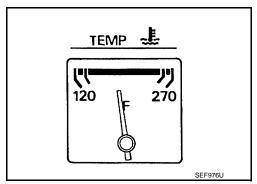
BASIC INSPECTION: Special Repair Requirement

INFOID:0000000007742346

1. INSPECTION START

- 1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for 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.
- Start engine and warm it up until engine coolant temperature indicator points the middle of gauge. Ensure engine stays below 1,000 rpm.

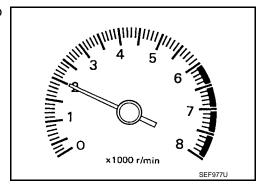




- 5. Run engine at about 2,000 rpm for about 2 minutes under no load.
- 6. Check that no DTC is displayed with CONSULT or GST.

Is any DTC 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 TARGET IDLE SPEED

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

INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

[VQ25HR FOR MEXICO]

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.

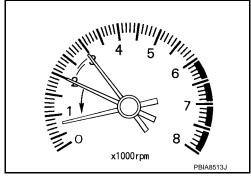
Check idle speed.

For procedure, refer to EC-1178, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-1589, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 4.



f 4.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Stop engine.

2. Perform EC-1179, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 5.

${f 5}$.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 6.

O.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-1180, "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 TARGET IDLE SPEED AGAIN

Start engine and warm it up to normal operating temperature.

2. Check idle speed.

For procedure, refer to EC-1178, "IDLE SPEED: Special Repair Requirement". For specification, refer to EC-1589, "Idle Speed".

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-1406, "Component Inspection"</u>.
- Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-1400</u>, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

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

9. CHECK ECM FUNCTION

- Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
- 2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to EC-1177, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> GO TO 4.

10. CHECK IGNITION TIMING

Run engine at idle.

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< BASIC INSPECTION >

[VQ25HR FOR MEXICO]

2. Check ignition timing with a timing light.

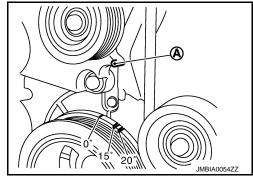
A :Timing indicator

For procedure, refer to <u>EC-1179</u>, "IGNITION TIMING : <u>Special</u> Repair Requirement".

For specification, refer to EC-1589, "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-1179</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-1180, "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 TARGET IDLE SPEED AGAIN

- Start engine and warm it up to normal operating temperature.
- 2. Check idle speed.

For procedure, refer to EC-1178, "IDLE SPEED: Special Repair Requirement".

For specification, refer to EC-1589, "Idle Speed".

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-1179</u>, "IGNITION TIMING : <u>Special</u> Repair Requirement".

For specification, refer to EC-1589, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 19.

NO >> GO TO 16.

A 15° 20° IMPLODE 477

16. CHECK TIMING CHAIN INSTALLATION

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

Is the inspection result normal?

YES >> GO TO 17.

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

INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

[VQ25HR FOR MEXICO]

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-1406, "Component Inspection".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-1400. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 18.

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

18. CHECK ECM FUNCTION

- Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
- Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to EC-1177, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> GO TO 4.

19. INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, go to EC-1177, "ADDITIONAL WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM)

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Description

When replacing ECM, the following procedure must be performed. (For details, refer to EC-1177, "ADDI-TIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement.)

PROGRAMMING OPERATION

NOTE:

After replacing with a blank ECM, programming is required to write ECM information. Be sure to follow the procedure to perform the programming.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement INFOID:0000000007742348

1.CHECK ECM PART NUMBER

Check ECM part number to see whether it is blank ECM or not.

NOTE:

- Part number of blank ECM is 23703 xxxxx.
- Check the part number when ordering ECM or with the one included in the label on the container box.

Is the ECM a blank ECM?

YES >> GO TO 2.

NO >> GO TO 4.

2.SAVE ECM PART NUMBER

Read out the part number from the old ECM and save the number, following the programming instructions. Refer to "CONSULT Operation Manual".

NOTE:

- The ECM part number is saved in CONSULT.
- Even when ECM part number is not saved in CONSULT, go to 3.

>> GO TO 3.

$oldsymbol{3}.$ PERFORM ECM PROGRAMMING

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INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

[VQ25HR FOR MEXICO]

After replacing ECM, perform the ECM programming. Refer to "CONSULT Operation Manual". **NOTE:**

- During programming, maintain the following conditions:
- Ignition switch: ON
- Electric load: OFF
- Brake pedal: Not depressed
- Battery voltage: 12 13.5 V (Be sure to check the value of battery voltage by selecting "BATTERY VOLT" in "Data monitor" of CONSULT.)

>> GO TO 5.

4. REPLACE ECM

Replace ECM.

>> GO TO 5.

5. PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS Refer to SEC-8. "ECM RE-COMMUNICATING FUNCTION: Special Repair Requirement".

>> GO TO 6.

6. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-1179, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 7.

7.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 8.

8. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> GO TO 9.

9.PERFORM EXHAUST VALVE TIMING CONTROL LEARNING

Refer to EC-1182, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED: Description

This describes how to check the idle speed. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IDLE SPEED: Special Repair Requirement

INFOID:0000000007742350

1. CHECK IDLE SPEED

(P)With CONSULT

Check idle speed in "DATA MONITOR" mode with CONSULT.

With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING: Description

INFOID:0000000007742351

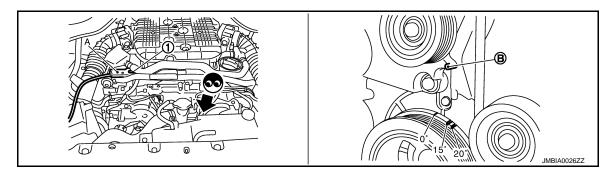
INFOID:0000000007742352

This describes how to check the ignition timing. For the actual procedure, follow the instructions in "BASIC INSPECTION".

IGNITION TIMING: Special Repair Requirement

1. CHECK IGNITION TIMING

Attach timing light to loop wire as shown.



- Loop wire
- Timing light

Timing indicator

Check ignition timing.

>> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING: Description INFOID:000000007742355

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 harness connector of accelerator pedal position sensor or ECM is disconnected.

ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement INFOID:0000000007742356

1.START

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- Check that accelerator pedal is fully released.
- Turn ignition switch ON and wait at least 2 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON and wait at least 2 seconds.
- Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING: Description

INFOID:0000000007742357

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 or electric throttle control actuator is cleaned.

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INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

[VQ25HR FOR MEXICO]

THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement

IEO ID:0000000007742358

1.START

(P) WITH CONSULT

- 1. Turn ignition switch ON.
- Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode.
- 3. Follow the instructions on the CONSULT display.
- 4. Turn ignition switch OFF and wait at least 10 seconds.

Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

N WITHOUT CONSULT

1. Start the engine.

NOTE:

Coolant temperature is less than 25°C (77°F) before engine starts.

2. Warm up the engine.

NOTE:

Warm up the engine until "COOLAN TEMP/S" on "DATA MONITOR" of CONSULT reaches more than 65°C (149°F).

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

NOTE:

Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

IDLE AIR VOLUME LEARNING: Description

INFOID:0000000007742359

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 any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

IDLE AIR VOLUME LEARNING: Special Repair Requirement

INFOID:0000000007742360

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)
- Selector lever: P or N
- · Electric load switch: OFF

(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
- With CONSULT: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A/T" system indicates less than 0.9 V.
- Without CONSULT: Drive vehicle for 10 minutes.

Will CONSULT be used?

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

2.perform idle air volume learning

(P)With CONSULT

 Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-1179</u>, "ACCELERATOR PEDAL <u>RELEASED POSITION LEARNING</u>: Special Repair Requirement".

INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

[VQ25HR FOR MEXICO]

- Perform Throttle Valve Closed Position Learning. EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- Start engine and warm it up to normal operating temperature. 3.
- Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.
- Touch "START" and wait 20 seconds.

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 4.

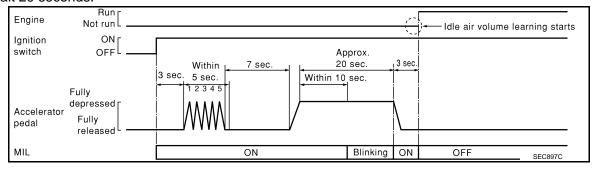
NO >> GO TO 5.

3.PERFORM IDLE AIR VOLUME LEARNING

®Without CONSULT

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.
- 1. Perform Accelerator Pedal Released Position Learning. Refer to EC-1179, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".
- Perform Throttle Valve Closed Position Learning. EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 3. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.
- Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
- 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 for approx. 20 seconds until the MIL stops blinking and turned ON.
- Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
- Start engine and let it idle.
- 10. Wait 20 seconds.



>> GO TO 4

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and check that idle speed and ignition timing are within the specifications. Refer to EC-1589, "Idle Speed" and EC-1589, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 5.

${f 5.}$ 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. EC

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[VQ25HR FOR MEXICO]

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-1287</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 all over again:

- · Engine stalls.
- · Erroneous idle.

>> INSPECTION END

EXHAUST VALVE TIMING CONTROL LEARNING

EXHAUST VALVE TIMING CONTROL LEARNING: Description

INFOID:0000000007742361

Exhaust Valve Timing Control Learning is a function of ECM to learn the characteristic of exhaust valve timing control magnet retarder by comparing the target angle of exhaust camshaft with the actual retarded angle of exhaust camshaft.

It must be performed each time as follows;

- Exhaust valve timing control magnet retarder is disconnected or replaced
- · ECM is replaced
- · Changing oil to low kinematic viscosity from high it.

EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement

INFOID:0000000007742362

1.START

(P)With CONSULT

- Start engine and warm it up to normal operating temperature.
- Set selector lever to N position and confirm that following electrical or mechanical loads are not applied.
- Headlamp switch is OFF
- Air conditioner switch is OFF
- Rear defogger switch is OFF
- Steering wheel is in the straight-ahead position, etc.
- Select "EXH V/T CONTROL LEARN" in "WORK SUPPORT" mode with CONSULT.
- Touch "START" and wait 20 seconds.
- 5. Keep the engine speed between 2,200 and 4,000 rpm.
- 6. Check that "CMPLT" is displayed on CONSULT screen.

Learning completed : CMPLT Learning not yet : YET

♥Without CONSULT

- 1. Disconnect the negative battery terminal and wait at least 10 minutes.
- Reconnect the negative battery terminal.
- 3. Start engine and warm it up to normal operating temperature.
- 4. Set selector lever to N position and confirm that following electrical or mechanical loads are not applied.
- Headlamp switch is OFF
- Air conditioner switch is OFF
- Rear defogger switch is OFF
- Steering wheel is in the straight-ahead position, etc.
- 5. Keep the engine speed between 2,200 and 4,000 rpm at 20 seconds.

>> END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

[VQ25HR FOR MEXICO]

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000007742363

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:0000000007742364

1.START

(I) With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT.
- Clear mixture ratio self-learning value by touching "CLEAR".

With GST

- 1. Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF.
- 3. Disconnect mass air flow sensor (bank 1) harness connector.
- 4. Restart engine and let it idle for at least 5 seconds.
- 5. Stop engine and reconnect mass air flow sensor (bank 1) harness connector.
- 6. Select Service \$03 with GST. Check DTC P0102 is detected.
- 7. Select Service \$04 with GST to erase the DTC P0102.

>> END

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HOW TO SET SRT CODE

Description

OUTLINE

In order to set all SRTs, the self-diagnoses as in the "SRT ITEM" table must have been performed at least once. Each diagnosis may require actual driving for a long period of time under various conditions.

SRT ITEM

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

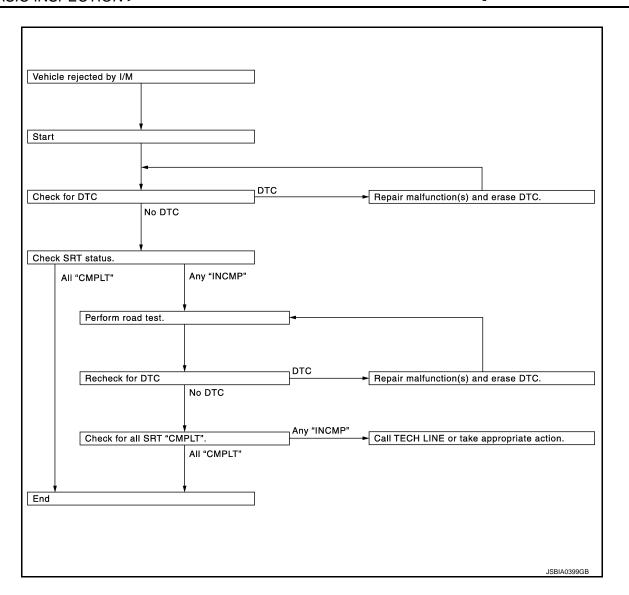
SRT item*1 (CONSULT indication)	Performance Priority*2	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	1	Three way catalyst function	P0420, P0430
HO2S	4	Air fuel ratio (A/F) sensor 1	P0133, P0153
		Heated oxygen sensor 2	P0137, P0157
	1	Heated oxygen sensor 2	P0138, P0158
		Heated oxygen sensor 2	P0139, P0159
EGR/VVT SYSTEM	2	Intake value timing control function	P0011, P0021

^{*1:} Though displayed on the CONSULT screen, "HO2S HTR" is not SRT item.

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, referring to the following flowchart.

^{*2:} If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.



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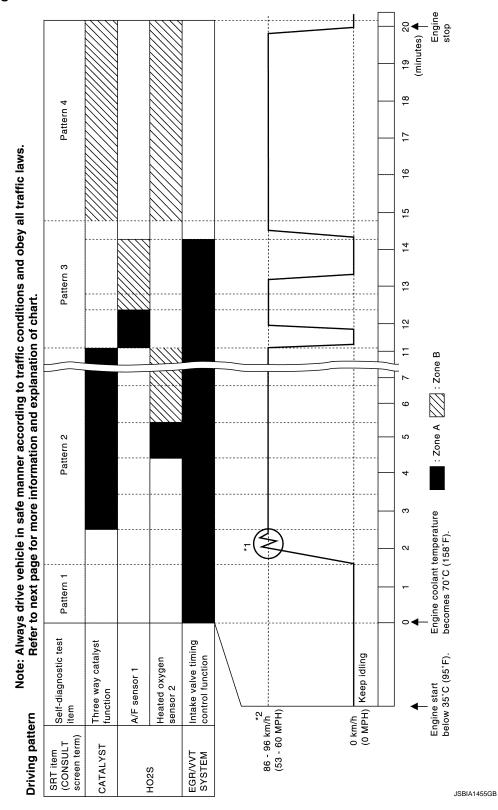
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SRT Set Driving Pattern

INFOID:0000000007742366



NOTE:

^{*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.

The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.

HOW TO SET SRT CODE [VQ25HR FOR MEXICO] < BASIC INSPECTION > Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the short-Α Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within *: Normal conditions refer to the following: EC 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. Work Procedure D INFOID:0000000007742367 1.CHECK DTC Е Check DTC. Is any DTC detected? >> Repair malfunction(s) and erase DTC. Refer to EC-1563, "DTC Index". F NO >> GO TO 2. 2.CHECK SRT STATUS (P)WITH CONSULT Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT. ®WITHOUT CONSULT Perform "SRT status" mode with EC-1275, "On Board Diagnosis Function". Н WITH GST Select Service \$01 with GST. Is SRT code(s) set? YES >> END NO-1 >> With CONSULT: GO TO 3. NO-2 >> Without CONSULT: GO TO 4. 3.DTC CONFIRMATION PROCEDURE Select "SRT WORK SUPPORT" in "DTC & SRT CONFIRMATION" mode with CONSULT. K For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" according to the "Performance Priority" in the "SRT ITEM" table. Refer to EC-1184, "Description". 3. Check DTC. Is any DTC detected? YES >> Repair malfunction(s) and erase DTC. Refer to EC-1563, "DTC_Index".

NO >> GO TO 9.

4.PERFORM ROAD TEST

- Check the "Performance Priority" in the "SRT ITEM" table. Refer to EC-1184, "Description".
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to EC-1186, "SRT Set Driving Pattern".

In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5. PATTERN 1

- Check the vehicle condition:
- Engine coolant temperature is –10 to 35°C (14 to 95°F).
- Fuel tank temperature is more than 0°C (32°F).
- 2. Start the engine.
- 3. Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)

NOTE:

ECM terminal voltage is follows;

Engine coolant temperature

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EC-1187

< BASIC INSPECTION >

- -10 to 35°C (14 to 95°F): 3.0 4.3 V
- 70°(158°F): Less than 1.4 V
- Fuel tank temperature: Less than 4.1 V Refer to EC-1538, "Reference Value".

>> GO TO 6.

6. PATTERN 2

- 1. Drive the vehicle. And 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.
- 2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

NOTE:

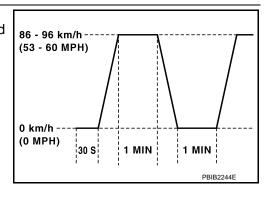
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7. PATTERN 3

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).

>> GO TO 8.



8. PATTERN 4

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 9.

9. CHECK SRT STATUS

WITH CONSULT

Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT.

NWITHOUT CONSULT

Perform "SRT status" mode with EC-1275, "On Board Diagnosis Function".

Select Service \$01 with GST.

Is SRT(s) set?

YES >> END

NO >> Call TECH LINE or take appropriate action.

SYSTEM DESCRIPTION

ENGINE CONTROL SYSTEM

System Diagram

INFOID:00000000007742371

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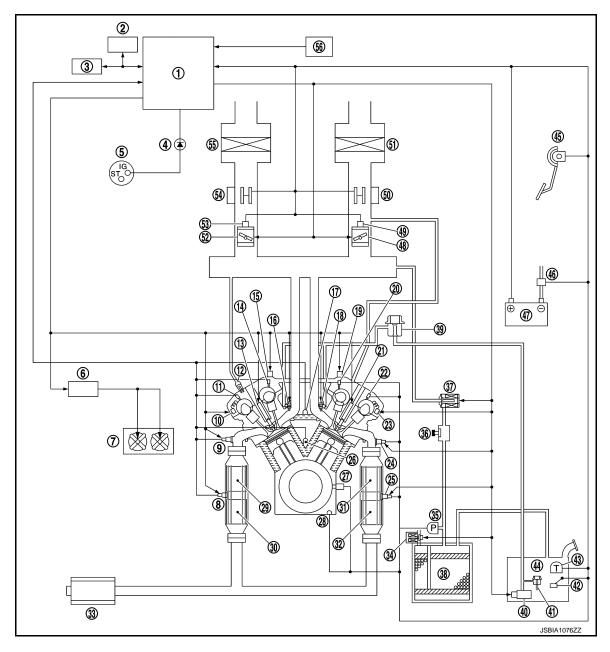
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- 1. ECM
- 4. MIL
- 7. Cooling fan
- Exhaust valve timing control magnet 11. retarder (bank 1)
- 13. Spark plug
- 16. Fuel injector
- 19. Intake valve timing control solenoid valve (bank 2)

- 2. Data link connector
- 5. Ignition switch
- 8. Heated oxygen sensor 2 (bank 1)
- Exhaust valve timing control position sensor (bank 1)
- Camshaft position sensor (PHASE) (bank 1)
- 17. Engine coolant temperature sensor
- 20. Camshaft position sensor (PHASE) (bank 2)

- 3. CAN communication
- 6. Cooling fan control module
- 9. A/F sensor 1 (bank 1)
- 12. PCV valve
- 15. Intake valve timing control solenoid valve (bank 1)
- 18. Fuel injector
- 21. Spark plug

Revision: 2013 February EC-1189 2012 G Sedan

ENGINE CONTROL SYSTEM

CVCTEM	DESCRIPTION >	
< > Y > 1 F IVI	DESCRIPTIONS	>

[VQ25HR FOR MEXICO]

22.	Exhaust valve timing control position sensor (bank 2)	23.	Exhaust valve timing control magnet retarder (bank 2)	24.	A/F sensor 1 (bank 2)
25.	Heated oxygen sensor 2 (bank 2)	26.	Knock sensor	27.	Crankshaft position sensor (POS)
28.	Engine oil temperature sensor	29.	Three way catalyst 1	30.	Three way catalyst 2
31.	Three way catalyst 1	32.	Three way catalyst 2	33.	Muffler
34.	EVAP canister vent control valve*	35.	EVAP control system pressure sensor*	36.	EVAP service port
37.	EVAP canister purge volume control solenoid valve	38.	EVAP canister	39.	Fuel damper
40.	Fuel pump	41.	Fuel pressure regulator	42.	Fuel level sensor*
43.	Fuel tank temperature sensor*	44.	Fuel tank	45.	Accelerator pedal position sensor
46.	Battery current sensor	47.	Battery	48.	Electric throttle control actuator (bank 2)
49.	Throttle position sensor (bank 2)	50.	Mass air flow sensor (with intake air temperature sensor) (bank 2)	51.	Air cleaner (bank 2)
52.	Electric throttle control actuator (bank 1)	53.	Throttle position sensor (bank 1)	54.	Mass air flow sensor (with intake air temperature sensor) (bank 1)

^{*:} These parts are not used for engine control.

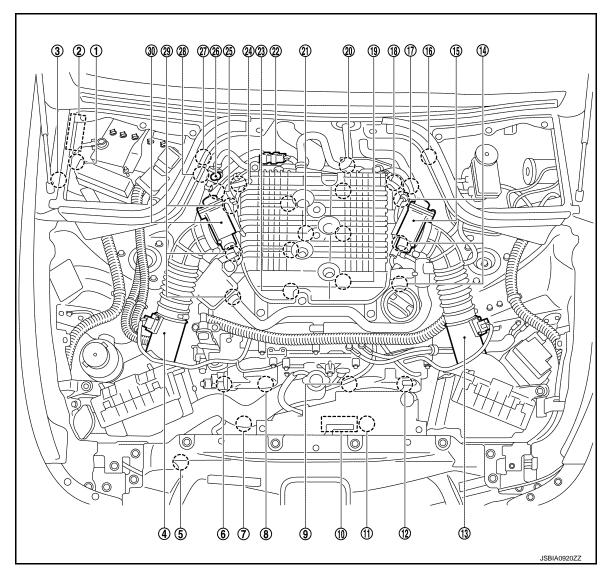
System Description

INFOID:0000000007742372

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

Component Parts Location

INFOID:0000000007742373



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- Cooling fan motor-1
- Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- Engine coolant temperature sensor 20.
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- 3. Cooling fan relay
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Exhaust valve timing control magnet retarder (bank 2)
- Electric throttle control actuator 15. (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)

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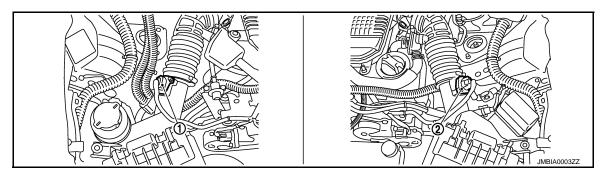
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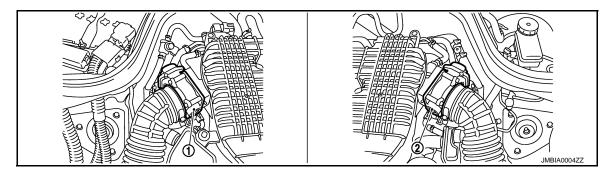
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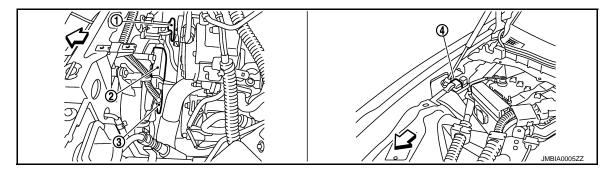
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- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)

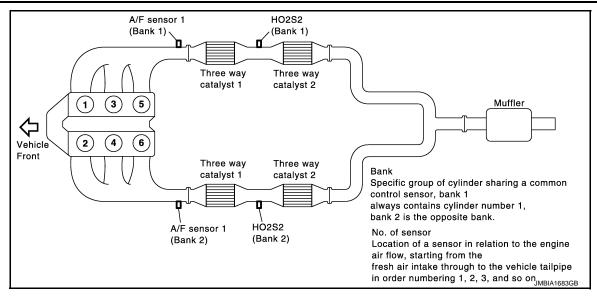


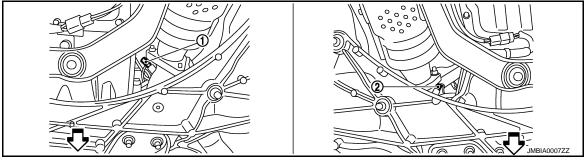
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



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

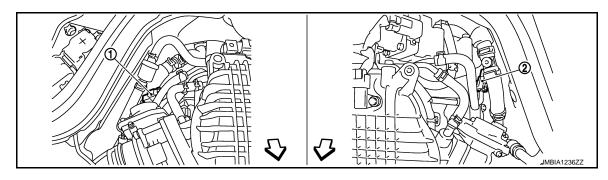
- Cooling fan relay
- ∀
 : Vehicle front





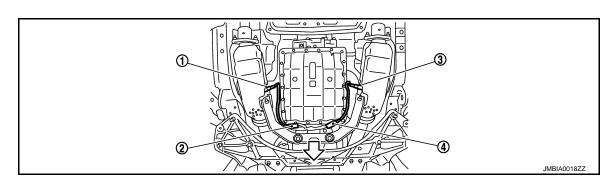
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

∀
 □: Vehicle front



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

∀ : Vehicle front



Revision: 2013 February EC-1193 2012 G Sedan

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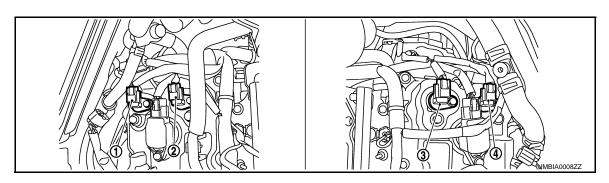
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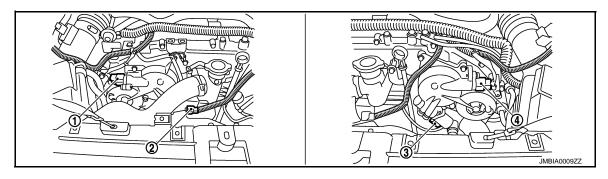
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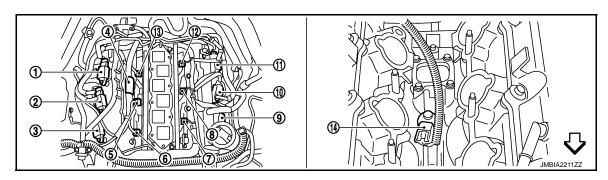
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- 4. Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

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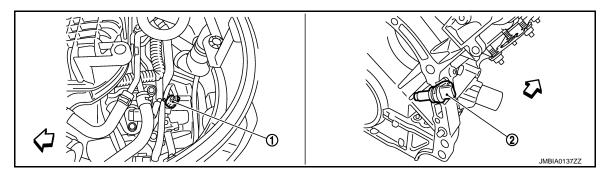
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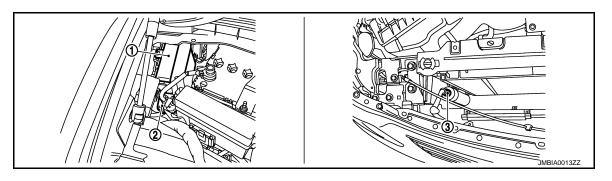
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- 13. Fuel injector No. 5
- 14. Knock sensor

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 : Vehicle front

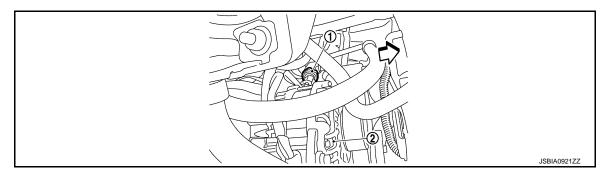


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀ : Vehicle front



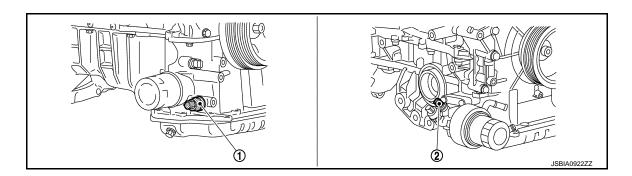
1. IPDM E/R

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

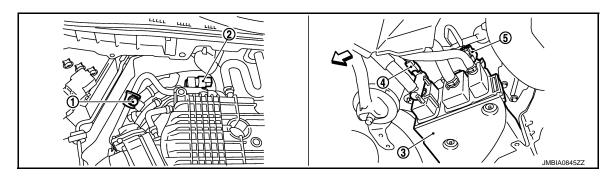


- 1. Power steering pressure sensor
- 2. Alternator

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 : Vehicle front

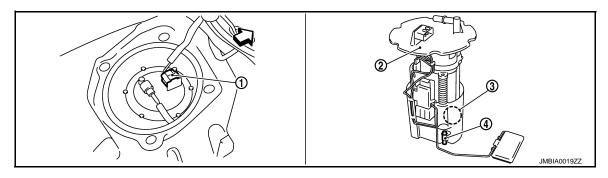


Engine oil temperature sensor (2WD 2. Engine oil temperature sensor (AWD models)

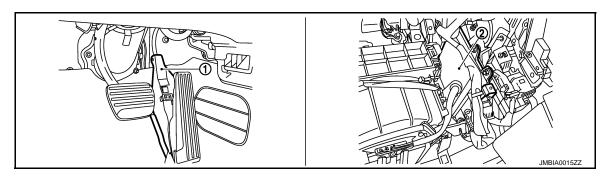


- EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve*
- EVAP control system pressure sensor*

- : Vehicle front
- * : These parts are not used for engine control



- Fuel level sensor unit and fuel pump harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- 4. Fuel tank temperature sensor
- ∀ : Vehicle front



- 1. Accelerator pedal position sensor
- . ECM

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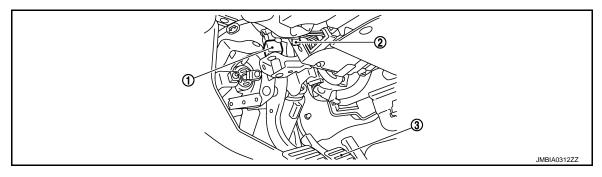
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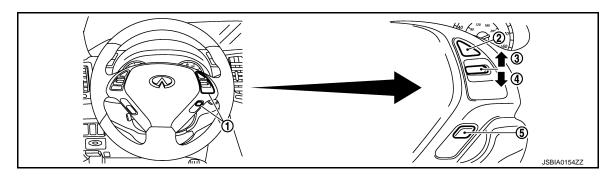
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- Stop lamp switch
- 2. ASCD brake switch
- Brake pedal



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

3. RESUME/ACCELERATE switch

Component Description

INFOID:0000000007742374

Component	Reference
A/F sensor 1	EC-1336. "Description"
A/F sensor 1 heater	EC-1308, "Description"
Accelerator pedal position sensor	EC-1497, "Description"
ASCD brake switch	EC-1485. "Description"
ASCD steering switch	EC-1482, "Description"
Battery current sensor	EC-1465, "Description"
Camshaft position sensor (PHASE)	EC-1402. "Description"
Crankshaft position sensor (POS)	EC-1397. "Description"
Cooling fan control module	EC-1515, "Description"
Cooling fan motor	EC-1515, "Description"
Electric throttle control actuator	EC-1458, "Description"
Engine coolant temperature sensor	EC-1329, "Description"
Engine oil temperature sensor	EC-1382, "Description"
EVAP canister purge volume control solenoid valve	EC-1413, "Description"
Exhaust valve timing control magnet retarder	EC-1317, "Description"
Exhaust valve timing control position sensor	EC-1436, "Description"
Fuel injector	EC-1521, "Description"
Fuel pump	EC-1524, "Description"
Heated oxygen sensor 2	EC-1353, "Description"
Heated oxygen sensor 2 heater	EC-1311, "Description"

ENGINE CONTROL SYSTEM

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

Component	Reference
Ignition coil with power transistor	EC-1527, "Description"
Intake air temperature sensor	EC-1326, "Description"
Intake valve timing control solenoid valve	EC-1314, "Description"
Knock sensor	EC-1395, "Description"
Mass air flow sensor	EC-1320, "Description"
PCV valve	EC-1534, "Description"
Power steering pressure sensor	EC-1422, "Description"
Refrigerant pressure sensor	EC-1536, "Description"
Stop lamp switch	EC-1494, "Description"
Throttle control motor	EC-1455, "Description"
Throttle control motor relay	EC-1463, "Description"
Throttle position sensor	EC-1332, "Description"

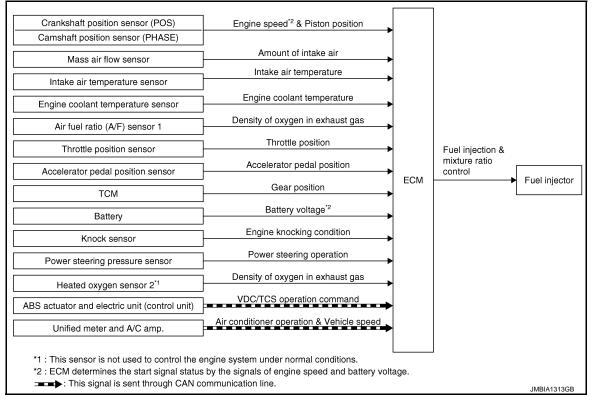
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MULTIPORT FUEL INJECTION SYSTEM

System Diagram



System Description

INFOID:0000000007742376

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)			
Camshaft position sensor (PHASE)	Engine speed*3 & 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 & mixture	Fuel injector
TCM	Gear position	ratio control	,
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)	VDC/TCS operation command*2		
Unified meter and A/C amp.	Air conditioner operation & Vehicle speed*2		

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

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^{*2:} This signal is sent to the ECM through 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.

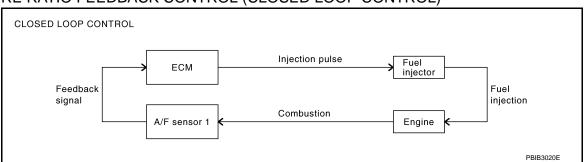
<Fuel increase>

- · During warm-up
- When starting the engine
- During acceleration
- · Hot-engine operation
- When selector lever is changed from N to D
- 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 drivability and emission control. The three way catalyst 1 can then 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 EC-1336. "Description". 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 control 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
- 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 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.

MULTIPORT FUEL INJECTION SYSTEM

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

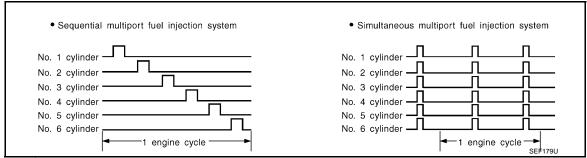
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"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 long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



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.

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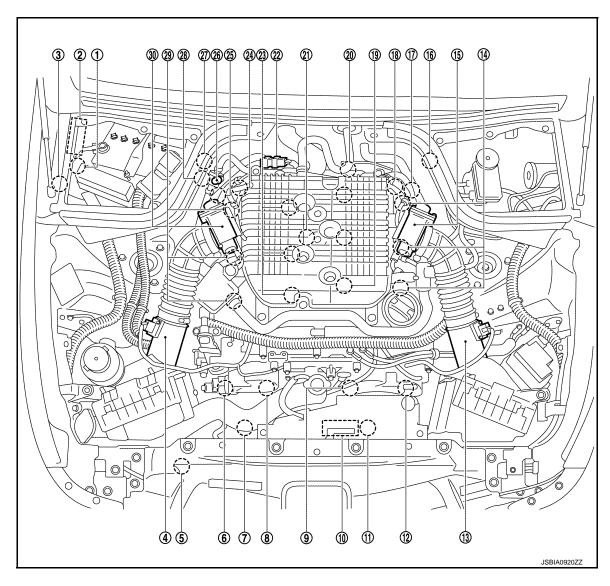
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Component Parts Location

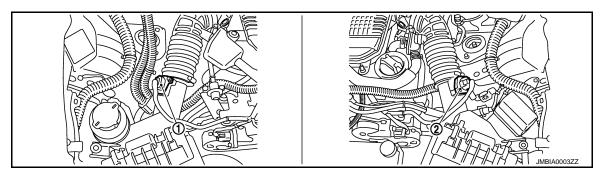
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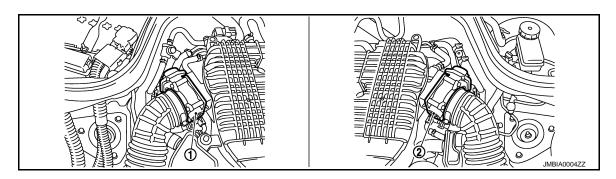
- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

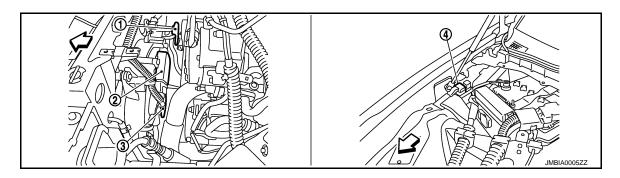
- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)



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



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



- 1. Cooling fan motor-2
- . Cooling fan relay
- ∀ : Vehicle front

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

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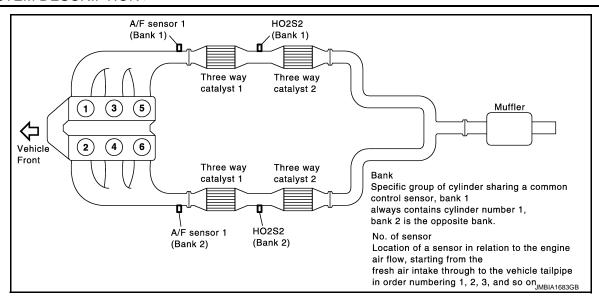
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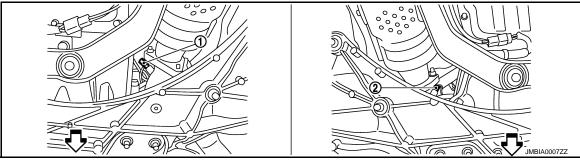
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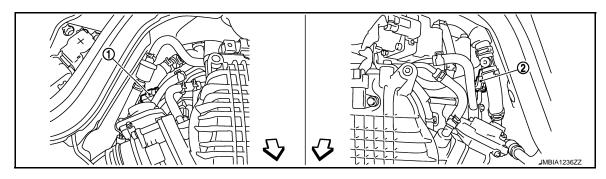
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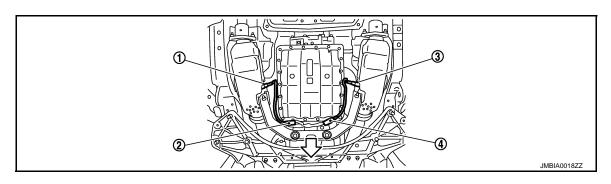
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front

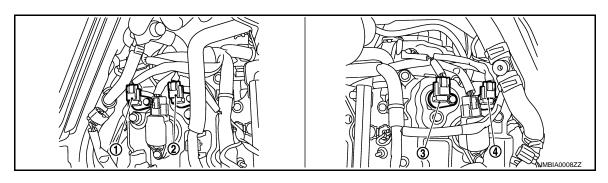


- A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

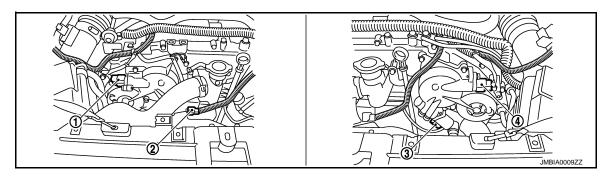
⟨□: Vehicle front



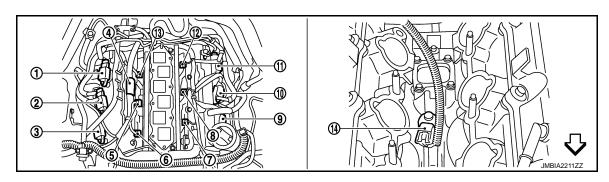
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 3. Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

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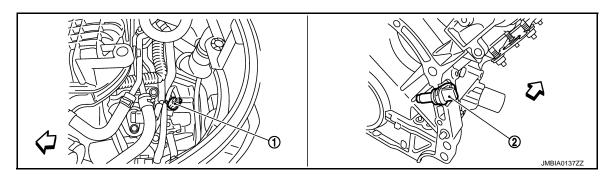
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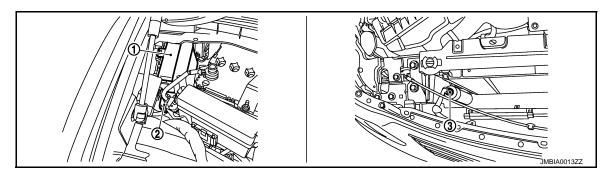
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- 13. Fuel injector No. 5
- 14. Knock sensor

∀ : Vehicle front

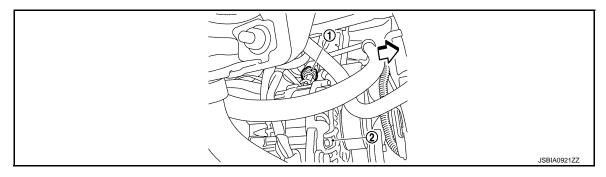


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀: Vehicle front



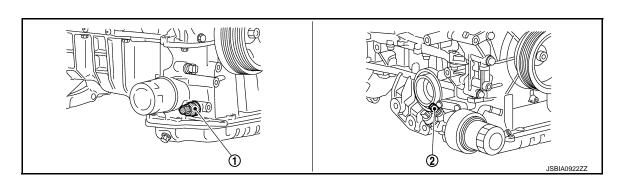
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

∀
 □: Vehicle front

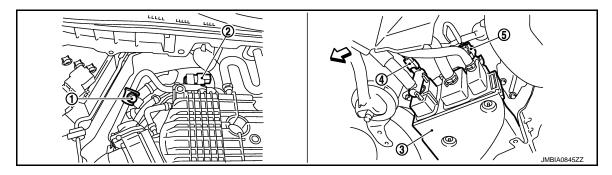


MULTIPORT FUEL INJECTION SYSTEM

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

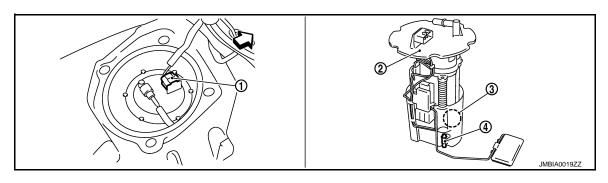
. Engine oil temperature sensor (2WD 2. Engine oil temperature sensor (AWD models)



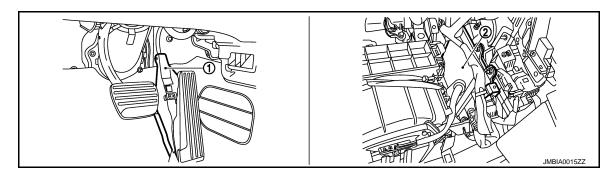
- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve*
- EVAP control system pressure sensor*

: Vehicle front

* : These parts are not used for engine control



- 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
- ∀
 : Vehicle front



1. Accelerator pedal position sensor

. ECM

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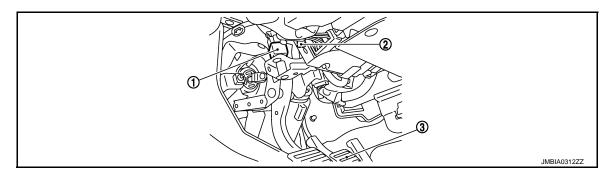
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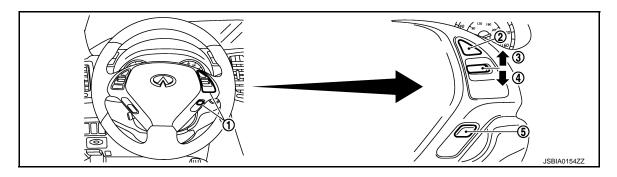
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- Stop lamp switch
- 2. ASCD brake switch
- . Brake pedal



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

3. RESUME/ACCELERATE switch

Component Description

INFOID:0000000007742378

Component	Reference
A/F sensor 1	EC-1336, "Description"
Accelerator pedal position sensor	EC-1497, "Description"
Camshaft position sensor (PHASE)	EC-1402, "Description"
Crankshaft position sensor (POS)	EC-1397, "Description"
Engine coolant temperature sensor	EC-1329, "Description"
Fuel injector	EC-1521, "Description"
Heated oxygen sensor 2	EC-1353, "Description"
Intake air temperature sensor	EC-1326, "Description"
Knock sensor	EC-1395, "Description"
Mass air flow sensor	EC-1320, "Description"
Power steering pressure sensor	EC-1422, "Description"
Throttle position sensor	EC-1385, "Description"

[VQ25HR FOR MEXICO]

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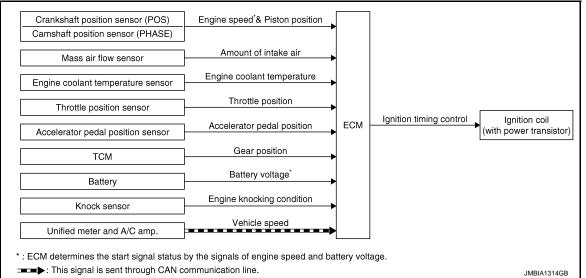
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ELECTRIC IGNITION SYSTEM

System Diagram



System Description

INFOID:0000000007742380

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	F 12°2 0 D			
Camshaft position sensor (PHASE)	Engine speed* ² & Piston position			
Mass air flow sensor	Amount of intake air			
Engine coolant temperature sensor	Engine coolant temperature		Ignition coil (with power transistor)	
Throttle position sensor	Throttle position	Ignition timing		
Accelerator pedal position sensor	Accelerator pedal position	control		
TCM	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 through CAN communication line.

SYSTEM DESCRIPTION

Firing 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

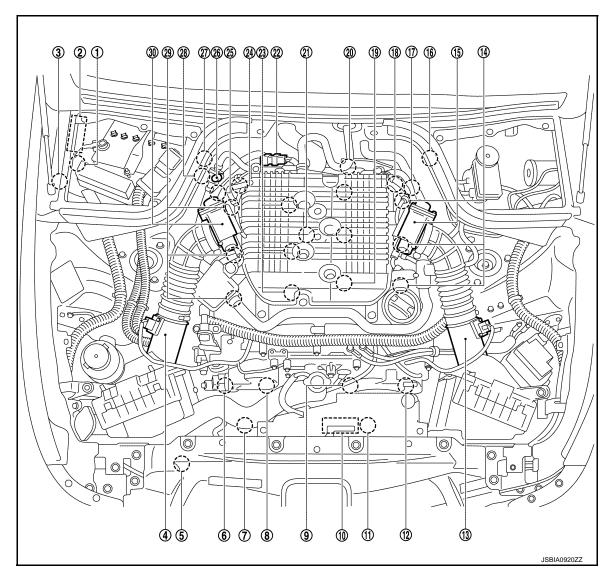
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not

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

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:0000000007801279



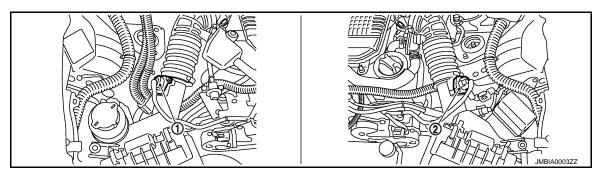
- 1. Battery current sensor
- Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- 10. Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)

Revision: 2013 February

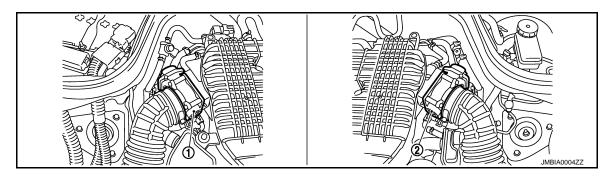
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- 2. IPDM E/R
- 5. Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

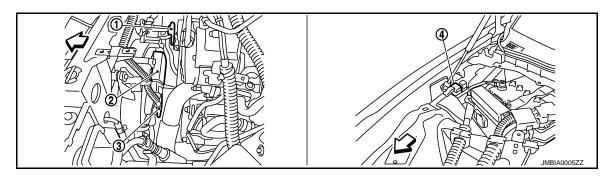
- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)



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



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



- 1. Cooling fan motor-2
- Cooling fan relay
- ∀
 □: Vehicle front

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

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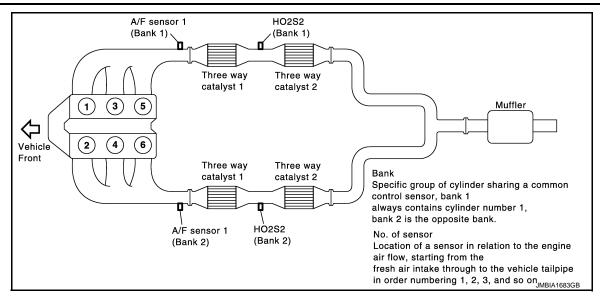
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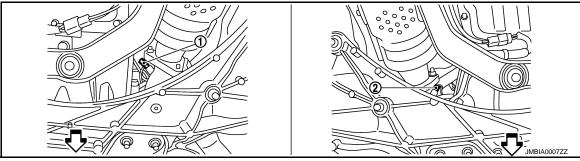
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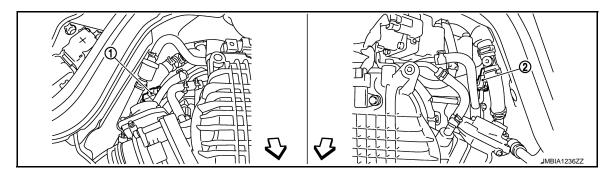
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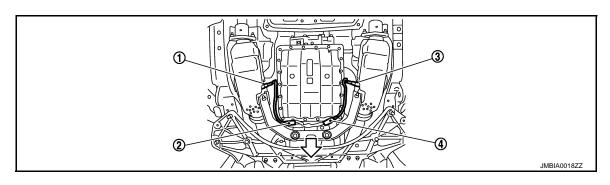
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

∀
 □: Vehicle front

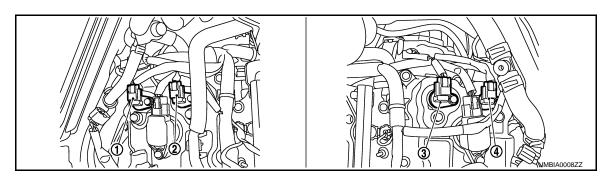


- A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

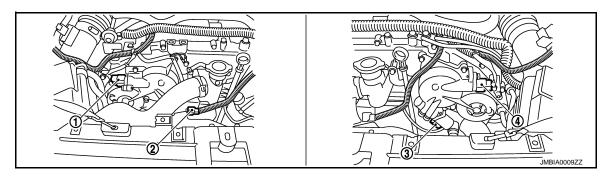
⟨□: Vehicle front



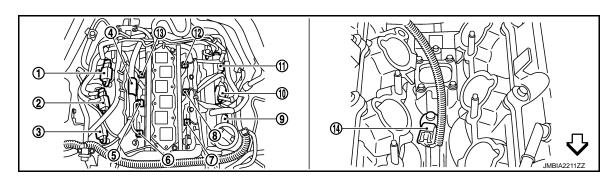
- 1. Heated oxygen sensor (bank 2)
- 2. Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ⟨□: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet 4. retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power tran-1. sistor)
- 4. Condenser
- Fuel injector No. 2 7.
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- Ignition coil No. 6 (with power tran-11. sistor)
- Ignition coil No. 1 (with power tran-3. sistor)
- 6. Fuel injector No. 1
- sistor)

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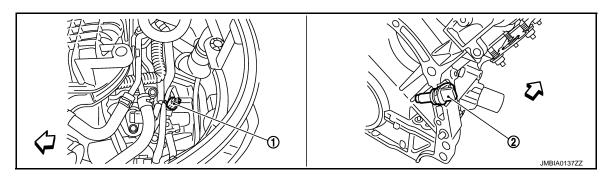
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Ignition coil No. 2 (with power tran-

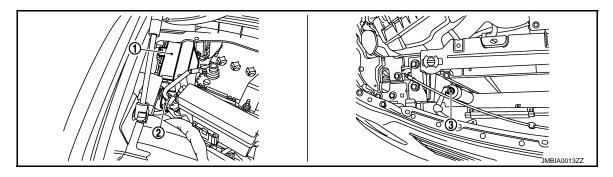
12. Fuel injector No. 6

- 13. Fuel injector No. 5
- 14. Knock sensor

∀ : Vehicle front

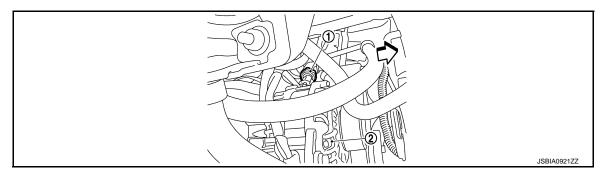


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
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 □: Vehicle front



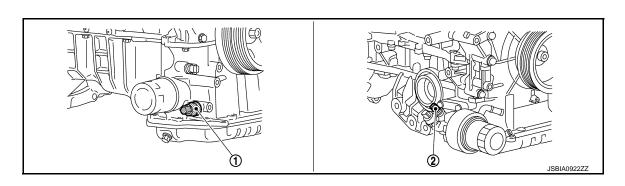
1. IPDM E/R

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

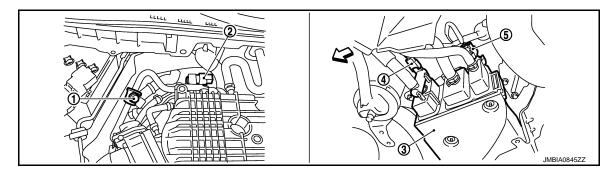


- 1. Power steering pressure sensor
- 2. Alternator

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 □: Vehicle front

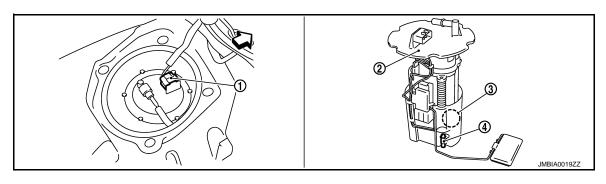


. Engine oil temperature sensor (2WD 2. Engine oil temperature sensor (AWD models)

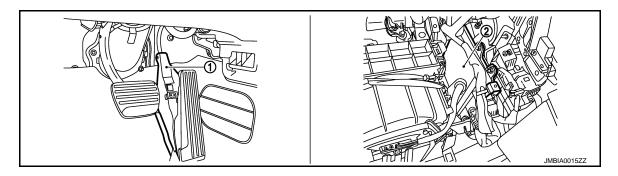


- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve*
- EVAP control system pressure sensor*

- : Vehicle front
- * : These parts are not used for engine control



- 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
- ∀
 : Vehicle front



- 1. Accelerator pedal position sensor
- 2. ECM

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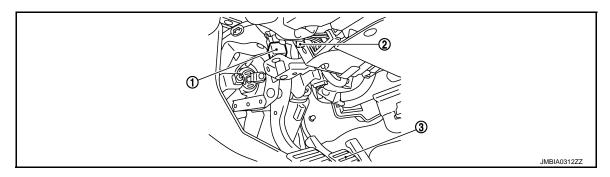
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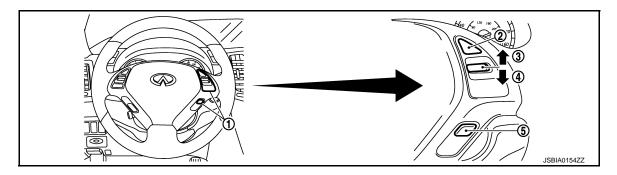
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- 1. Stop lamp switch
- 2. ASCD brake switch
- . Brake pedal



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

3. RESUME/ACCELERATE switch

Component Description

INFOID:0000000007742382

Component	Reference		
Accelerator pedal position sensor	EC-1497, "Description"		
Camshaft position sensor (PHASE)	EC-1402, "Description"		
Crankshaft position sensor (POS)	EC-1397, "Description"		
Engine coolant temperature sensor	EC-1329, "Description"		
Knock sensor	EC-1395, "Description"		
Mass air flow sensor	EC-1320, "Description"		
Throttle position sensor	EC-1332, "Description"		

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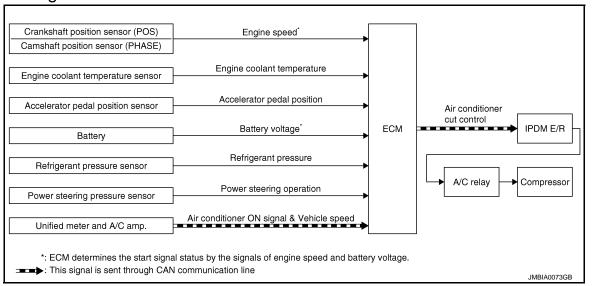
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AIR CONDITIONING CUT CONTROL

System Diagram



System Description

INFOID:0000000007742384

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	
Accelerator pedal position sensor	Accelerator pedal position	Air conditioner	↓ · · · · · · · · · · · · · · · · · · ·	
Battery voltage* ²		cut control	A/C relay ↓	
Refrigerant pressure sensor	Por Refrigerant pressure		Compressor	
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 through CAN communication line.

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.

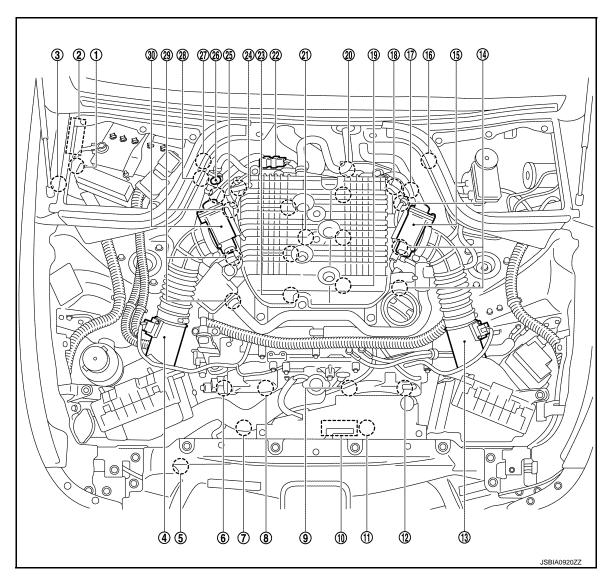
Under the following conditions, the air conditioner is turned off.

- 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.

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

Component Parts Location

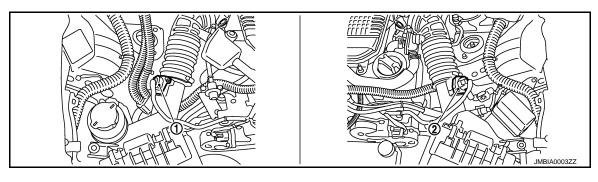
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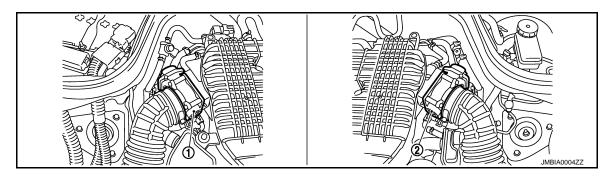
- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

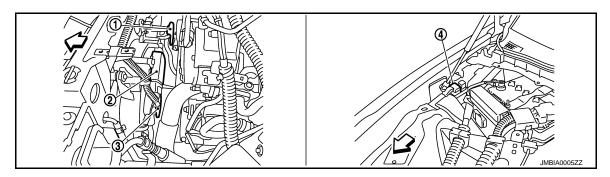
- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)



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



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



- 1. Cooling fan motor-2
- 4. Cooling fan relay
- ∀
 □: Vehicle front

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

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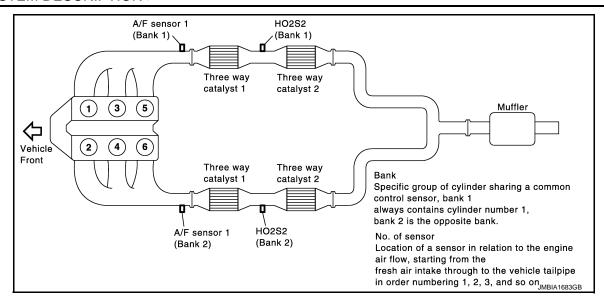
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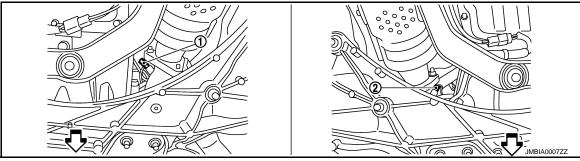
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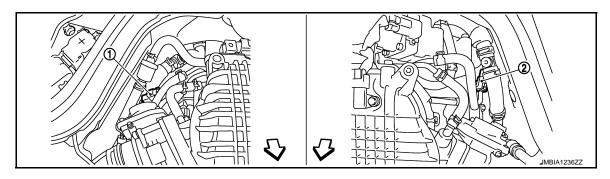
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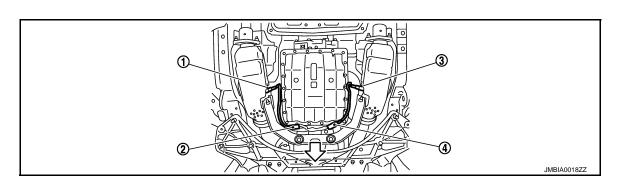
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front

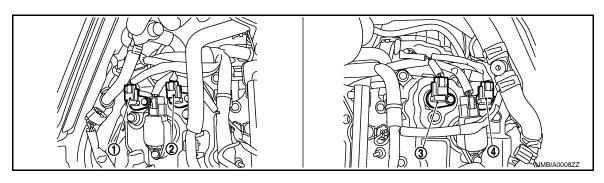


- A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

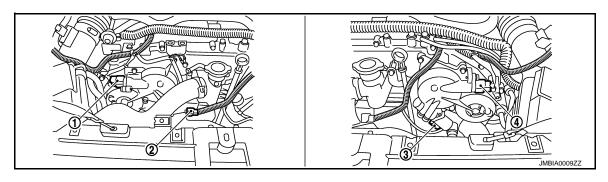
⟨□: Vehicle front



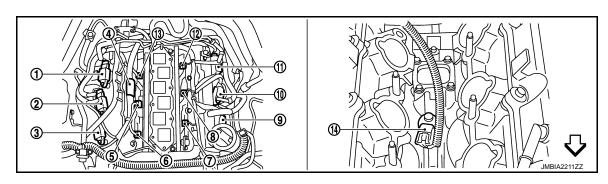
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector



- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 3. Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

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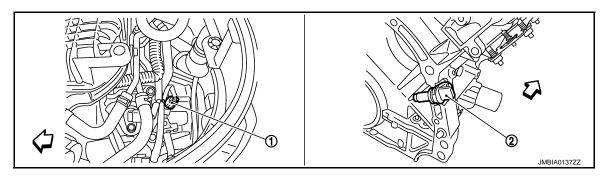
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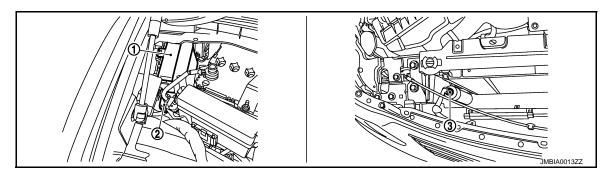
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- 13. Fuel injector No. 5
- 14. Knock sensor

∀ : Vehicle front

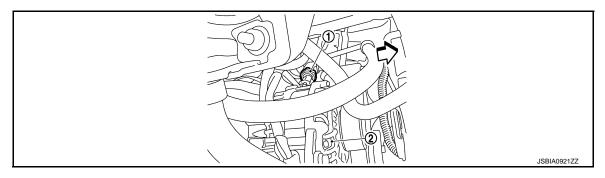


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀
 □: Vehicle front



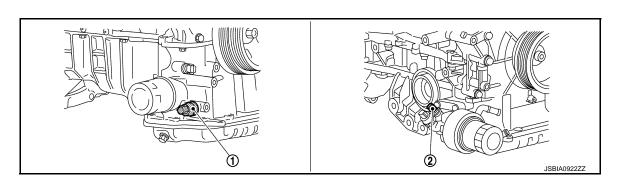
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

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 □: Vehicle front

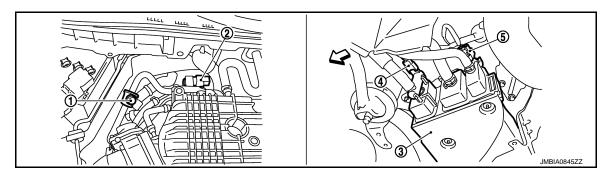


AIR CONDITIONING CUT CONTROL

< SYSTEM DESCRIPTION >

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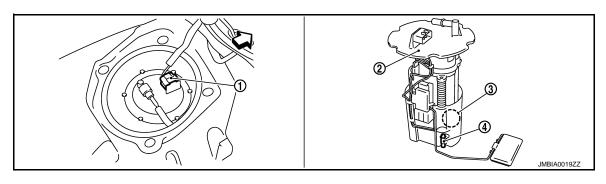
. Engine oil temperature sensor (2WD 2. Engine oil temperature sensor (AWD models)



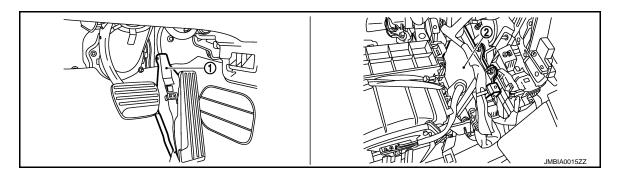
- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- EVAP canister vent control valve*
- EVAP control system pressure sensor*

: Vehicle front

* : These parts are not used for engine control



- 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
- ∀
 : Vehicle front



Accelerator pedal position sensor

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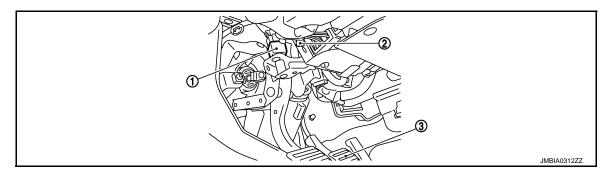
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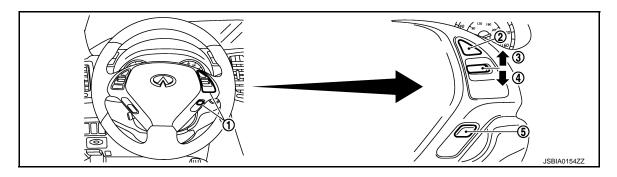
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- 1. Stop lamp switch
- 2. ASCD brake switch
- B. Brake pedal



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

3. RESUME/ACCELERATE switch

Component Description

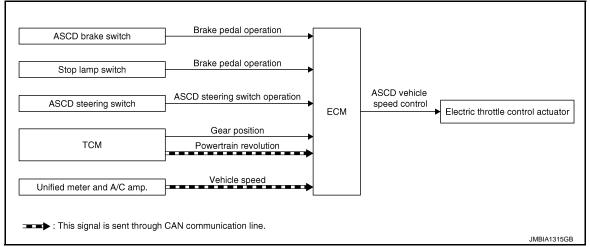
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Component	Reference
Accelerator pedal position sensor	EC-1497, "Description"
Camshaft position sensor (PHASE)	EC-1402, "Description"
Crankshaft position sensor (POS)	EC-1397, "Description"
Engine coolant temperature sensor	EC-1329, "Description"
Power steering pressure sensor	EC-1422, "Description"
Refrigerant pressure sensor	EC-1536, "Description"

INFOID:0000000007742387

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			
Stop lamp switch	Brake pedal operation		Electric throttle control	
ASCD steering switch	ASCD steering switch operation	ASCD vehicle speed control		
TCM	Gear position	actuator		
TOW	Powertrain revolution*			
Unified meter and A/C amp.	Vehicle speed*			

^{*:} This signal is sent to the ECM through 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.

The ASCD operation status is indicated by two indicators (CRUISE and SET on the information display) on the combination meter. If any malfunction occurs in the ASCD system, SET indicator blink and ASCD control is deactivated.

NOTE:

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

SET OPERATION

Press MAIN switch. (CRUISE is indicator on the information display.)

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 is indicated on the information display, and the set speed is also displayed.)

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. And then ASCD will keep the new set speed.

CANCEL OPERATION

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

CANCEL switch is pressed

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AUTOMATIC SPEED CONTROL DEVICE (ASCD)

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Selector lever is changed to N, P, R position
- 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 indicators.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator may blink slowly.
 - When the engine coolant temperature decreases to the normal operating temperature, CRUISE indicator 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 keep the new set speed.

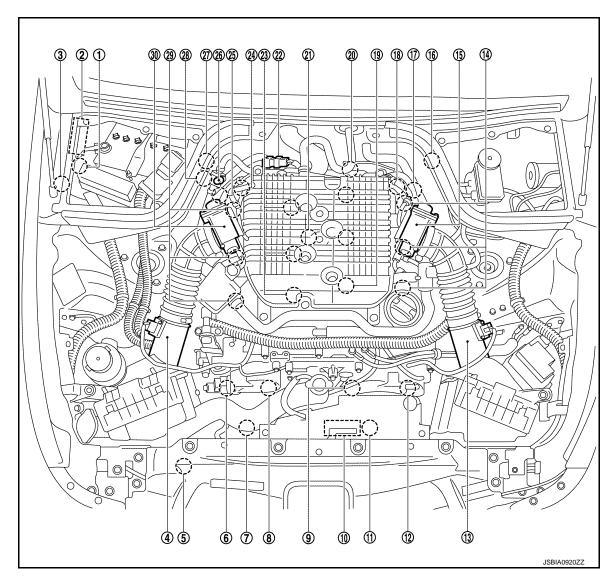
RESUME OPERATION

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

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

Component Parts Location

INFOID:0000000007801274



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- Engine coolant temperature sensor 20.
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Exhaust valve timing control magnet retarder (bank 2)
- Electric throttle control actuator 15. (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)

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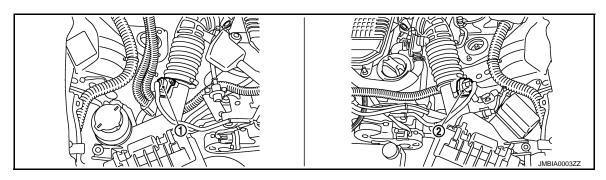
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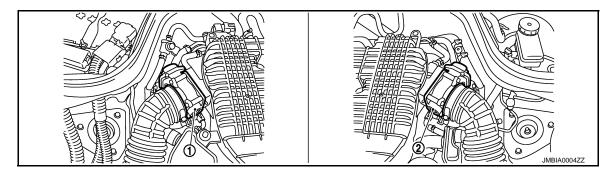
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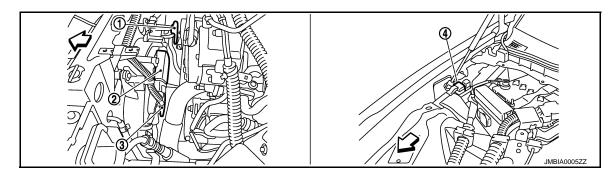
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- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



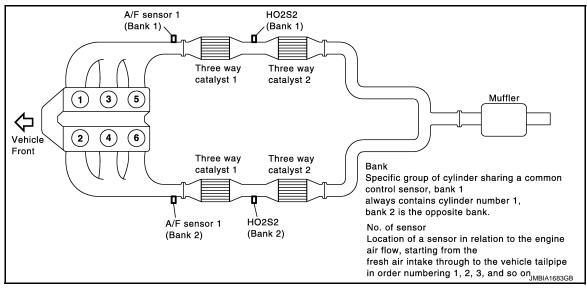
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)

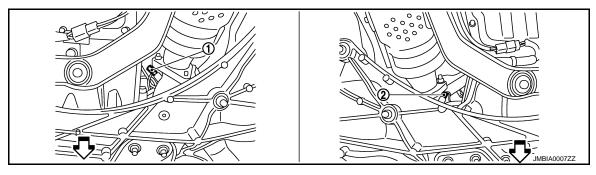


- 1. Cooling fan motor-2
- 2. Cooling fan control module
- 3. Cooling fan motor-1

Cooling fan relay

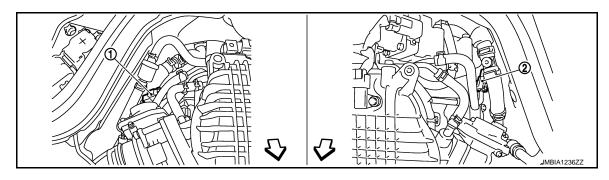
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 : Vehicle front





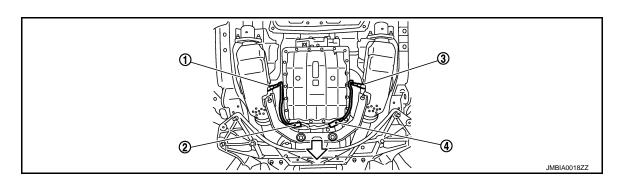
- A/F sensor 1 (bank 2)
- A/F sensor 1 (bank 1) 2.

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 □: Vehicle front



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

∀ : Vehicle front



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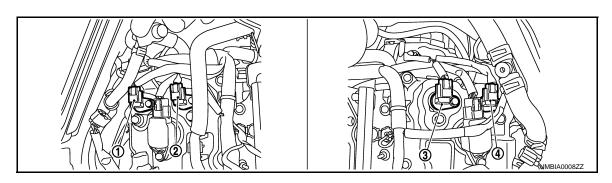
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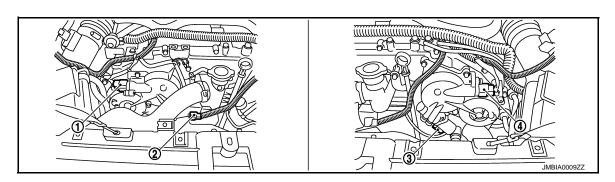
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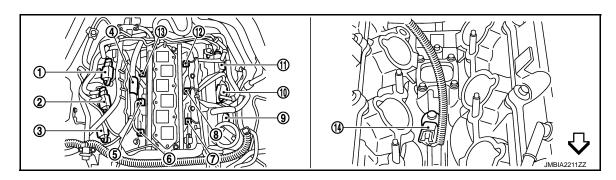
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- 4. Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

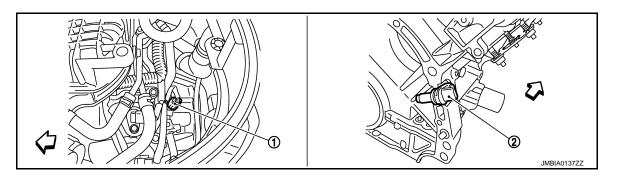
< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

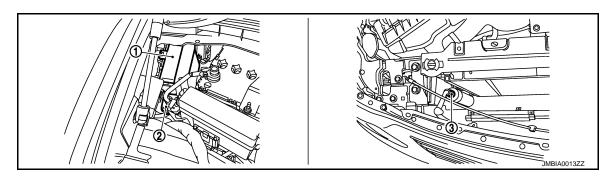
13. Fuel injector No. 5

14. Knock sensor

∀ : Vehicle front

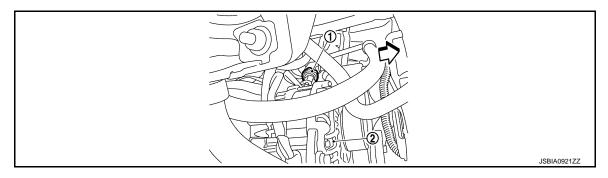


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀ : Vehicle front



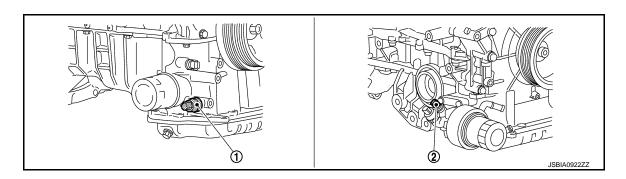
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

∀ : Vehicle front



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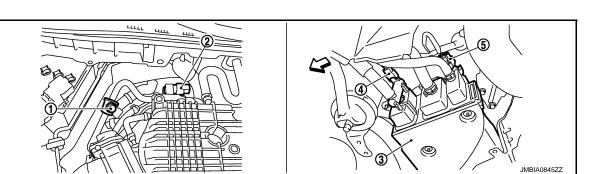
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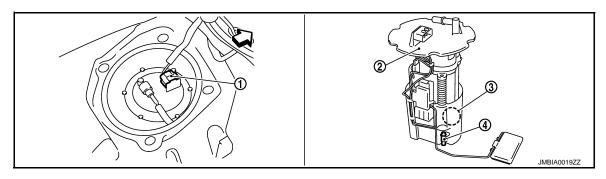
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Engine oil temperature sensor (2WD 2. Engine oil temperature sensor (AWD models)

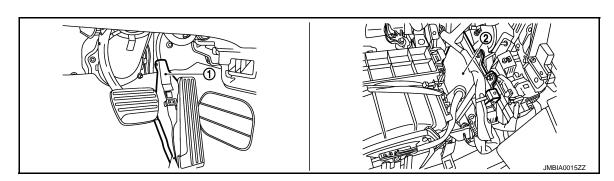


- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve*
- EVAP control system pressure sensor*

- : Vehicle front
- * : These parts are not used for engine control



- Fuel level sensor unit and fuel pump harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- 4. Fuel tank temperature sensor
- ∀
 □: Vehicle front



- 1. Accelerator pedal position sensor
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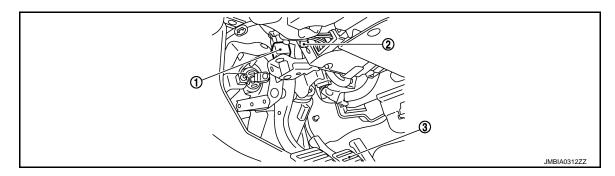
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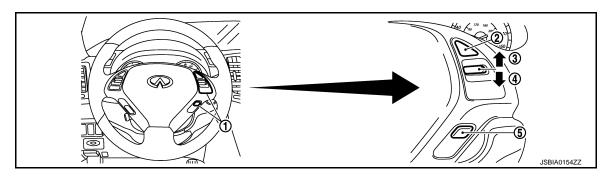
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Stop lamp switch

- 2. ASCD brake switch
- 3. Brake pedal



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

3. RESUME/ACCELERATE switch

Component Description

INFOID:0000000007742390

Component	Reference
ASCD steering switch	EC-1482, "Description"
ASCD brake switch	EC-1485, "Description"
Stop lamp switch	EC-1485, "Description"
Electric throttle control actuator	EC-1463, "Description"
ASCD indicator	EC-1514, "Description"

Revision: 2013 February

CAN COMMUNICATION

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

CAN COMMUNICATION

System Description

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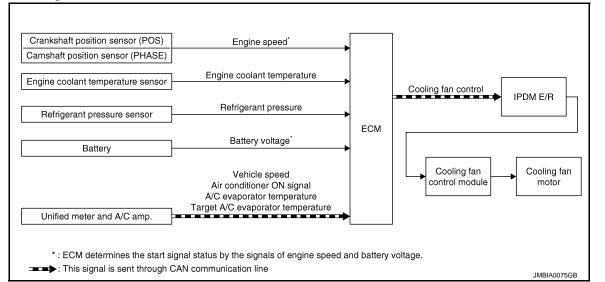
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information 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.

Refer to LAN-26, "CAN Communication Signal Chart", about CAN communication for detail.

COOLING FAN CONTROL

System Diagram

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System Description

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INPUT/OUTPUT SIGNAL CHART

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

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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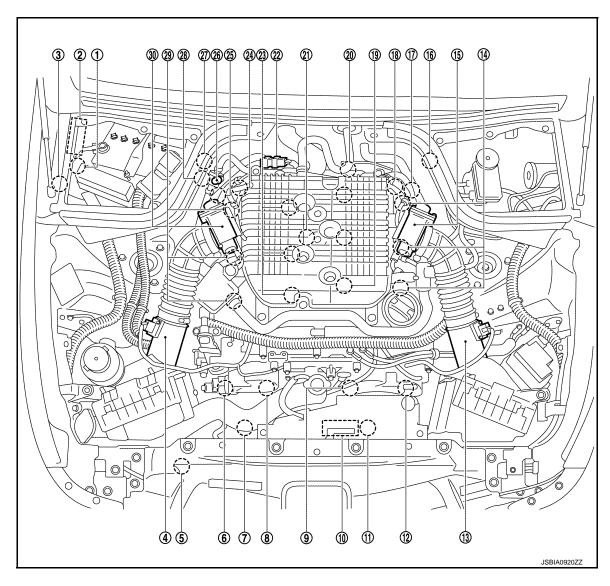
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^{*2:} This signal is sent to ECM through CAN communication line.

Component Parts Location

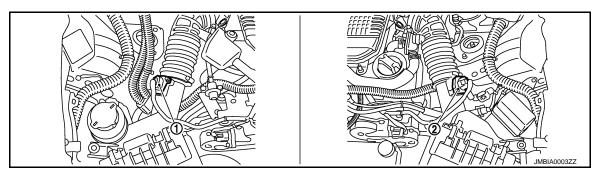
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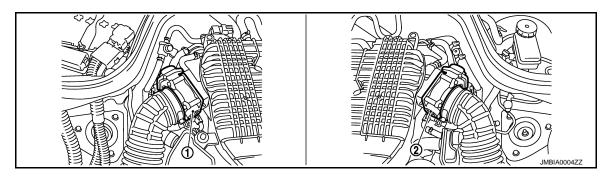
- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- 11. Cooling fan motor-1
- 14. Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- 20. Engine coolant temperature sensor
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

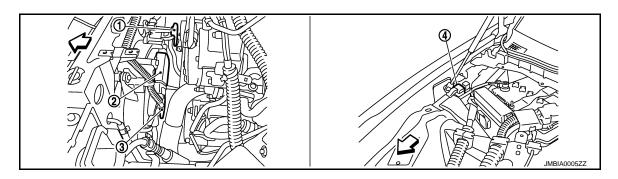
- Cooling fan relay 3.
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 12. Exhaust valve timing control magnet retarder (bank 2)
- 15. Electric throttle control actuator (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)



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



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



- 1. Cooling fan motor-2
- 4. Cooling fan relay
- ∀ : Vehicle front

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

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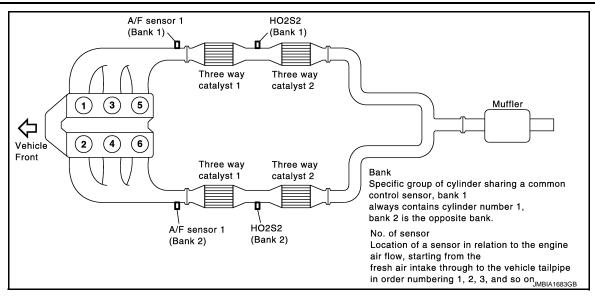
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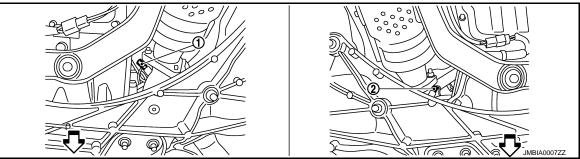
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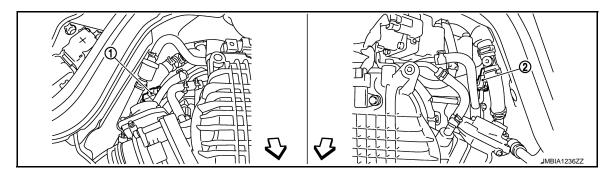
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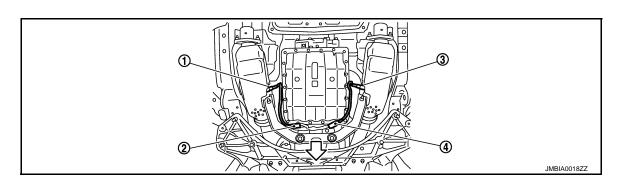
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front

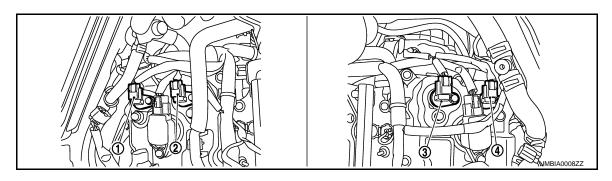


- A/F sensor 1 (bank 1) harness con- 2. nector
- A/F sensor 1 (bank 2) harness connector

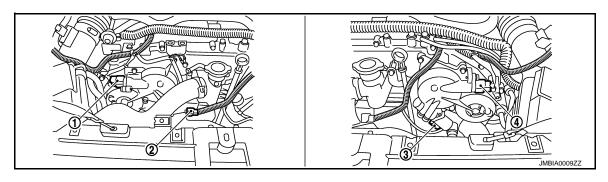
⟨□: Vehicle front



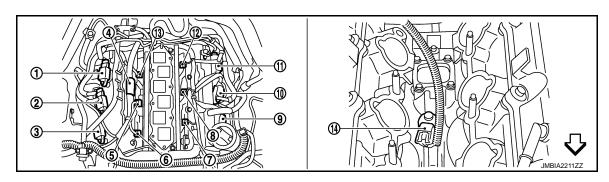
- 1. Heated oxygen sensor (bank 2)
- 2. Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- Heated oxygen sensor (bank 1) harness connector
- ⟨□: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- 3. Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- Exhaust valve timing control magnet 4. retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power tran-1. sistor)
- 4. Condenser
- Fuel injector No. 2 7.
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- Ignition coil No. 6 (with power tran-11. sistor)
- Ignition coil No. 1 (with power tran-3. sistor)
- 6. Fuel injector No. 1
- sistor)
- 12. Fuel injector No. 6

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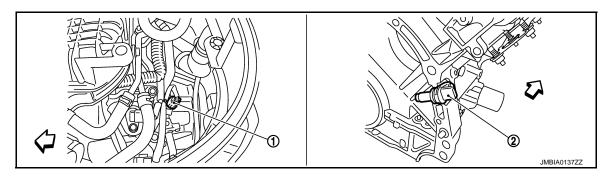
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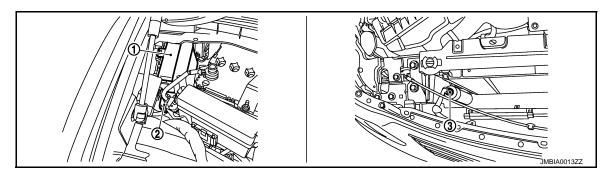
Ignition coil No. 2 (with power tran-

- 13. Fuel injector No. 5
- 14. Knock sensor

∀ : Vehicle front

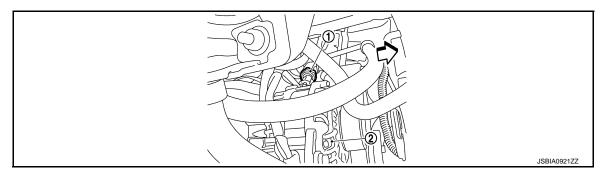


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀
 □: Vehicle front



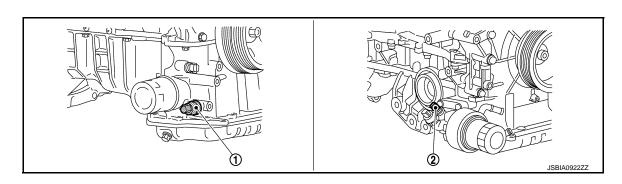
1. IPDM E/R

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

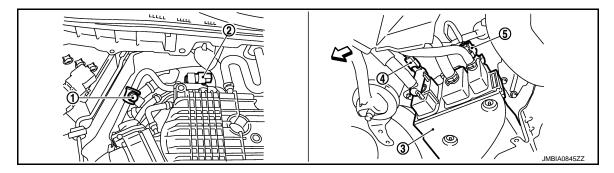


- 1. Power steering pressure sensor
- 2. Alternator

∵: Vehicle front



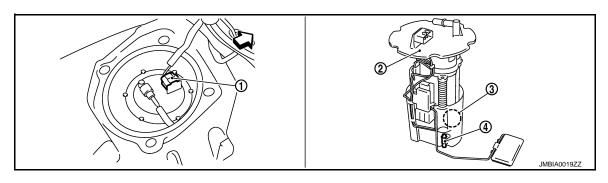
. Engine oil temperature sensor (2WD 2. Engine oil temperature sensor (AWD models)



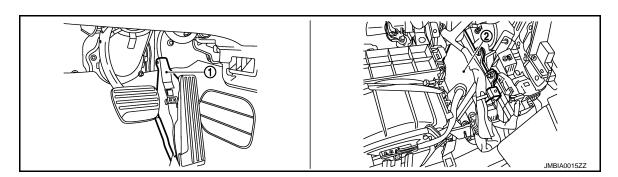
- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve*
- EVAP control system pressure sensor*

: Vehicle front

* : These parts are not used for engine control



- 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
- ∀
 : Vehicle front



Accelerator pedal position sensor

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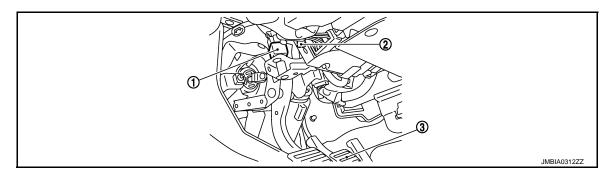
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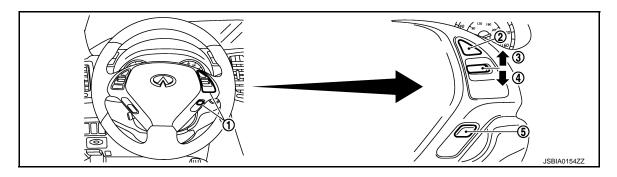
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- 1. Stop lamp switch
- 2. ASCD brake switch
- Brake pedal



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

3. RESUME/ACCELERATE switch

Component Description

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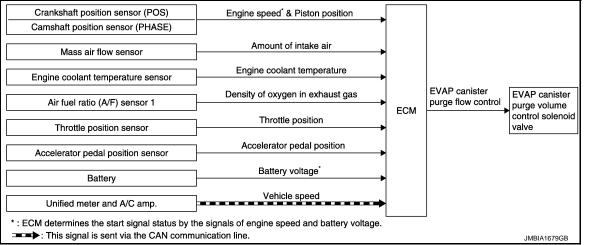
Component	Reference
Camshaft position sensor (PHASE)	EC-1402, "Description"
Crankshaft position sensor (POS)	EC-1397, "Description"
Cooling fan control module	EC-1515, "Description"
Cooling fan motor	EC-1515, "Description"
Engine coolant temperature sensor	EC-1329, "Description"
Refrigerant pressure sensor	EC-1536, "Description"

EVAPORATIVE EMISSION SYSTEM

[VQ25HR FOR MEXICO]

EVAPORATIVE EMISSION SYSTEM

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	- · w10 - 5 · · · · · · ·		
Camshaft position sensor (PHASE)	Engine speed* ¹ & Piston position		
Mass air flow sensor	Amount of intake air	gine coolant temperature Insity of oxygen in exhaust gas sixture ratio feedback signal) Fortle position Celerator pedal position Ittery voltage*1	EVAP canister purge vol- ume control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*1		
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.

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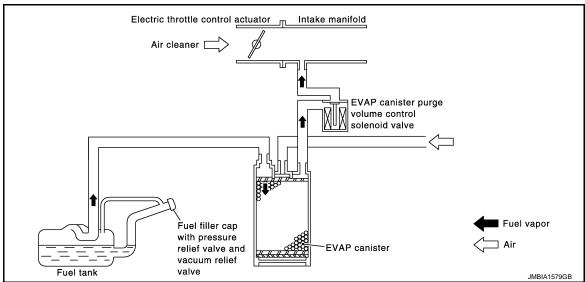
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^{*2:} This signal is sent to the ECM via the CAN communication line.

[VQ25HR FOR MEXICO]

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.

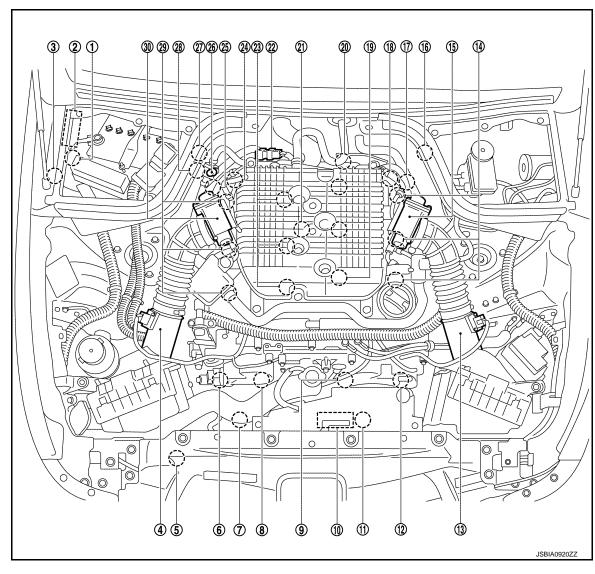
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

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.

Component Parts Location

INFOID:0000000007801276



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- Cooling fan motor-1
- Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- Engine coolant temperature sensor 20.
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- 3. Cooling fan relay
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Exhaust valve timing control magnet retarder (bank 2)
- Electric throttle control actuator 15. (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- 30. Electric throttle control actuator (bank 1)

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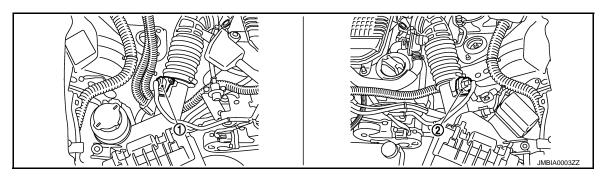
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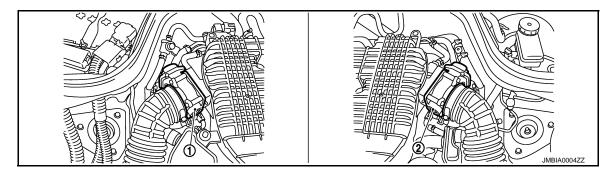
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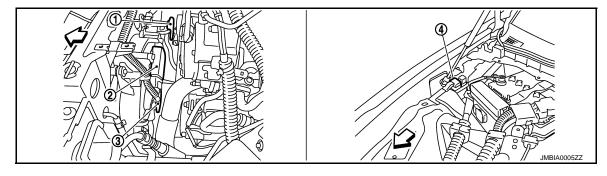
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- Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)

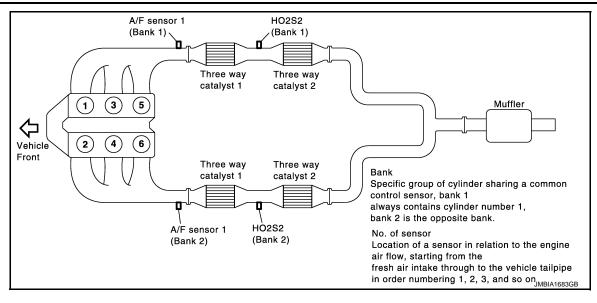


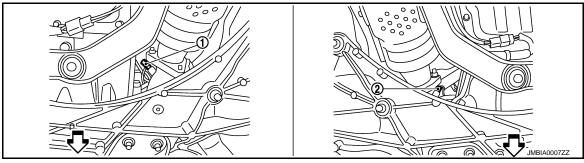
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



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

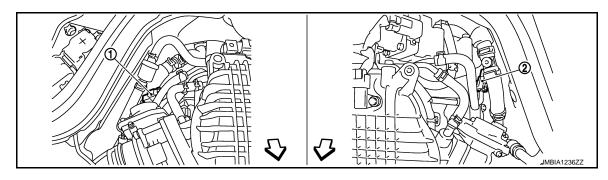
- Cooling fan relay
- ∵: Vehicle front





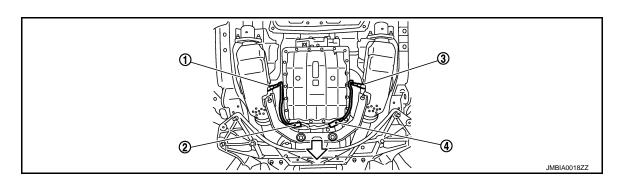
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front



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

∀
 : Vehicle front



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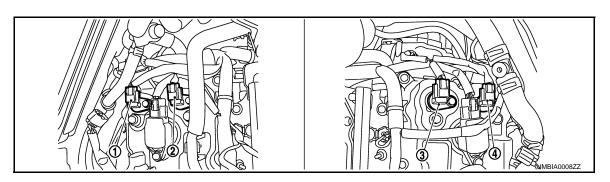
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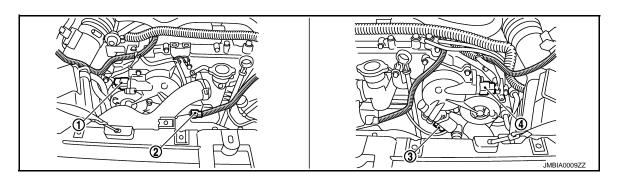
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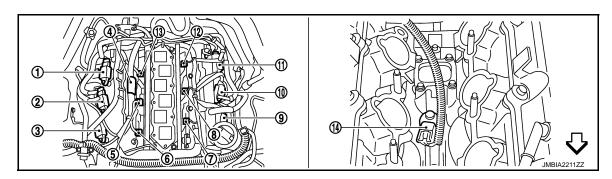
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- 4. Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 3. Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

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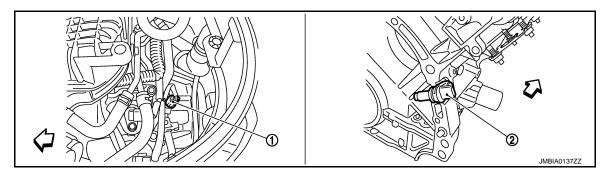
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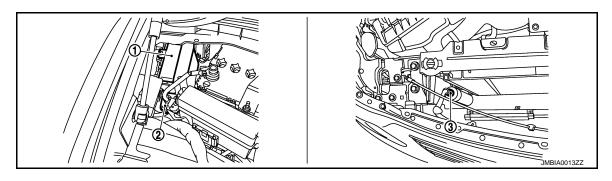
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- 13. Fuel injector No. 5
- 14. Knock sensor

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 □: Vehicle front

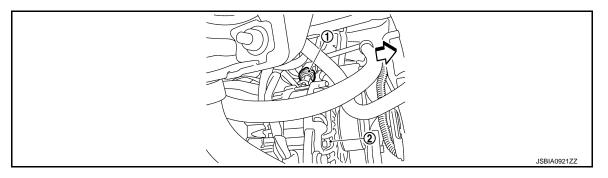


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀ : Vehicle front



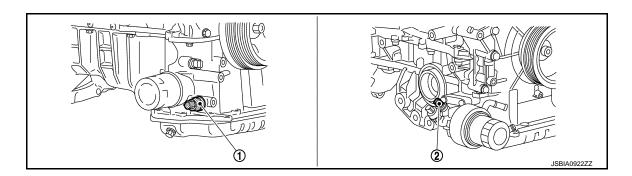
1. IPDM E/R

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



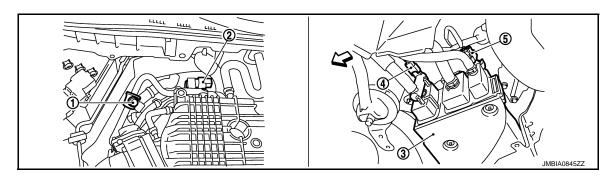
- 1. Power steering pressure sensor
- 2. Alternator

∀ : Vehicle front



Engine oil temperature sensor (2WD 2. models)

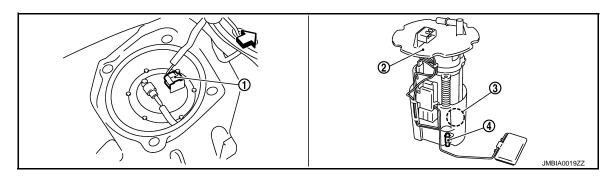
Engine oil temperature sensor (AWD models)



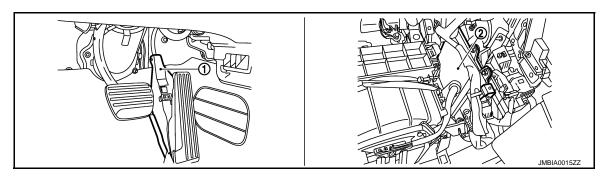
- EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve*
- EVAP control system pressure sensor*

: Vehicle front

* : These parts are not used for engine control



- Fuel level sensor unit and fuel pump harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- 4. Fuel tank temperature sensor
- ∀ : Vehicle front



1. Accelerator pedal position sensor

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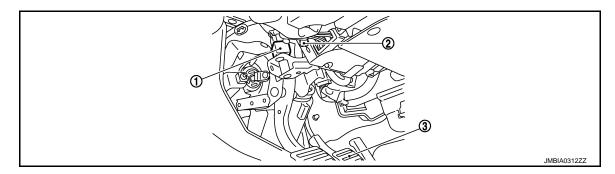
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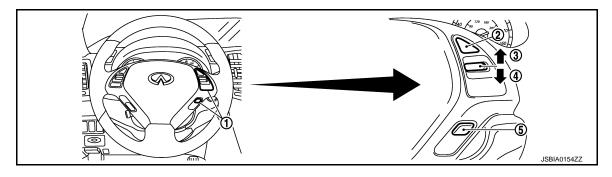
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Stop lamp switch

- 2. ASCD brake switch
- Brake pedal



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

3. RESUME/ACCELERATE switch

Component Description

INFOID:0000000007742399

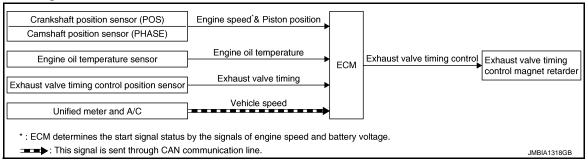
Component	Reference
A/F sensor 1	EC-1336, "Description"
Accelerator pedal position sensor	EC-1497, "Description"
Camshaft position sensor (PHASE)	EC-1402, "Description"
Crankshaft position sensor (POS)	EC-1397, "Description"
Engine coolant temperature sensor	EC-1329, "Description"
EVAP canister purge volume control solenoid valve	EC-1413, "Description"
Mass air flow sensor	EC-1320, "Description"
Throttle position sensor	EC-1332, "Description"

Revision: 2013 February

EXHAUST VALVE TIMING CONTROL

System Diagram

INFOID:0000000007742400



System Description

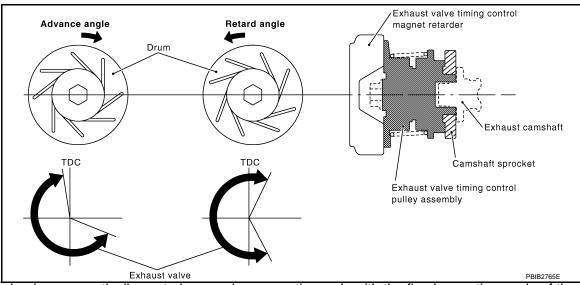
INFOID:0000000007742401

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*1 & Piston position		
Camshaft position sensor (PHASE)	Engine speed * & Piston position	Exhaust valve timing control	Exhaust valve timing control magnet retarder
Engine oil temperature sensor	Engine oil temperature		
Exhaust valve timing control position sensor	Exhaust valve timing signal	anning control	aror magnet retarder
Unified meter and A/C amp.	Vehicle speed* ²		

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

SYSTEM DESCRIPTION



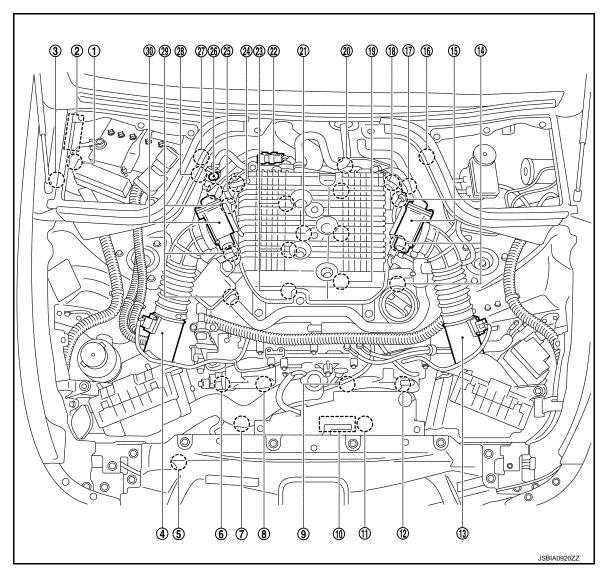
This mechanism magnetically controls cam phases continuously with the fixed operating angle of the exhaust valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine oil temperature. Then, the ECM sends ON/OFF pulse duty signals to the exhaust valve timing control magnet retarder depending on driving status. This makes it possible to control the shut/open timing of the exhaust valve to increase engine torque and output in a range of high engine speed.

^{*2:} This signal is sent to the ECM through CAN Communication line

Component Parts Location

INFOID:0000000007801277



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
- Intake valve timing control solenoid valve (bank 1)
- Cooling fan motor-1
- Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- Engine coolant temperature sensor 20.
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- 3. Cooling fan relay
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Exhaust valve timing control magnet retarder (bank 2)
- Electric throttle control actuator 15. (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- (bank 1)

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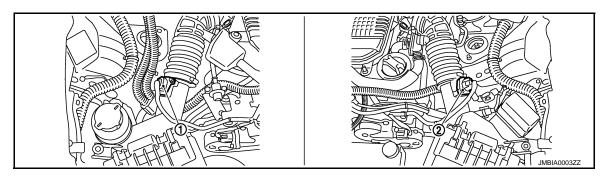
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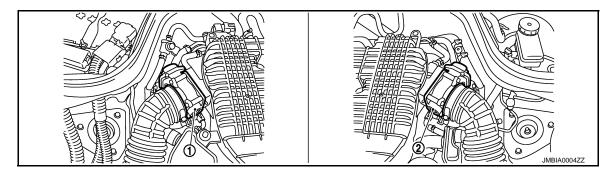
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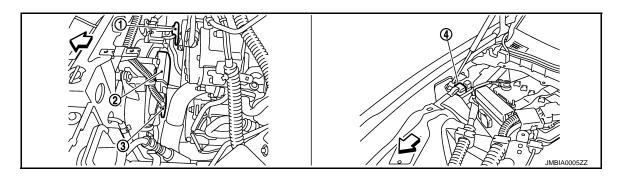
30. Electric throttle control actuator



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

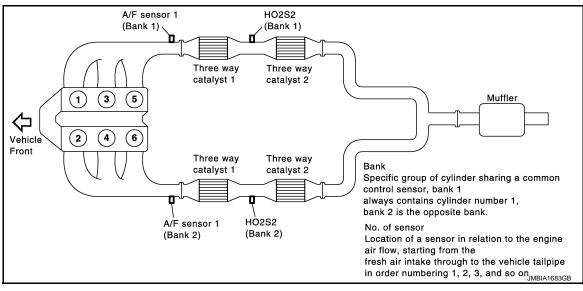


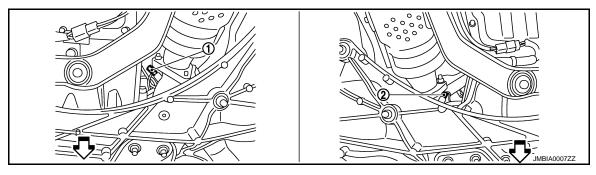
- Electric throttle control actuator (bank 1)
- Electric throttle control actuator (bank 2)



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

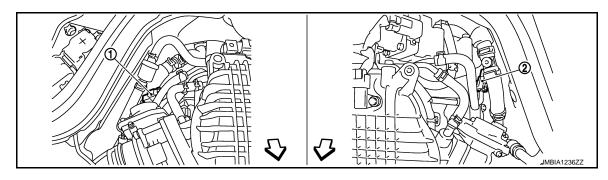
- Cooling fan relay
- ⟨□: Vehicle front





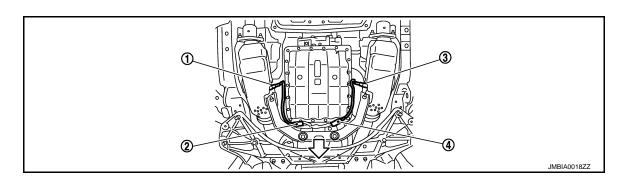
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front



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

∀ : Vehicle front



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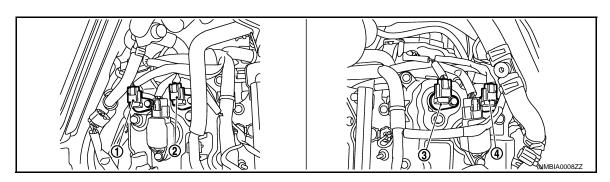
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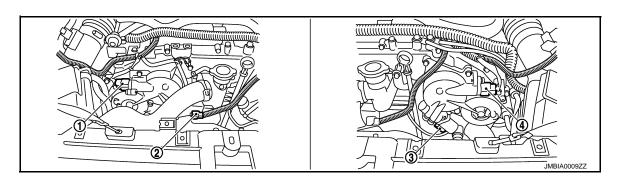
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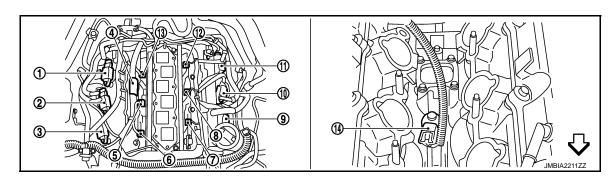
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- 4. Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- 3. Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

EXHAUST VALVE TIMING CONTROL

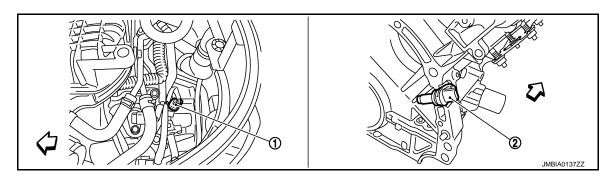
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[VQ25HR FOR MEXICO]

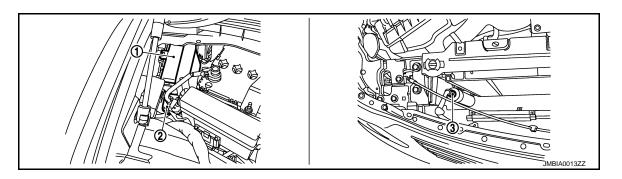
13. Fuel injector No. 5

14. Knock sensor

∀
 □: Vehicle front

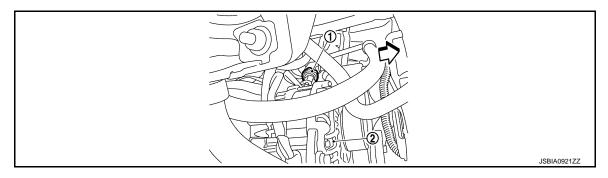


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀ : Vehicle front



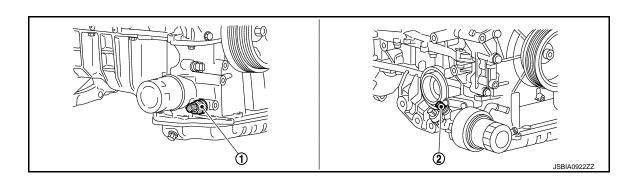
1. IPDM E/R

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



- 1. Power steering pressure sensor
- 2. Alternator

∀ : Vehicle front



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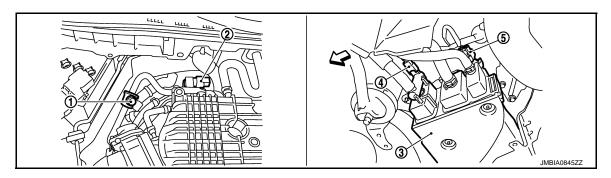
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Engine oil temperature sensor (2WD 2. Ending models)

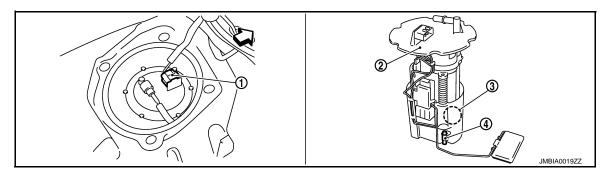
Engine oil temperature sensor (AWD models)



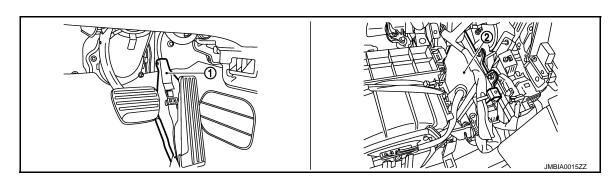
- 1. EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve*
- EVAP control system pressure sensor*

: Vehicle front

* : These parts are not used for engine control



- Fuel level sensor unit and fuel pump harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- 4. Fuel tank temperature sensor
- ∀
 □: Vehicle front



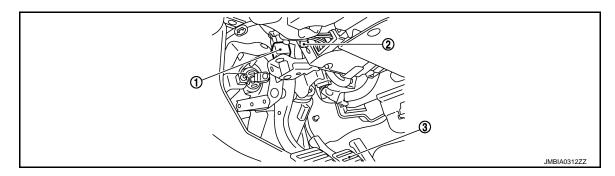
1. Accelerator pedal position sensor

. ECM

EXHAUST VALVE TIMING CONTROL

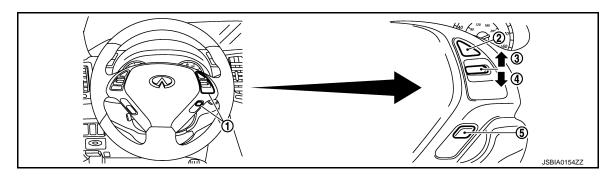
< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]



Stop lamp switch

- 2. ASCD brake switch
- Brake pedal



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

3. RESUME/ACCELERATE switch

Component Description

INFOID:0000000007742403

Component	Reference
Camshaft position sensor (PHASE)	EC-1402, "Description"
Crankshaft position sensor (POS)	EC-1397, "Description"
Engine oil temperature sensor	EC-1382, "Description"
Exhaust valve timing control magnet retarder	EC-1317, "Description"
Exhaust valve timing control position sensor	EC-1436, "Description"

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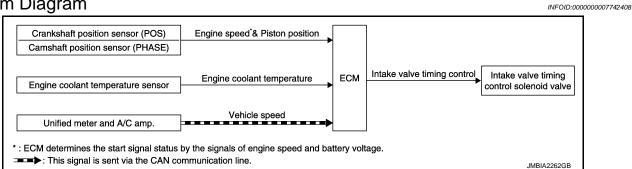
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INTAKE VALVE TIMING CONTROL

System Diagram



System Description

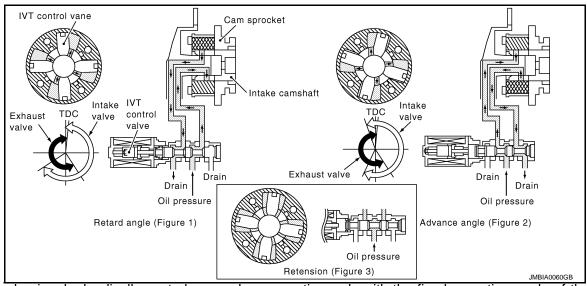
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INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*1 & Piston position		
Camshaft position sensor (PHASE)	Engine speed & Piston position	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Unified meter and A/C amp.	Vehicle speed* ²		

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

SYSTEM DESCRIPTION



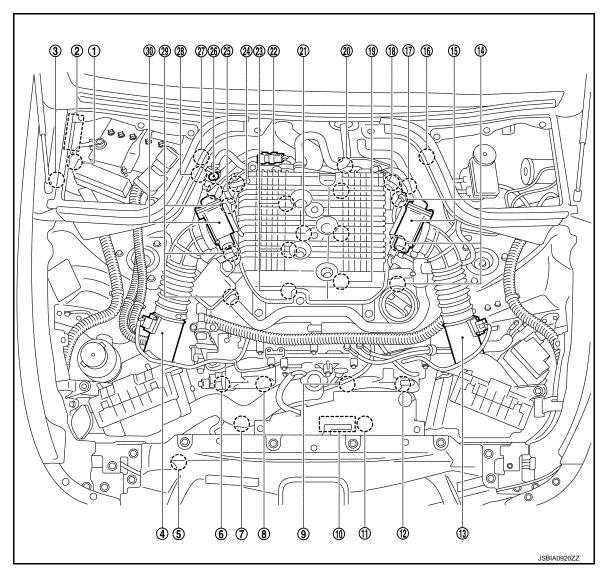
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

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.

^{*2:} This signal is sent to the ECM via the CAN communication line

Component Parts Location

INFOID:0000000007801278



- Battery current sensor
- Mass air flow sensor (with intake air 5. temperature sensor) (bank 1)
- 7. Cooling fan motor-2
- Cooling fan control module
- 13. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 16. A/F sensor 1 (bank 2)
- 19. Fuel injector (bank 2)
- 22. EVAP canister purge volume control solenoid valve
- 25. Exhaust valve timing control position 26. EVAP service port sensor (bank 1)
- 28. Crankshaft position sensor (POS)

- IPDM E/R 2.
- Refrigerant pressure sensor
 - Intake valve timing control solenoid valve (bank 1)
 - Cooling fan motor-1
- Ignition coil (with power transistor) and spark plug (bank 2)
- 17. Exhaust valve timing control position sensor (bank 2)
- Engine coolant temperature sensor 20.
- 23. Fuel injector (bank 1)
- 29. Ignition coil (with power transistor) and spark plug (bank 1)

- 3. Cooling fan relay
- Exhaust valve timing control magnet retarder (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- Exhaust valve timing control magnet retarder (bank 2)
- Electric throttle control actuator 15. (bank 2)
- 18. Camshaft position sensor (PHASE) (bank 2)
- 21. Knock sensor
- 24. Camshaft position sensor (PHASE) (bank1)
- 27. A/F sensor 1 (bank 1)
- (bank 1)

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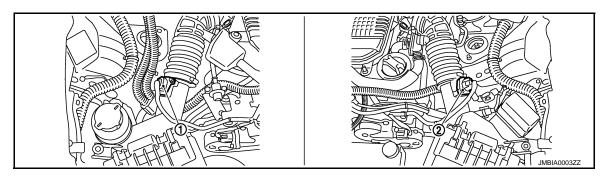
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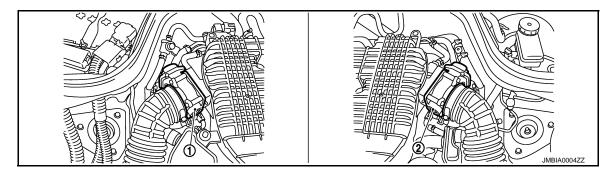
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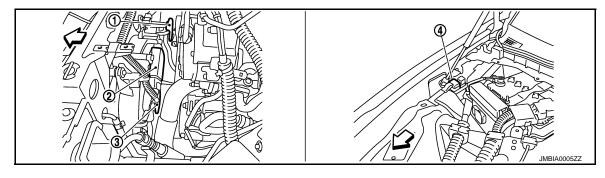
30. Electric throttle control actuator



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



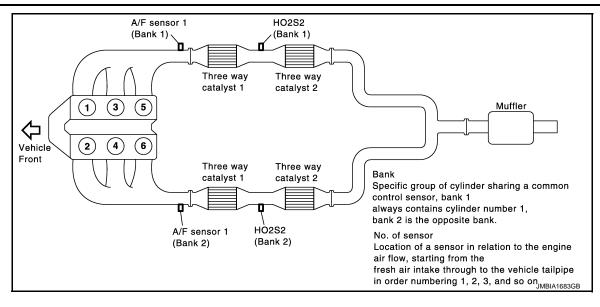
- Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)

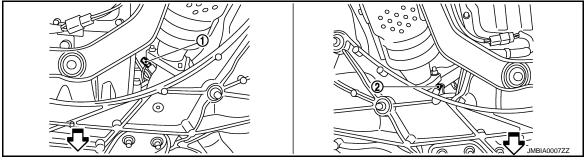


- 1. Cooling fan motor-2
- 2. Cooling fan control module
- 3. Cooling fan motor-1

Cooling fan relay

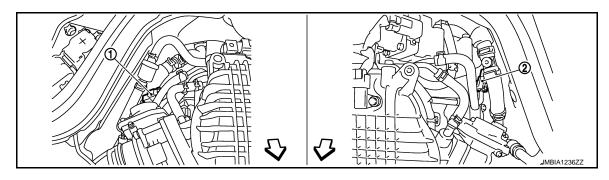
∀
 : Vehicle front





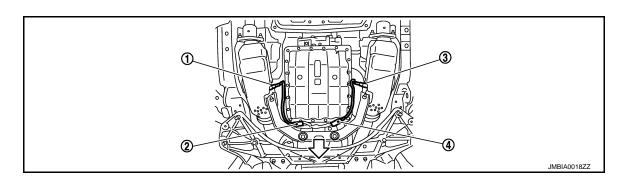
- 1. A/F sensor 1 (bank 2)
- 2. A/F sensor 1 (bank 1)

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 □: Vehicle front



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

∀ : Vehicle front



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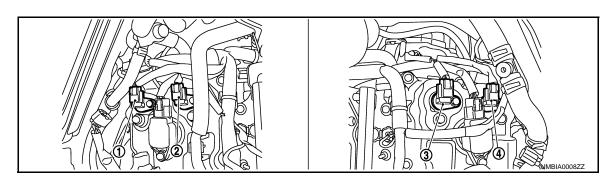
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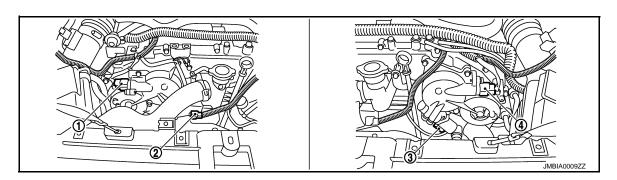
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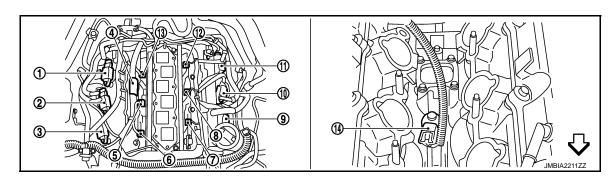
- 1. Heated oxygen sensor (bank 2)
- Heated oxygen sensor (bank 2) har- 3. Heated oxygen sensor (bank 1) ness connector
- 4. Heated oxygen sensor (bank 1) harness connector
- ∀
 □: Vehicle front



- Exhaust valve timing control position 2. sensor (bank 1)
- Exhaust valve timing control position sensor (bank 2)
- Camshaft position sensor (PHASE) (bank 1)
- Camshaft position sensor (PHASE) (bank 2)



- Exhaust valve timing control magnet 2. retarder (bank 1) harness connector
- 4. Exhaust valve timing control magnet retarder (bank 2) harness connector
- Intake valve timing control solenoid valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



- Ignition coil No. 5 (with power transistor)
- 4. Condenser
- 7. Fuel injector No. 2
- 10. Ignition coil No. 4 (with power transistor)
- 2. Ignition coil No. 3 (with power transistor)
- 5. Fuel injector No. 3
- 8. Fuel injector No. 4
- 11. Ignition coil No. 6 (with power transistor)
- Ignition coil No. 1 (with power transistor)
- 6. Fuel injector No. 1
- Ignition coil No. 2 (with power transistor)
- 12. Fuel injector No. 6

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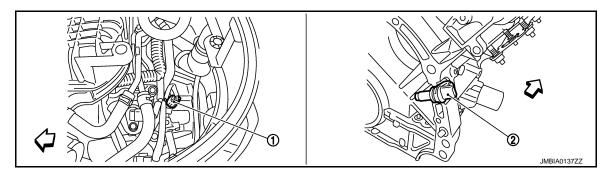
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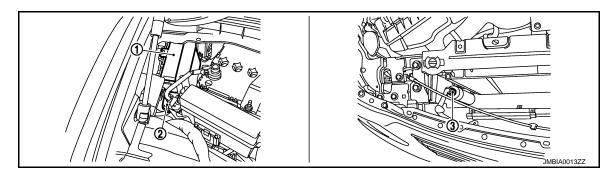
13. Fuel injector No. 5

14. Knock sensor

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 □: Vehicle front

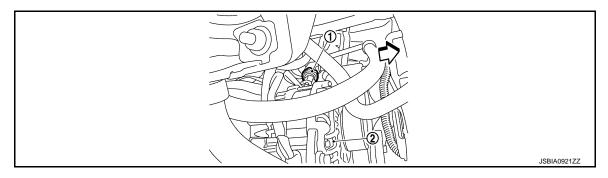


- 1. Engine coolant temperature sensor 2. Crankshaft position sensor (POS)
- ∀ : Vehicle front



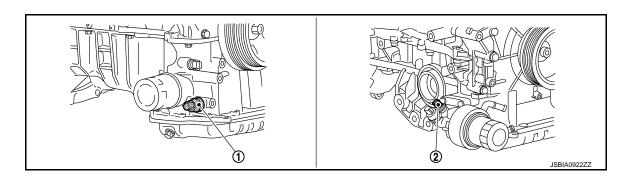
1. IPDM E/R

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

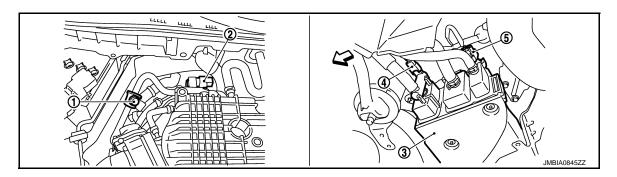


- 1. Power steering pressure sensor
- 2. Alternator

∀ : Vehicle front

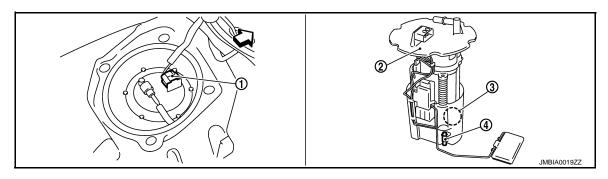


Engine oil temperature sensor (2WD 2. Engine oil temperature sensor (AWD models)

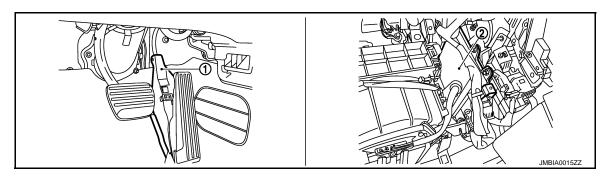


- EVAP service port
- EVAP canister purge volume control 3. EVAP canister solenoid valve
- 4. EVAP canister vent control valve*
- EVAP control system pressure sensor*

- : Vehicle front
- * : These parts are not used for engine control



- Fuel level sensor unit and fuel pum harness connector
- Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator
- 4. Fuel tank temperature sensor
- ∀
 □: Vehicle front



- 1. Accelerator pedal position sensor
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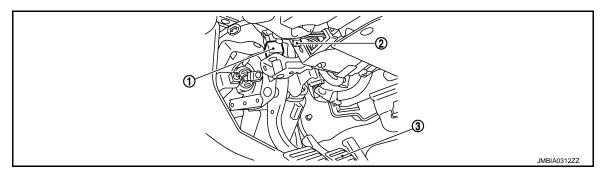
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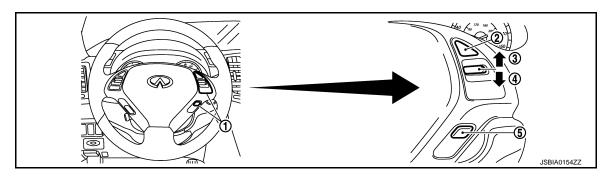
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- Stop lamp switch
- 2. ASCD brake switch
- Brake pedal



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

3. RESUME/ACCELERATE switch

Component Description

INFOID:0000000007742411

Component	Reference
Camshaft position sensor (PHASE)	EC-1402, "Description"
Crankshaft position sensor (POS)	EC-1397, "Description"
Engine coolant temperature sensor	EC-1329, "Description"
Intake valve timing control solenoid valve	EC-1314, "Description"

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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000007742412

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in ECU memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

GST (Generic Scan Tool)

INFOID:0000000007742413

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to EC-1268. "Diagnosis Description".

NOTE:

Service \$0A is not applied for regions where it is not mandated.

[VQ25HR FOR MEXICO]

DIAGNOSIS SYSTEM (ECM) DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION: 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:0000000007742414

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 when 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.

×: Applicable —: Not applicable

		M	IL		D.	TC	1st trip DTC		
Items	1s ⁻	t trip	2nc	l trip	1st trip	2nd trip	1st trip	2nd trip display- ing	
	Blinking	Illuminat- ed	Blinking	Illuminat- ed	displaying	displaying	displaying		
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 (Refer to EC-1563, "DTC Index".)	_	×	_	_	×	_	_	_	
Except above	_	_	_	×	_	×	×		

DIAGNOSIS DESCRIPTION: DTC and Freeze Frame Data

INFOID:0000000007742415

DTC AND 1ST TRIP DTC

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 light up (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 saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored 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 light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

For malfunctions in which 1st trip DTCs are displayed, refer to EC-1563, "DTC Index". 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.

1st trip DTC is specified in Service \$07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.

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 EC-1169, "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 or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

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< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

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 stored 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. 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		
2	Except the above items			
3	1st trip freeze frame data			

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 can be stored in the ECM). If freeze frame data is stored in the ECM memory and 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.

DIAGNOSIS DESCRIPTION: Counter System

INFOID:0000000007742416

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 come on.
- The MIL will turn OFF after the vehicle is driven 3 times (driving pattern B) with no malfunction. The 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.
- 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 CONSULT 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.

COUNTER SYSTEM CHART

Items	Fuel Injection System	Misfire	Other
MIL (turns OFF)	3 (pattern B)	3 (pattern B)	3 (pattern B)
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)
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>", "Fuel Injection System"

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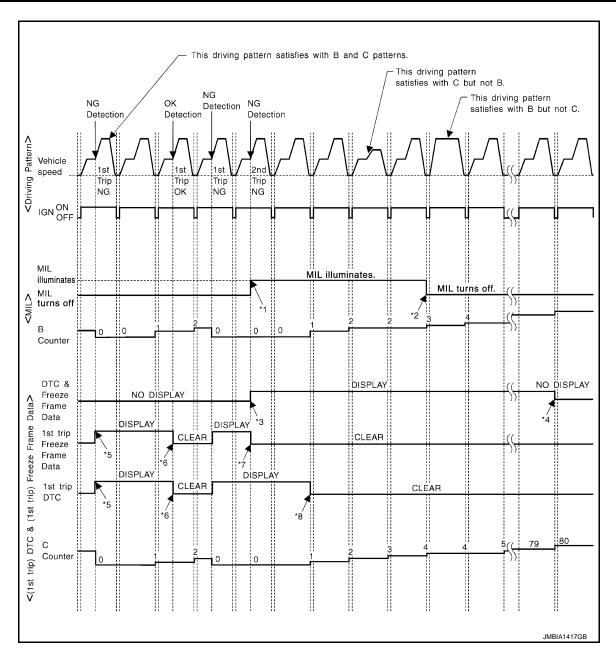
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- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and 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 driv- *3: When the same malfunction is deen 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.
- tected 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

Refer to EC-1273, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern C

Refer to EC-1273, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Example:

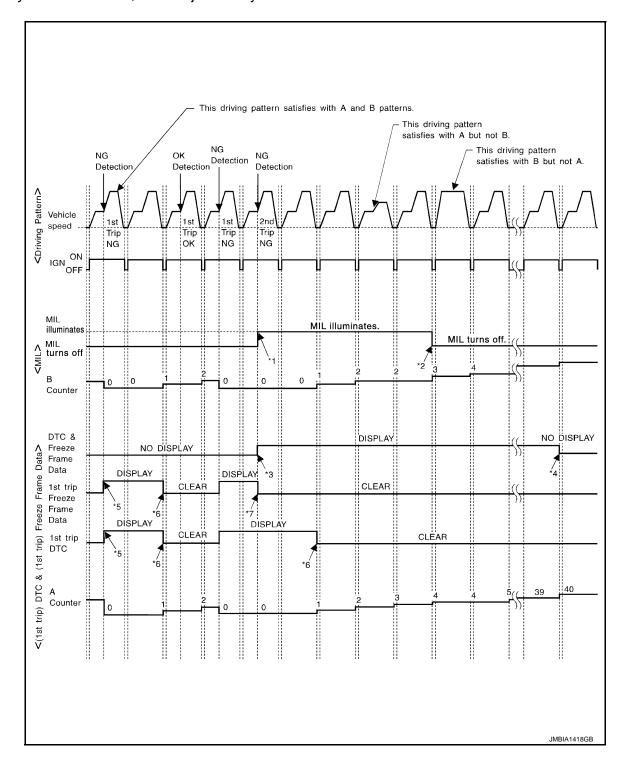
If the stored freeze frame data is as per the following:

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: more than 70° C (158° F)

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For "Misfire <Exhaust Quality Deterioration>", "Fuel Injection System"



< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

- *1: When the same malfunction is detected in two consecutive trips, MIL will light up.
- *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
- *7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

still remain in ECM.)

- *2: MIL will turn OFF after vehicle is driv- *3: When the same malfunction is deen 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.
- tected in two consecutive trips, the DTC and the 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.

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

Driving Pattern A

Refer to EC-1273, "DIAGNOSIS DESCRIPTION: Driving Pattern".

Driving Pattern B

Refer to EC-1273, "DIAGNOSIS DESCRIPTION: Driving Pattern".

DIAGNOSIS DESCRIPTION: Driving Pattern

INFOID:0000000007742417

CAUTION:

Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A.

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 120 km/h (44 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 60 km/h (19 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- A lapse of 22 minutes or more after engine start.

NOTE:

- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:

The following conditions should be satisfied at the same time:

Engine speed: (Engine speed in the freeze frame data) ±375 rpm

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< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%] Engine coolant temperature condition:

- When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE:

- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DIAGNOSIS DESCRIPTION: System Readiness Test (SRT) Code

INFOID:0000000007742418

System Readiness Test (SRT) code is specified in Service \$01 of SAE J1979/ISO 15031-5.

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:

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.

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.

	Self-diagnosis result		Example							
Self-diag			\leftarrow ON \rightarrow	on cycle $OFF \leftarrow ON \rightarrow OF$	FF ← ON →					
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"				

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				Example			
Self-diagnosis result		Diagnosis	Diagnosis $ \begin{array}{c} \text{Ignition cycle} \\ \leftarrow \text{ON} \rightarrow \text{ OFF } \leftarrow \text{ON} \rightarrow \text{ OFF } \leftarrow \text{ON} \rightarrow \text{ OFF} \end{array} $				
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.

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.
- During SRT driving pattern, the 1st trip DTC (NG) is detected prior to "CMPLT" of SRT and the self-diagnosis
 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".

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

When emission-related ECU detects a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions), it turns on/blinks MIL to inform the driver that a malfunction has been detected.

 The MIL illuminates when ignition switch is turned ON (engine is not running).

NOTE:

Check the MIL circuit if MIL does not illuminate. Refer to <u>EC-1533</u>, "Component Function Check".

2. When the engine is started, the MIL should go off.

NOTE:

If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.

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Diagnostic test mode	Function
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to <u>EC-1179</u> , "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-1179, "THROTTLE VALVE CLOSED POSITION LEARNING: Description".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Description".
Exhaust valve timing control learning	ECM can learn the exhaust valve timing. Refer to EC-1182, "EXHAUST VALVE TIMING CONTROL LEARNING: Description".

BULB CHECK MODE

Description

This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).

Operation Procedure

- 1. Turn ignition switch ON.
- 2. The MIL on the instrument panel should stay ON.

 If it remains OFF, check MIL circuit. Refer to <u>EC-1533</u>, "<u>Diagnosis Procedure</u>".

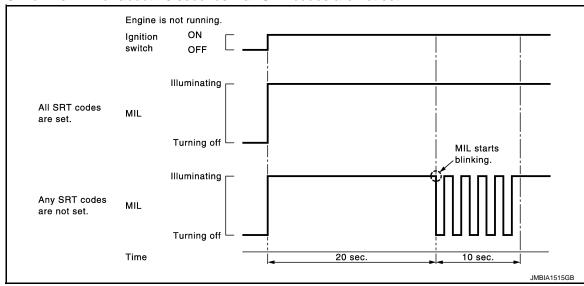
SRT STATUS MODE

Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to EC-1274, "DIAGNOSIS DESCRIPTION: System Readiness Test (SRT) Code".

Operation Procedure

- Turn ignition switch ON and wait 20 seconds.
- SRT status is indicated as shown blow.
 - ECM continues to illuminate MIL if all SRT codes are set.
 - ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

Turn ignition switch ON.

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

- 2. Check that MIL illuminates.
 - If it remains OFF, check MIL circuit. Refer to EC-1533, "Diagnosis Procedure".
- 3. Start engine and let it idle.
 - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
 - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
 - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MIL is blinking.

How to Set Self-diagnostic Results 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.
- After ignition switch is turned off, ECM is always released from the "self-diagnostic results" mode.
- 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:

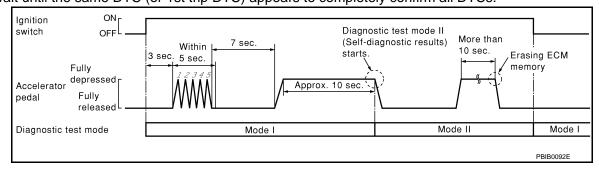
Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.

4. Fully release the accelerator pedal.

ECM has entered to "Self-diagnostic results" mode.

NOTE:

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



How to Read Self-diagnostic Results

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 "malfunction warning" mode, it is a DTC; if two or more codes are displayed, they may be either

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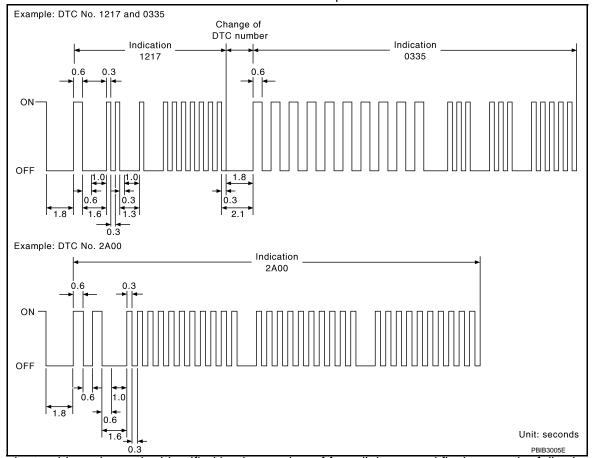
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DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.



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	Е	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. Refer to <u>EC-1563</u>, "DTC Index".

How to Erase Self-diagnostic Results

By performing this procedure, ECM memory is erased and the following diagnostic information is erased as well.

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

NOTE:

Also, if a battery terminal is disconnected, ECM memory is erased and the diagnostic information as listed above is erased. (The amount of time required for erasing may vary from a few seconds to several hours.)

- 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.

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

- Turn ignition switch ON.
- Set ECM in "self-diagnostic results" mode. 5.
- The diagnostic information has been erased from the backup memory in the ECM. Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
- Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT Function

INFOID:0000000007742421

FUNCTION

Diagnostic test mode	Function
Self Diagnostic Result	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.
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
ECU Identification	ECM part number can be read.
DTC Work support	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.

- *: The following emission-related diagnostic information is 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

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-1563, "DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in "self-diag results".

- When ECM detects a 1st trip DTC, 1t" is displayed for "TIME".
- When ECM has detected a current DTC, "0" is displayed for "TIME".
- If "TIME" is neither "0" nor "1t", the DTC occurred in the past and ECM shows the number of times the vehicle has been driven since the last detection of the DTC.

How to Erase DTC and 1st Trip DTC

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 EC-1563, "DTC Index"), skip step 1.
- Erase DTC in TCM. Refer to TM-242, "DTC Index".
- Select "ENGINE" with CONSULT.
- 3. Select "SELF-DIAG RESULTS".
- Touch "ERASE". (DTC in ECM will be erased.)

Freeze Frame Data and 1st Trip Freeze Frame Data

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Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-1563, "DTC_Index".)
FUEL SYS-B1	"Fuel injection system status" at the moment a malfunction is detected is displayed.
FUEL SYS-B2	One mode in the following 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
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 schedule.
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.
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.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	
COMBUST CONDI- TION	These items are displayed but are not applicable to this model.

^{*:} The items are the same as those of 1st trip freeze frame data.

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". 		

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

Monitored item	Unit	Description	Remarks	
COOLAN TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine coolant tempera- ture sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The en- gine coolant temperature determined by the ECM is displayed.	
A/F SEN1 (B1)		The A/F signal computed from the input signal of		
A/F SEN1 (B2)	V	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) HO2S2 MNTR (B2)	RICH/LEAN	Display of heated oxygen sensor 2 signal: 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.	
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from unified meter and A/C amp. 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	
ACCEL SEN 2	V	age is displayed.	ECM internally. Thus, they differs from ECM terminal voltage signal.	
TP SEN 1-B1		The throttle position conser signal valtage is dis-	TP SEN 2-B1 signal is converted by	
TP SEN 2-B1	V	The throttle position sensor signal voltage is displayed.	ECM internally. Thus, they differs 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 sen- sor) is indicated.		
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 displayed regardless of the starter signal.	
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 conditioner switch as determined by the air conditioner signal.		
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral 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 lighting 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.		
BRAKE SW	ON/OFF	Indicates [ON/OFF] condition from the stop lamp switch signal.		

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

Monitored item	Unit	Description	Remarks	
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 signals.	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.		
MASS AIRFLOW	g/s	Indicates the mass air flow computed by ECM according 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)	- CA	gle.		
EXH/V TIM B1	2004	Ladicates [OCA] of subsuret constant materials and		
EXH/V TIM B2	°CA	Indicates [°CA] of exhaust camshaft retard angle.		
INT/V SOL (B1)		The control value of the intake valve timing con-		
INT/V SOL (B2)	%	 trol solenoid valve (determined by ECM according to the input signals) is indicated. The advance angle becomes larger as the value increases. 		
VTC DTY EX B1		The control value of the exhaust valve timing con-		
VTC DTY EX B2	%	 trol magnet retarder (determined by ECM according to the input signals) is indicated. The retard 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 FOM integrally. Thus, the walling are	
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 (determined 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. 		
THRTL RELAY	ON/OFF	Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.		
HO2S2 HTR (B1)	211/2	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 input 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	Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.		
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by the signal voltage of the engine oil temperature sen- sor) is displayed.		

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

Monitored item	Unit	Description	Remarks	Λ
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.		А
A/F S1 HTR (B1)		Air fuel ratio (A/F) sensor 1 heater control value		
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. 		EC
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.		С
VHCL SPEED SE	km/h or mph	 The vehicle speed computed from the vehicle speed signal sent from unified meter and A/C amp. is displayed. 		D
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.		
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from MAIN switch signal.		Е
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.		F
SET SW	ON/OFF	Indicates [ON/OFF] condition from SET/COAST switch signal.		G
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.		Н
DIST SW	ON/OFF	Indicates [ON/OFF] condition from DISTANCE switch signal.		ı
VHCL SPD CUT	NON/CUT	Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.		J
LO SPEED CUT	NON/CUT	Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.		K
AT OD MONITOR	ON/OFF	Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.		
AT OD CANCEL	ON/OFF	Indicates [ON/OFF] condition of A/T O/D cancel request signal.		M
CRUISE LAMP	ON/OFF	Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.		Ν
SET LAMP	ON/OFF	Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.		0
EXH V/T LEARN	YET/CMPLT	Display the condition of Exhaust Valve Timing Control Learning YET: Exhaust Valve Timing Control Learning has not been performed yet. CMPLT: Exhaust Valve Timing Control Learning has already been performed successfully.		Р
BAT CUR SEN	mV	The signal voltage of battery current sensor is displayed.		

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

Monitored item	Unit	Description	Remarks
ALT DUTY SIG	ON/OFF	The control condition of the power generation voltage variable control (determined by ECM according 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		Indicates the correction of factor stored in ECM. The factor is calculated form the difference by	
A/F ADJ-B2	_	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 signals.	
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.	
THRTL STK CNT B1	These items	are displayed but are not applicable to this model.	

NOTE:

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

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
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
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
SELF-LEARNING CONT	THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEF- FICIENT.	When clearing mixture ratio self- learning value
EXH V/T CONTROL LEARN	IN THIS MODE, OPERATION TO LEARN EXHAUST VALVE TIMING CONTROL MAGNET RETARDER CHARACTERISTIC.	When learning the exhaust valve timing control
TARGET IDLE RPM ADJ*	IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	IDLE CONDITION	When adjusting target ignition timing
CLSD THL POS LEARN	IGNITION ON AND ENGINE STOPPED.	When learning the throttle valve closed position

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

ACTIVE TEST MODE

Test Item

[VQ25HR FOR MEXICO]

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJEC- TION	Engine: Return to the original non-standard condition Change the amount of fuel injection using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectors Fuel injector Air fuel ratio (A/F) sensor 1
IGNITION TIM- ING	Engine: Return to the original non-standard condition Timing light: Set Retard the ignition timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
POWER BAL- ANCE	 Engine: After warming up, idle the engine. A/C switch OFF Selector lever: P or N Cut off each injector signal one at a time using CONSULT. 	Engine runs rough or dies.	Harness and connectors Compression Fuel injector Power transistor Spark plug Ignition coil
ENG COOLANT TEMP	 Engine: Return to the original non-standard condition Change the engine coolant tem- perature using CONSULT. 	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectorsEngine coolant temperature sensorFuel injector
FUEL PUMP RE- LAY	 Ignition switch: ON (Engine stopped) Turn the fuel pump relay ON and OFF using CONSULT and listen to operating sound. 	Fuel pump relay makes the operating sound.	Harness and connectors Fuel pump relay
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 CONSULT. 	Engine speed changes according to the opening percent.	Harness and connectors Solenoid valve
FUEL/T TEMP SEN	Change the fuel tank temperature	using CONSULT.	
VENT CON- TROL/V	Ignition switch: ON (Engine stopped) Turn solenoid valve ON and OFF with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	Harness and connectors Solenoid valve
INT V/T ASSIGN ANGLE	Engine: Return to the original non-standard condition Change intake valve timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectors Intake valve timing control solenoid valve
EXH V/T ASSIGN ANGLE	Engine: Return to the original non-standard condition Change exhaust valve timing using CONSULT.	If malfunctioning symptom disappears, see CHECK ITEM.	Harness and connectors Exhaust valve timing control magnet retarder
FAN DUTY CON- TROL*	Ignition switch: ON Change duty ratio using CON-SULT.	Cooling fan speed changes.	Harness and connectors Cooling fan motor Cooling fan relay Cooling fan control module IPDM E/R
ALTERNATOR DUTY	Engine: Idle Change duty ratio using CON- SULT.	Battery voltage changes.	Harness and connectors IPDM E/R Alternator

^{*:} Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

< SYSTEM DESCRIPTION >

[VQ25HR FOR MEXICO]

- For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT screen; for items whose SRT codes are not set, "INCMP" is displayed.
- "SRT STATUS" provides the presence of absence of Permanent DTCs stored in ECM memory.

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
	A/F SEN1 (B1) P1278/P1279	P0133	EC-1348
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-1336
AVE SEINT	A/F SEN1 (B2) P1288/P1289	P0153	EC-1348
	A/F SEN1 (B2) P1286	P0150	EC-1336
	HO2S2 (B1) P1146	P0138	EC-1359
	HO2S2 (B1) P1147	P0137	EC-1353
HO2S2	HO2S2 (B1) P0139	P0139	EC-1367
HO252	HO2S2 (B2) P1166	P0158	EC-1359
	HO2S2 (B2) P1167	P0157	EC-1353
	HO2S2 (B2) P0159	P0159	EC-1367

^{*:} DTC P1442 and P1456 does not apply to V36 models but appears in DTC Work Support Mode screens.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description INFOID:0000000007742422

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" in "DATA MONI-TOR" mode of CONSULT 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 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 light 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-
- 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

Check that all of the following conditions are satisfied.

TESTING CONDITION

- 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)
- Atmospheric temperature: 20 30°C (68 86°F)
- Engine coolant temperature: 75 95°C (167 203°F)
- Transmission: Warmed-up
- After the engine is warmed up to normal operating temperature, drive vehicle until "ATF TEMP SE 1" (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- · Engine speed: Idle

>> GO TO 2.

2.PERFORM SPEC IN DATA MONITOR MODE

(P)With CONSULT

NOTE:

Perform "SPEC" in "DATA MONITOR" mode in maximum scale display.

- 1. Perform EC-1174, "BASIC INSPECTION: Special Repair Requirement".
- 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.
- Check that monitor items are within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Go to EC-1288, "Diagnosis Procedure".

EC-1287 Revision: 2013 February 2012 G Sedan

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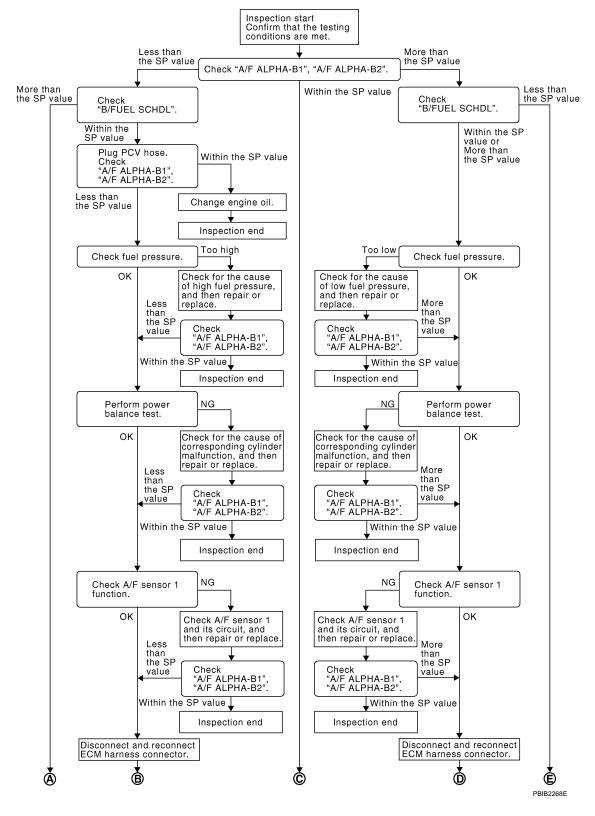
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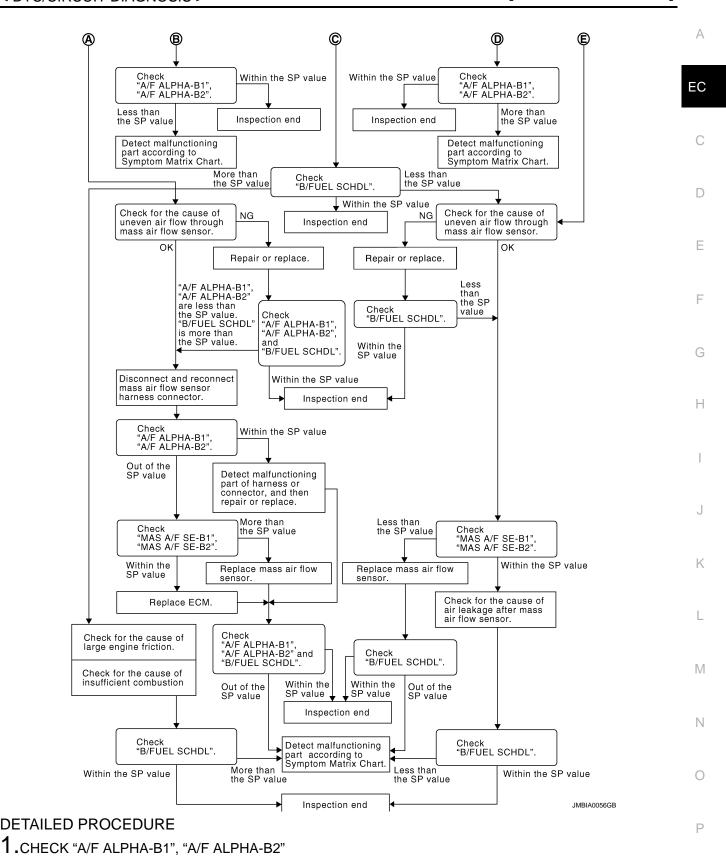
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Diagnosis Procedure

INFOID:0000000007742424

OVERALL SEQUENCE





(I) With CONSULT

- Start engine.
- 2. Confirm that the testing conditions are met. Refer to EC-1287, "Component Function Check".
- 3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that the each indication is within the SP value.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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 check 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 check 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.

f 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 check that the 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.
- 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 condition.

>> INSPECTION END

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-1586. "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. Refer to FL-6, "Removal and Installation".

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

7. 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. Refer to FL-6. "Removal and Installation".

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

TROUBLE DIAGNOSIS - SPECIFICATION VALUE [VQ25HR FOR MEXICO] < DTC/CIRCUIT DIAGNOSIS > $8.\mathsf{CHECK}$ "A/F ALPHA-B1", "A/F ALPHA-B2" Α 1. Start engine. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and check that the each indication is within the SP value. EC Is the measurement value within the SP value? YES >> INSPECTION END NO >> GO TO 9. 9. PERFORM POWER BALANCE TEST Perform "POWER BALANCE" in "ACTIVE TEST" mode. Make sure that the each cylinder produces a momentary engine speed drop. D Is the inspection result normal? YES >> GO TO 12. Е NO >> GO TO 10. 10.DETECT MALFUNCTIONING PART Check the following. Ignition coil and its circuit (Refer to <u>EC-1527</u>, "Component Function Check".) Fuel injector and its circuit (Refer to EC-1521, "Component Function Check".) Intake air leakage Low compression pressure (Refer to <u>EM-168, "Inspection"</u>.) Is the inspection result normal? YES >> Replace fuel injector and then GO TO 11. Refer to EM-189, "Removal and Installation". NO >> Repair or replace malfunctioning part and then GO TO 11. 11.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 check that the each indication is within the SP value. Is the measurement value within the SP value? YES >> INSPECTION END NO >> GO TO 12. 12.CHECK A/F SENSOR 1 FUNCTION K Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1. For DTC P0130, P0150, refer to <u>EC-1336, "DTC Logic"</u>. For DTC P0131, P0151, refer to EC-1340, "DTC Logic". For DTC P0132, P0152, refer to <u>EC-1344, "DTC Logic"</u>. For DTC P0133, P0153, refer to <u>EC-1348, "DTC Logic"</u>. Is any DTC detected? YES >> GO TO 13. NO >> GO TO 15. 13.check a/f sensor 1 circuit N 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 check that the each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

Revision: 2013 February EC-1291 2012 G Sedan

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

- 1. Stop the engine.
- 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"

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> Detect malfunctioning part according to EC-1574, "Symptom Table".

17. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and check 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 check that the 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. 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 >

[VQ25HR FOR MEXICO]

>> GO TO 22.

22.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 check that the each indication is within the SP value.

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Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-1321, "Diagnosis Procedure". Then GO TO 29.

NO >> GO TO 23.

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 check that the indication is within the SP value.

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 TO 29. Refer to EM-179, "Exploded View".

24.REPLACE ECM

1. Replace ECM. Refer to EC-1191, "Component Parts Location".

2. Go to <u>EC-1177</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> GO TO 29.

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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 of air cleaner element
- · Uneven dirt of air cleaner element
- Improper specification of 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 check that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END

>> 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 check that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 28.

NO

NO >> Less than the SP value: Replace malfunctioning mass air flow sensor, and then GO TO 30. Refer to EM-179, "Exploded View".

28. CHECK INTAKE SYSTEM

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 of PCV valve

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of 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 check that the 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-1574</u>. "Symptom Table".

30. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and then check 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 EC-1574, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

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1. CHECK GROUND CONNECTION-I

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between ECM harness connector and ground.

E	СМ	Ground	Continuity	
Connector	Connector Terminal		Continuity	
F101	8			
M107	123		Existed	
	124	Ground		
	127			
	128			

3. Also check harness for short to power.

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F103, M116
- · Harness for open or short between ECM and ground

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

4. CHECK ECM POWER SUPPLY CIRCUIT-I

- 1. Reconnect ECM harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between ECM harness connector and ground.

+		-	_	Voltage
Connector	Terminal	Connector	Terminal	
F102	53	M107	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- IPDM E/R harness connector E7
- 10 A fuse (No. 44)
- Harness for open or short between ECM and fuse

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

6.CHECK ECM POWER SUPPLY CIRCUIT-II

- Turn ignition switch OFF and wait at least 10 seconds.
- 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 voltage will exist for a few seconds, then drop approximately 0 V.

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 9.

7.CHECK ECM POWER SUPPLY CIRCUIT-III

- Turn ignition switch ON.
- Check the voltage between IPDM E/R harness connector and ground.

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

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".

8.CHECK INTERMITTENT INCIDENT

Refer to GI-46, "Circuit Inspection".

>> INSPECTION END

9. CHECK ECM POWER SUPPLY CIRCUIT-III

- Turn ignition switch OFF and wait at least 10 seconds.
- 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-iv

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F101	24	E7	69	Existed

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

< DTC/CIRC	UII DIAGNO	SIS >				
4. Also ched	ck harness for	short to grou	nd and short	to power.		
Is the inspect				·		Α
YES >> G	O TO 12.					
	SO TO 11.					
11.DETECT	MALFUNCT	IONING PART	Γ			EC
Check the foll	lowing.					
Harness or						С
Harness orHarness for			M and IPDM	E/D		
Tiamess for	open or snor	between Lo	ivi and ii bivi	L/11		
>> R	epair open ci	rcuit or short t	o around or s	short to power	in harness or connectors.	D
12. CHECK			9.00a 0. c			
1		No FO) from I	DDM E/D			Е
2. Check 15	ct 15 A fuse (5 A fuse.	140. 50) 110111 1	PDIVI E/K.			_
Is the inspect		nal?				
•	O TO 15.					F
	Replace 15 A f					
13.CHECK	ECM POWER	R SUPPLY CII	RCUIT-IV			
	ct ECM harne					G
	ct IPDM E/R I			ootor and IDD	M E/D barness connector	
3. Check the	e continuity be	etween ECM i	iamess com	iector and IPD	M E/R harness connector.	Н
F(CM	IPDM	1 F/R			
Connector	Terminal	Connector	Terminal	Continuity		
M107	125	E7	49	Existed		I
4. Also ched	ck harness for	short to arou				
Is the inspect						J
· ·	O TO 15.					
	SO TO 14.					12
14.DETECT	Γ MALFUNCT	IONING PAR	Τ			K
Check the foll	lowing.					
Harness or			M and IDDM	E/D		L
 Harness for 	open or snor	between EC	ivi and ipdivi	E/R		
~~ R	enair onen ci	rcuit or short t	o around or s	short to nower	in harness or connectors.	
15.check			-	short to power	in namess of connectors.	M
			I			
Refer to GI-43						Ν
Is the inspect YES >> R			DCC 24 "Da	amoual and Inc	atallation"	
				emoval and Instance in the second sec	in harness or connectors.	
			5	1 -		0
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[VQ25HR FOR MEXICO]

U0101 CAN COMM CIRCUIT

Description INFOID:0000000007742426

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

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 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-1298, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742428

Go to LAN-17. "Trouble Diagnosis Flow Chart".

U1001 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

U1001 CAN COMM CIRCUIT

Description INFOID:0000000007742429

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

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 communication 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 1st trip DTC.

Is DTC detected?

YES >> EC-1299, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Revision: 2013 February

Go to LAN-17, "Trouble Diagnosis Flow Chart".

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[VQ25HR FOR MEXICO]

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-1314, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0011	Intake valve timing control performance (bank 1)		Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Intake valve timing control solenoid valve
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

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 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

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

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	P or N position

- Let engine idle for 10 seconds.
- Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-1301, "Diagnosis Procedure"

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

(P)With CONSULT

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

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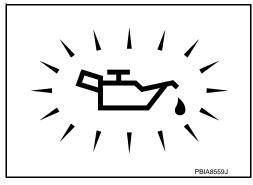
	PUUTI, PUUZITVI CONTROL		
< DTC/CIRCUIT DIAG	GNOSIS >	[VQ2	
ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)		
COOLAN TEMP/S	More than 60°C (140°F)		
Selector lever	1st or 2nd position		
Driving location uphill	Driving vehicle uphill		
Is 1st trip DTC detecte YES >> Go to EC- NO >> INSPECTI	C. With CONSULT" above. d? 1301, "Diagnosis Procedure" ION END		
Diagnosis Proced	ure		
1.CHECK OIL PRESS	SURE WARNING LAMP		
 Start engine. Check oil pressur 	re warning lamp and confirm it is not illumi-		

nated.

Is oil pressure warning lamp illuminated?

>> Go to LU-9, "Inspection". YES

NO >> GO TO 2.



2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-1302, "Component Inspection",

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-1400, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS). Refer to EM-273, "Exploded View".

f 4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1406, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

>> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-246, "Exploded View". NO

5.CHECK CAMSHAFT (INTAKE)

Check the following.

P0011, P0021 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

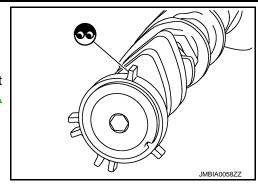
- · Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 6.

NO

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-246, "Exploded View".



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".

NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to EM-73. "Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742434

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- 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		
1 and 2	7.0 - 7.7 Ω [at 20°C (68°F)]		
1 or 2 and ground	${}^{\infty}\Omega$ (Continuity should not exist)		

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-50, "Exploded View.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

P0011, P0021 IVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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

CAUTION:

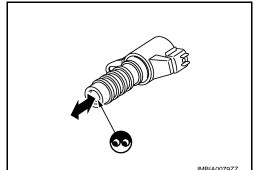
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

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. Refer to EM-50, "Exploded View".



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[VQ25HR FOR MEXICO]

P0014, P0024 EVT CONTROL

DTC Logic

DTC DETECTION LOGIC

NOTE:

- If DTC P0014 or P0024 is displayed with DTC P0078, P0084 first perform trouble diagnosis for DTC P0078, P0084. Refer to <u>EC-1317</u>, "<u>DTC Logic"</u>.
- If DTC P0014 or P0024 is displayed with P1078, P1084 first perform trouble diagnosis for P1078, P1084. Refer to <u>EC-1436</u>, "<u>DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0014	Exhaust valve timing control performance (bank 1)		Crankshaft position sensor (POS) Camshaft position sensor (PHASE) Exhaust valve timing control position sensor
P0024	Exhaust valve timing control performance (bank 2)	There is a gap between angle of target and phase-control angle degree.	 Exhaust valve control magnet retarder Accumulation of debris to the signal pick-up portion of the camshaft Timing chain installation Exhaust valve timing control pulley assembly

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 V and 16 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

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

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	D position

- 4. Let engine idle for 10 seconds.
- 5. Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-1305, "Diagnosis Procedure"

NO >> GO TO 3.

3.perform dtc confirmation procedure-ii

(P)With CONSULT

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

P0014, P0024 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

ENG SPEED	1,500 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	Mara than 60°C (140°E)
COOLAN TEIVIP/S	More than 60°C (140°F)
Selector lever	1st or 2nd position
Ocicetor level	13t of Zha position
	Driving vehicle uphill
Driving location uphill	(Increased engine load will help maintain the driving
Driving location aprilii	,
	conditions required for this test.)

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CAUTION:

Always drive at a safe speed.

Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-1305, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742436

1. CHECK FUNCTION OF EXHAUST VALVE TIMING CONTROL

(II) With CONSULT

- Turn ignition switch ON.
- Select "EXH V/T ASSIGN ANGLE" in "ACTIVE TEST" mode with CONSULT.
- Start engine and keep the engine speed at 2,500 rpm, then touch "START".
- 4. Check that the values of "EXH/V TIM B1" and "EXH/V TIM B2" change when touching "UP" or "DOWN".

⋈ Without CONSULT

- 1. Start engine and rev engine up above 1,500 rpm.
- Read the voltage signal between ECM harness connector terminals as follows with an oscilloscope.

ECM				
	+	_		Voltage signal
Connector	Terminal	Connector	Terminal	
F101	6 [EVT control magnet retarder (bank 1) signal] 7 [EVT control magnet retarder (bank 2) signal]	M107	128	5V/div JMBIA0034GB

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 2.

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2.CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

Refer to EC-1306, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

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3.replace exhaust valve timing control magnet retarder

- 1. Replace malfunctioning exhaust valve timing control magnet retarder. Refer to <u>EM-69</u>, "Removal and <u>Installation"</u>.
- Perform EC-1182, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

[VQ25HR FOR MEXICO]

4.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Refer to EC-1439, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning exhaust valve timing control position sensor. Refer to EM-47, "Exploded View".

5. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-1400, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-96, "2WD : Exploded View"</u> (2WD models) or <u>EM-99, "AWD : Exploded View"</u> (AWD models).

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1406, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-47, "Exploded View".

7.CHECK CAMSHAFT (EXH)

Check the following.

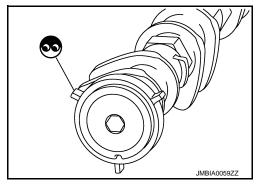
- Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 8.

NO

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-69, "Removal and Installation".



8. 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".

NO >> GO TO 9.

9. REPLACE EXHAUST VALVE TIMING CONTROL PULLEY ASSEMBLY

- 1. Replace exhaust valve timing control pulley assembly and exhaust valve timing control magnet retarder. Refer to <u>EM-51</u>, "Removal and Installation" and <u>EM-69</u>, "Removal and Installation".
- 2. Perform EC-1182, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742437

1. CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

1. Turn ignition switch OFF.

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P0014, P0024 EVT CONTROL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

- Disconnect exhaust valve timing control magnet retarder harness connector.
- Check resistance between exhaust valve timing control magnet retarder terminals as follows.

Terminals	Resistance		
1 and 2	9.0 - 11.0 Ω [at 20°C (68°F)]		

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Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2. C

2.replace exhaust valve timing control magnet retarder

- Replace malfunctioning exhaust valve timing control magnet retarder. Refer to EM-69, "Removal and
- Perform EC-1182, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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

Description INFOID:000000007742438

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	Air fuel ratio (A/F) sensor 1
Mass air flow sensor	Amount of intake air	TICALOT COTILION	noator

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

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 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-1309, "Diagnosis Procedure".

NG >> INSPECTION END

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Diagnosis Procedure

INFOID:0000000007742440

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect air fuel ratio (A/F) sensor 1 harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
DIC	Bank	Connector			voltage
P0031, P0032	1	F66	4	Ground	Battery voltage
P0051, P0052	2	F67	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 E25, F30
- 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.

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

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

DTC	A/F sensor 1		ECM		Continuity	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0031, P0032	1	F66	3	F101	1	Existed
P0051, P0052	2	F67	3	1 101	5	LAISIEU

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

Is the inspection result normal?

YFS >> GO TO 5.

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

5.CHECK A/F SENSOR 1 HEATER

Refer to EC-1310, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

Revision: 2013 February

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-35, "Exploded View". **CAUTION:**

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

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

- 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

7. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

>> Repair or replace malfunctioning part.

Component Inspection

INFOID:0000000007742441

1. CHECK AIR FUEL RATIO (A/F) SENSOR 1

- 1. Turn ignition switch OFF.
- 2. Disconnect A/F sensor 1 harness connector.
- 3. Check resistance between A/F sensor 1 terminals as follows.

Terminal	Resistance
3 and 4	1.98 - 2.42 Ω [at 25°C (77°F)]
3 and 1, 2	Ω∞
4 and 1, 2	(Continuity should not exist)

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-35, "Exploded View".

CAUTION:

- Discard any air fuel ratio (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 air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).

>> INSPECTION END

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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P0037, P0038, P0057, P0058 HO2S2 HEATER

Description INFOID:0000000007742442

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		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	Heated oxygen sensor 2 heater	F
Above 3,600 rpm	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	G

DTC Logic

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 sensor 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 sensor 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 sensor 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 sensor 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.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

2. PERFORM DTC CONFIRMATION PROCEDURE

- 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 1 minute.
- 7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1312, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742444

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK HO2S2 POWER SUPPLY CIRCUIT

- 1. Disconnect heated oxygen sensor 2 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between HO2S2 harness connector and ground.

DTC	HO2S2		Ground	Voltage	
ы	Bank	Connector	Terminal	Ground	voltage
P0037, P0038	1	F54	2	Ground	Battery voltage
P0057, P0058	2	F53	2	Giodila	Dattery Voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- 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 or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Check the continuity between HO2S2 harness connector and ECM harness connector.

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

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

Is the inspection result normal?

P0037, P0038, P0057, P0058 HO2S2 HEATER

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> GO TO 5.

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

${f 5}$.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-1313, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

$oldsymbol{6}.$ REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-35, "Exploded View". **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

.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

- Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 harness connector.
- Check resistance between HO2S2 terminals as follows.

Terminal	Resistance
2 and 3	3.4 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	∞ Ω
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. Refer to EM-35, "Exploded View".

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

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P0075, P0081 IVT CONTROL SOLENOID VALVE

Description INFOID:000000007742446

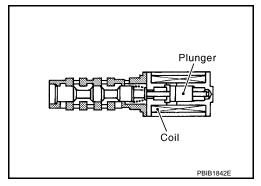
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

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

INFOID:0000000007742447

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075	Intake valve timing control so- lenoid valve (bank 1) circuit	An improper voltage is sent to the ECM	Harness or connectors (Intake valve timing control solenoid)
P0081	Intake valve timing control so- lenoid valve (bank 2) circuit	through intake valve timing control solenoid valve.	valve circuit is open or shorted.) • Intake valve timing control solenoid valve

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.

>> 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-1314, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742448

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

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

P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

DTC	IVT	control soleno	oid valve	Ground	Voltage	
DIC	Bank	Connector	Terminal	Giodila		
P0075	1	F28	2	Ground	Battery voltage	
P0081	2	F29	2	Ground		

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Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E25, F30

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

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

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between intake valve timing (IVT) control solenoid valve harness connector and ECM harness connector.

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DTC	IVT	control solen	oid valve	E	Continuity		
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0075	1	F28	1	F101	18	Existed	
P0081	2	F29	1	1 101	29	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 or short to ground or short to power in harness or connectors.

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f 4 .CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-1315, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO

>> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

INFOID:0000000007742449

>> INSPECTION END

Component Inspection

$oldsymbol{1}$.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

- 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.

P0075, P0081 IVT CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Terminals	Resistance
1 and 2	7.0 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	${}^{\infty}\Omega$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

2.check intake valve timing control solenoid valve-ii

Remove intake valve timing control solenoid valve. Refer to EM-50, "Exploded View".

Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check 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.

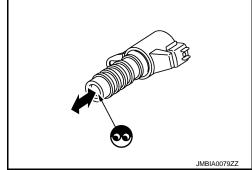
NOTE:

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. Refer to EM-50, "Exploded View"



P0078, P0084 EVT CONTROL MAGNET RETARDER

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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INFOID:0000000007742452

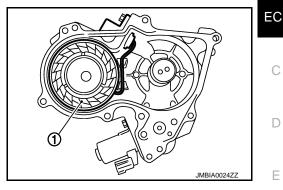
P0078, P0084 EVT CONTROL MAGNET RETARDER

Description INFOID:0000000007742450

Exhaust valve timing control magnet retarder (1) controls the shut/ open timing of the exhaust valve by ON/OFF pulse duty signals sent from the ECM.

The longer pulse width retards valve angle.

The shorter pulse width advances valve angle.



DTC Logic INFOID:000000000774245

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0078	Exhaust valve timing control magnet retarder (bank 1) circuit	An improper voltage is sent to the ECM	Harness or connectors (Exhaust valve timing control magnet)	O
P0084	Exhaust valve timing control magnet retarder (bank 2) circuit	through exhaust valve timing control mag- net retarder.	retarder circuit is open or shorted.) • Exhaust valve timing control magnet retarder	Н

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.
- Turn ignition switch ON.
- 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 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-1317, "Diagnosis Procedure". YES

NO >> INSPECTION END

Diagnosis Procedure

${f 1}$.CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER POWER SUPPLY CIRCUIT

- ground.

Turn ignition switch OFF. 2. Disconnect exhaust valve timing control magnet retarder harness connector. Turn ignition switch ON. 4. Check the voltage between exhaust valve timing (EVT) control magnet retarder harness connector and

DTC	EVT	control magne	et retarder	Ground	Voltago	
DIC	Bank	Connector	Terminal	Giodila	Voltage	
P0078	1	F58	1	Ground	Battery voltage	
P0084	2	F59	1	Giodila	ballery vollage	

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- Harness for open or short between exhaust valve timing control magnet retarder and IPDM E/R
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

3.check exhaust valve timing control magnet retarder output signal circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between exhaust valve timing control (EVT) magnet retarder harness connector and ECM harness connector.

DTC	EVT	control magne	et retarder	E	Continuity		
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0078	1	F58	2	F101	6	Existed	
P0084	2	F59	2	1 101	7	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 or short to ground or short to power in harness or connectors.

f 4.CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

Refer to EC-1318, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.REPLACE EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

- Replace malfunctioning exhaust valve timing control magnet retarder. Refer to <u>EM-69</u>, "<u>Removal and Installation</u>".
- 2. Perform EC-1182, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742453

1. CHECK EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

1. Turn ignition switch OFF.

P0078, P0084 EVT CONTROL MAGNET RETARDER

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

2. Disconnect exhaust valve timing control magnet retarder harness connector.

3. Check resistance between exhaust valve timing control magnet retarder terminals as follows.

Terminals	Resistance				
1 and 2	9.0 - 11.0 Ω [at 20°C (68°F)]				

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE EXHAUST VALVE TIMING CONTROL MAGNET RETARDER

1. Replace malfunctioning exhaust valve timing control magnet retarder. Refer to <u>EM-69</u>, "Removal and Installation".

Perform <u>EC-1182</u>, "EXHAUST VALVE TIMING CONTROL LEARNING: Special Repair Requirement".

>> INSPECTION END

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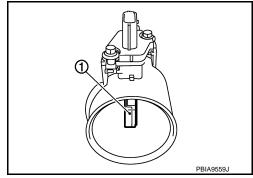
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DescriptionINFOID:000000007742458

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.



DTC Logic

INFOID:0000000007742459

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	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.
- 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.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1321, "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.

	P0102, P0103	, P010	C, P010D MAF SENSOR	
< DTC/CIRCU	IT DIAGNOSIS >		[VQ25HR FOR MEXICO]	
Is DTC detecte	<u>ed?</u>			
	o to <u>EC-1321, "Diagnosis Pro</u> D TO 4.	<u>cedure"</u> .	•	Α
4		CEDURE	E FOR DTC P0103 AND P010D-II	
	e and wait at least 5 second			EC
2. Check DT0			_	
Is DTC detecte				С
	o to <u>EC-1321, "Diagnosis Pro</u> SPECTION END	<u>cedure"</u> .	•	
Diagnosis P	rocedure		INFOID:0000000007742460	D
1.INSPECTIO	N START			
Confirm the de	tected DTC.			Е
Which DTC is	detected?			
P0102, P0100				F
P0103, P010I				Г
2.CHECK INT	AKE SYSTEM			
	wing for connection.			G
Air ductVacuum hose	es			
	ssage between air duct to int	ake mani	ifold	Н
Is the inspection	on result normal?			11
	O TO 3.			
_	econnect the parts.			
	OUND CONNECTION			
	on switch OFF.	o Grounc	d Inspection in GI-46, "Circuit Inspection".	.1
_	on result normal?	o Ground	a mopeonori m or 40, onean mopeonori.	0
	O TO 4.			
	epair or replace ground conne	ection.		Κ
4.CHECK MA	F SENSOR POWER SUPPL	Y CIRCU	UIT	
1. Disconnec	t mass air flow (MAF) senso	r harness	s connector.	ı
	on switch ON.	r harnaa	on connector and ground	_
3. Check the	voltage between MAF senso	n names	ss connector and ground.	
	MAF sensor			M
DTC	Bank Connector Terminal	Ground	Voltage	
			 	

DTC	MAF sensor			Ground	Voltage
DIO	Bank	Connector	Terminal	Ground	voltage
P0102, P0103	1	F31	5	Ground	- Ground Battery voltage
P010C, P010D	2	F42	5		

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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 or short to ground or short to power in harness or connectors.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC		MAF sense	or	EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0102, P0103	1	F31	4	F102	68	Existed
P010C, P010D	2	F42	4	1 102	94	LXISIGU

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 or 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 sense	or	EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0102, P0103	1	F31	3	F102	77	Existed
P010C, P010D	2	F42	3	F 102	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 or short to ground or short to power in harness or connectors.

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-1322, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning mass air flow sensor. Refer to EM-28, "Exploded View".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742461

1. CHECK MASS AIR FLOW SENSOR-I

(I) With CONSULT

- 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 and select "DATA MONITOR" mode.
- 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 - 1.1
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 - 1.1 to Approx. 2.4*

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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

♥Without CONSULT

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 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)
	Terminal	Terminal		
[MAF senso signa			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77	68	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	signal]		2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*
F102		79 AF sensor (bank 2) 94	Ignition switch ON (Engine stopped.)	Approx. 0.4
1			Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	[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 - 1.1 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. 2.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.CHECK MASS AIR FLOW SENSOR-II

(P)With CONSULT

- 1. Repair or replace malfunctioning part.
- 2. Start engine and warm it up to normal operating temperature.
- Connect CONSULT and select "DATA MONITOR" mode.
- 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 - 1.1
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 - 1.1 to Approx. 2.4*

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

♥Without CONSULT

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

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EC-1323 Revision: 2013 February 2012 G Sedan

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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

ECM				
Connector	+	_	Condition	Voltage (V)
	Terminal	Terminal		
			Ignition switch ON (Engine stopped.)	Approx. 0.4
	77 [MAF sensor (bank 1) signal]	68	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4
	79	.1.0)	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	[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 - 1.1 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

(I) With CONSULT

- 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 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 MAS A/F SE-B2	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.1 to Approx. 2.4*

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

Without CONSULT

- 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 >

[VQ25HR FOR MEXICO]

	ECM				
Connector	+	-	Condition	Voltage (V)	
Connector	Terminal	Terminal			
			Ignition switch ON (Engine stopped.)	Approx. 0.4	
[M	77	68	Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1	
	[MAF sensor (bank 1) 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 - 1.1 to Approx. 2.4*	
F 102		79	Ignition switch ON (Engine stopped.)	Approx. 0.4	
]	79 [MAF sensor (bank 2) 94 signal]		Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1	
		94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	
			Idle to about 4,000 rpm	0.7 - 1.1 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. Refer to EM-28, "Exploded View".

Revision: 2013 February EC-1325 2012 G Sedan

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P0112, P0113 IAT SENSOR

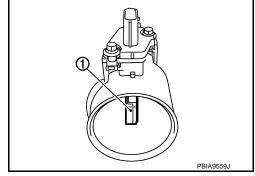
Description INFOID:000000007742462

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.

NOTE:

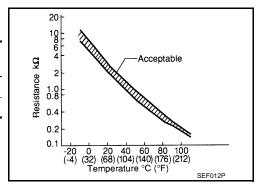
ECM uses only the intake air temperature sensor (bank 1) for engine control and self-diagnosis. It does not use the intake air temperature sensor (bank 2).



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
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).



DTC Logic

INFOID:0000000007742463

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature 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 short-
P0113	Intake air temperature sensor (bank 1) 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-1327, "Diagnosis Procedure".

NO >> INSPECTION END

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Diagnosis Procedure

INFOID:0000000007742464

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1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect mass air flow sensor (with intake air temperature sensor) (bank 1) harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between mass air flow sensor (bank 1) harness connector and ground.

MAF sens	or (bank 1)	Ground	Voltage (V)
Connector	Connector Terminal		voltage (v)
F31	2	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.

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

3.check intake air temperature sensor ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between mass air flow sensor (bank 1) harness connector and ECM harness connector.

MAF sensor (bank 1)		ECM		Continuity
Connector	Terminal	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 or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1327, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to EM-28, <a href="Exploded View".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742465

1. CHECK INTAKE AIR TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- Disconnect mass air flow sensor (bank 1) harness connector.
- Check resistance between mass air flow sensor (bank 1) terminals as follows.

P0112, P0113 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

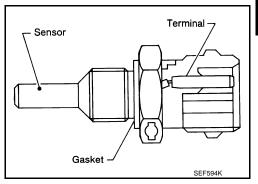
YES >> INSPECTION END

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to <u>EM-28</u>, <u>"Exploded View"</u>.

P0117, P0118 ECT SENSOR

Description INFOID:0000000007742471

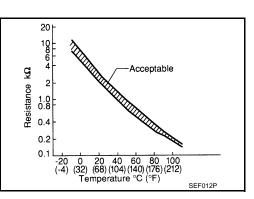
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	ŀ
P0117	Engine coolant tem- perature sensor cir- cuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors (The sensor circuit is open or shorted.)	ı
P0118	Engine coolant tem- perature sensor cir- cuit 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 procedure before conducting the next test.

- 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.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Check DTC.

Is DTC detected?

>> Go to EC-1330, "Diagnosis Procedure". YES

>> INSPECTION END NO

EC-1329 Revision: 2013 February 2012 G Sedan

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[VQ25HR FOR MEXICO]

Diagnosis Procedure

INFOID:0000000007742473

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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 s	sensor	Ground	Voltage (V)
Connector	Terminal	Glodila	voitage (v)
F17	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

${f 3.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F106, F107
- · Harness for open or short between ECT sensor and ground

>> Repair or replace harness or connectors.

4. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F17	2	F102	84	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

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

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1331, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

P0117, P0118 ECT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Component Inspection

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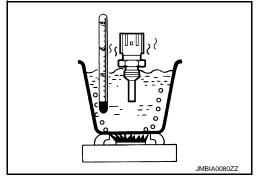
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1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View"
- 4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (kΩ)
		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. Refer to CO-32, "VQ37VHR: Exploded View".

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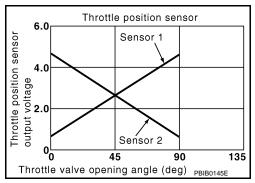
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P0122, P0123, P0227, P0228 TP SENSOR

Description INFOID:000000007742475

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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:0000000007742476

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-1430, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P0122	Throttle position sensor 2 (bank 1) circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.		
P0123	Throttle position sensor 2 (bank 1) circuit high input	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 input	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 input	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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1333, "Diagnosis Procedure".

NO >> INSPECTION END

P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Diagnosis Procedure

INFOID:0000000007742477

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK THROTTLE POSITION SENSOR 2 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	Ground	Voltage (V)		
ыс	Bank	Connector	Terminal	Giodila	voltage (v)	
P0122, P0123	1	F6	1	Ground	Approx. 5	
P0227, P0228	2	F27	1	Ground	дриох. 3	

Is the inspection result normal?

YES >> GO TO 3.

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

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			EC	Continuity	
510	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0122, P0123	1	F6	4	F101	40	Existed
P0227, P0228	2	F27	4	1 101	48	LXISTEG

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 or short to ground or short to power in harness or connectors.

f 4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			EC	Continuity	
ы	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0122, P0123	1	F6	3	F101	34	Existed
P0227, P0228	2	F27	3	1 101	35	LAISIEU

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

Is the inspection result normal?

YES >> GO TO 5.

Revision: 2013 February

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-1334, "Component Inspection".

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P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace malfunctioning electric throttle control actuator. Refer to <u>EM-30</u>. "Exploded View".
- 2. Go to EC-1334, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742478

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
	30	40	Accelerator pedal: Fully released	More than 0.36
[TP sensor '	[TP sensor 1 (bank 1)]	40	Accelerator pedal: Fully depressed	Less than 4.75
	31	48	Accelerator pedal: Fully released	More than 0.36
F101	[TP sensor 1 (bank 2)]	40	Accelerator pedal: Fully depressed	Less than 4.75
FIUI	34	40	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 1)]	40	Accelerator pedal: Fully depressed	More than 0.36
	35	48	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 2)]	40	Accelerator pedal: 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. Refer to EM-30, "Exploded View".
- 2. Go to EC-1334, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INEOID:000000000774247

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

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P0122, P0123, P0227, P0228 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

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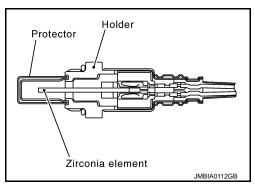
P0130, P0150 A/F SENSOR 1

Description INFOID:000000007742488

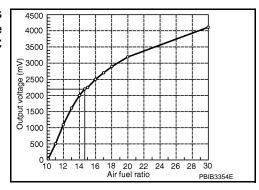
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause	
P0130 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 the range other than approx. 2.2 V.			
d)	(bank 1) circuit	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 (bank 2) circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	or shorted.) • A/F sensor 1	
(1	(Darik 2) Circuit	B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.		

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.
- 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.

P0130, P0150 A/F SENSOR 1

[VQ25HR FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS > 2.perform dtc confirmation procedure for malfunction a Start engine and warm it up to normal operating temperature. Let it idle for 2 minutes. Check 1st trip DTC. Is 1st trip DTC detected? >> Go to EC-1338, "Diagnosis Procedure". NO-1 >> With CONSULT: GO TO 3. NO-2 >> Without CONSULT: GO TO 7.

3.CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

- Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Does the indication fluctuates around 2.2 V?

YES >> GO TO 4.

NO >> Go to EC-1338, "Diagnosis Procedure".

f 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.
- Touch "START".
- 3. When the following conditions are met, "TESTING" will be displayed on the CONSULT screen.

ENG SPEED	1,000 - 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

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 screen?

YES >> GO TO 5.

NO >> Check A/F sensor 1 function again. GO TO 3.

$oldsymbol{5}$.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

Never apply brake during releasing the accelerator pedal.

Which does "TESTING" change to?

COMPLETED>>GO TO 6.

OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4.

$oldsymbol{6}$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT screen?

YES >> INSPECTION END

NO >> Go to EC-1338, "Diagnosis Procedure".

/.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-1338, "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?

YES >> INSPECTION END

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[VQ25HR FOR MEXICO]

NO >> Go to EC-1338, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007742490

1. PERFORM COMPONENT FUNCTION CHECK

With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
- Shift the selector lever to D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).

CAUTION:

Always drive vehicle at a safe speed.

NOTÉ:

Never apply brake during releasing the accelerator pedal.

- 4. Repeat steps 2 to 3 for five times.
- 5. Stop the vehicle and turn ignition switch OFF.
- 6. Wait at least 10 seconds and restart engine.
- 7. Repeat steps 2 to 3 for five times.
- 8. Stop the vehicle and connect GST to the vehicle.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1338, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742491

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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 sensor 1			Ground	Voltage	
ыс	Bank	Connector	Terminal	Giodila	voltage	
P0130	1	F66	4	Ground	Battery voltage	
P0150	2	F67	4	Glound	Battery Voltage	

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- 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 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

- Disconnect ECM harness connector.
- 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	F66	1		57	
P0130	1	F00	2	F102	61	Existed
P0150	2	F67	1	F 102	65	Existed
P0150	2	107	2		66	

Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC		A/F sensor	1	Ground	Continuity	
DIC	Bank	Bank Connector Terminal		Giodila	Continuity	
P0130	1	F66	1			
F0130	'	1 00	2	Ground	Not existed	
P0150	2	F67	1	Oround	Not existed	
F0130	2 107	2	1			

DTC	ECM		Ground	Continuity	
DIC	Connector Terminal		Giodila		
P0130		57			
	F102	61	Ground	Not existed	
P0150	F102	65			
		66			

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

O.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-35, "Exploded View".

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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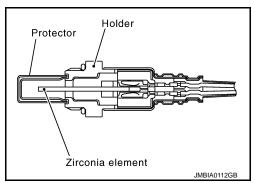
P0131, P0151 A/F SENSOR 1

Description INFOID:0000000007742492

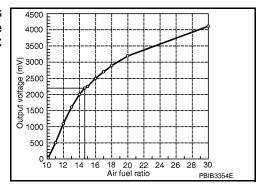
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
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

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.
- 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

(I) With CONSULT

- 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.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

P0131, P0151 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 0 V?

>> Go to EC-1341, "Diagnosis Procedure". YES

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
- 2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

Always drive vehicle at a safe speed.

3. 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 the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step
- Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-1341, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect A/F sensor 1 harness connector.
- Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F sensor 1		Ground	Voltage
DIC	Bank	Connector	Terminal	Glound	voltage
P0131	1	F66	4	Ground	Battery voltage
P0151	2	F67	4	Giodila	Dattery Voltage

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- IPDM E/R harness connector E7

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- 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 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 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
P0131	1	F66	1		57	
F0131	'	1	2	F102	61	Existed
D0151	2	F67	1	1 102	65	LXISIEU
F0151	P0151 2 F67	2		66		

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0131	1	F66	1		
10131	'	1 00	2	Ground	Not existed
P0151	2	F67	1	Giodila	Not existed
F0131		107	2		

DTC	EC	CM	Ground	Continuity
DIC	Connector			Continuity
P0131		57		Not existed
P0131	F102	61	Ground	
P0151		65		
		66		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-35, "Exploded View".

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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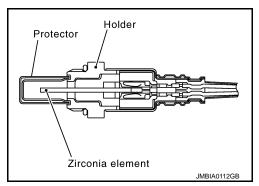
P0132, P0152 A/F SENSOR 1

Description INFOID:0000000007742498

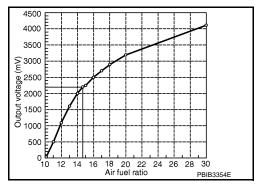
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 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

With CONSULT

- 1. Start engine and warm it up to normal operating temperature.
- Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

With GST

Follow the procedure "With CONSULT" above.

Is the indication constantly approx. 5 V?

>> Go to EC-1345, "Diagnosis Procedure". YES

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
- 2. 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.

3. 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 the cruising.
- If this procedure is not completed within 1 minute after restarting engine at step 1, return to step
- Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC is detected?

YES >> Go to EC-1345, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect A/F sensor 1 harness connector.
- Turn ignition switch ON.
- Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F sensor 1		Ground	Voltage
ыс	Bank	Connector	Terminal	Glound	voltage
P0132	1	F66	4	Ground	Battery voltage
P0152	2	F67	4	Glound	Dattery Voltage

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

Revision: 2013 February

- Harness connectors E25, F30
- IPDM E/R harness connector E7

EC-1345

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< DTC/CIRCUIT DIAGNOSIS >

- 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 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 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
P0132	1	F66	1		57	
F0132	Į.	1	2	F102	61	Existed
D0150	2	F67	1	1 102	65	LXISIEU
P0152	P0152 2 F67	2		66		

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0132	1	F66	1		
10132	'	1 00	2	Ground	Not existed
P0152	2	F67	1	Giodila	Not existed
F0132		107	2		

DTC	EC	CM	Ground	Continuity
DIC	Connector	Terminal	Giodila	Continuity
P0132		57		Not existed
P0132	F102	61	Ground	
P0152	F 102	65		
P0152		66		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace malfunctioning part.

6.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-35, "Exploded View".

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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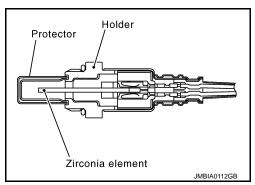
P0133, P0153 A/F SENSOR 1

Description INFOID:000000007742498

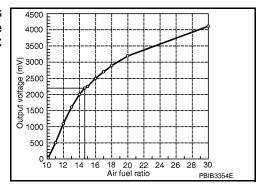
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

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 INFOID:000000007742499

DTC DETECTION LOGIC

To judge the malfunction of A/F sensor 1, 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 response		Harness or connectors (The A/F sensor 1 circuit is open or shorted.)
P0153	Air fuel ratio (A/F) sensor 1 (bank 2) circuit slow response	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

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.
- 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.

Will CONSULT be used?

P0133, P0153 A/F SENSOR 1

[VQ25HR FOR MEXICO] < DTC/CIRCUIT DIAGNOSIS > YES >> GO TO 2. NO >> GO TO 5. Α 2.PERFORM DTC CONFIRMATION PROCEDURE-I (P)With CONSULT EC Start engine and warm it up to normal operating temperature. 1. 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. 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. Touch "START". D Is "COMPLETED" displayed on CONSULT screen? YES >> GO TO 3 NO >> GO TO 4. Е 3.perform dtc confirmation procedure-ii Touch "SELF-DIAG RESULT". F Which is displayed on CONSULT screen? OK >> INSPECTION END NG >> Go to EC-1350, "Diagnosis Procedure". f 4 -PERFORM DTC CONFIRMATION PROCEDURE-II After perform the following procedure, "TESTING" will be displayed on the CONSULT screen. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds. Н Fully release accelerator pedal and then let engine idle for about 10 seconds. If "TESTING" is not displayed after 10 seconds, refer to EC-1287, "Component Function Check". 2. Wait for about 20 seconds at idle under the condition that "TESTING" is displayed on the CONSULT Check that "TESTING" changes to "COMPLETED". If "TESTING" changed to "OUT OF CONDITION", refer to EC-1287, "Component Function Check". Touch "SELF-DIAG RESULT". Which is displayed on CONSULT screen? >> INSPECTION END OK NG >> Go to EC-1350, "Diagnosis Procedure". K 5.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE **With GST** 1. Start engine and warm it up to normal operating temperature. Select Service \$01 with GST. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications. Is the total percentage within ±15%? >> GO TO 7. YES NO >> GO TO 6. N **6.**DETECT MALFUNCTIONING PART Check the following. Intake air leaks Exhaust gas leaks • Incorrect fuel pressure Lack of fuel Р Fuel injector • Incorrect PCV hose connection PCV valve

>> Repair or replace malfunctioning part.

Mass air flow sensor

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7. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 3. Let engine idle for 1 minute.
- 4. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
- 5. Fully release accelerator pedal and then let engine idle for about 1 minute.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1350, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742500

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

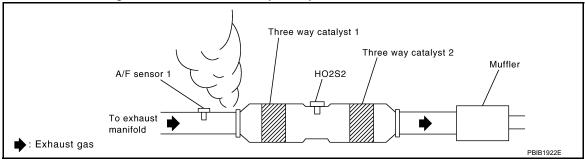
2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-35, "Exploded View".

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 5.

${f 5}$.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

- 1. Clear the mixture ratio self-learning value. Refer to <u>EC-1183</u>, "MIXTURE RATIO SELF-LEARNING <u>VALUE CLEAR</u>: Special Repair Requirement".
- 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?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-1374, "DTC Logic"</u> or <u>EC-1378, "DTC Logic"</u>.

NO >> GO TO 6.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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.

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DTC		A/F senso	r 1	Ground	Voltage	
DIC	Bank	Connector	Terminal	Giodila	voltage	
P0133	1	F66	4	Ground	Battery voltage	
P0153	2	F67	4	Giodila	Dattery Voltage	

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- 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.

$8.\mathsf{CHECK}$ A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 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
DIO	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0133	1	F66	1	F102	57	
F0133	'	100	2		61	Existed
P0153	2	F67	1		65	LXISIGU
F0155		F07	2		66	

4. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0133	1	F66	1		
1 0133	'	2		Ground	Not existed
P0153	153 2	F67	1	Giodila	Not existed
	2	1 07	2		

DTC	EC	CM	Ground	Continuity	
DIC	Connector	Terminal	Giodila	Continuity	
P0133		57		Not existed	
F0133	F102	61	Ground		
P0153	F 102	65			
F 0 100		66			

5. Also check harness for short to power.

Is the inspection result normal?

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P0133, P0153 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-1310, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 13.

10. CHECK MASS AIR FLOW SENSOR

Check both mass air flow sensor (bank 1 and bank 2).

Refer to EC-1322, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning mass air flow sensor. Refer to EM-28, "Exploded View".

11. CHECK PCV VALVE

Refer to EC-1534, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace PCV valve. Refer to EM-47, "Exploded View".

12. CHECK INTERMITTENT INCIDENT

Perform GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace malfunctioning part.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to <u>EM-35, "Exploded View"</u>. **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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P0137, P0157 HO2S2

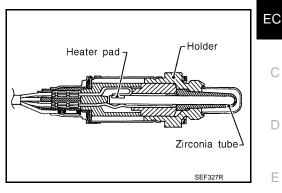
Description INFOID:0000000007742501

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.

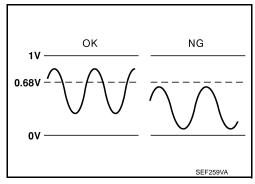
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



DTC Logic INFOID:0000000007742502

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 maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 (bank 1) circuit low voltage	The maximum voltage from the sensor is not	Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2
P0157	Heated oxygen sensor 2 (bank 2) circuit low voltage	reached to the specified voltage.	Fuel pressureFuel 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.

- 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.

Will CONSULT be used?

>> GO TO 2. YES

NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE

(P) With CONSULT

TESTING CONDITION:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds.

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< DTC/CIRCUIT DIAGNOSIS >

- 3. Turn ignition switch ON.
- 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.
- Let engine idle for 1 minute.
- 7. Select "DATA MONITOR" mode with CONSULT.
- 8. Check 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).
- 9. Open engine hood.
- Select "HO2S2 (B1) P1147" (for DTC P0137) or "HO2S2 (B2) P1167" (for DTC P0157) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- 11. Follow the instruction of CONSULT.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to <u>EC-1355</u>, "<u>Diagnosis Procedure</u>".

CANNOT BE DIAGNOSED>>GO TO 3.

3.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 2.

4. PERFORM COMPONENT FUNCTION CHECK

⋈ Without CONSULT

Perform component function check. Refer to EC-1354, "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-1355, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007742503

1. PERFORM COMPONENT FUNCTION CHECK-I

⋈Without CONSULT

- 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.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

	DTC + - Condition					
DTC			Voltage			
	Connector	Terminal	Terminal			
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

NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector terminals under the following condition.

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< DTC/CIRCUIT DIAGNOSIS >

		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	1 102	80	04	Reeping engine at lule for 10 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	1 102	80	04	sition	least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1355, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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-1183</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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-1374, "DTC Logic"</u>.

NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
- 3. Disconnect ECM harness connector.
- Check the continuity between HO2S2 harness connector and ECM harness connector.

_							
DTC		HO2S2			EC	Continuity	
	DIO	Bank	Connector	Terminal	Connector	Terminal	Continuity
	P0137	1	F54	1	E102	F102 84	
	P0157	2	F53	1	1 102	04	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		EC	CM	Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0137	1	F54	4	F102	76	Existed
P0157	2	F53	4	F102	80	EXISTEC

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity	
DIC	Bank	Connector	Terminal	Giodila	Continuity
P0137	1	F54	4	Ground	Not existed
P0157	2	F53	4	Giodila	NOI EXISIEU

DTC	EC	CM	Ground	Continuity	
DIC	Connector	Terminal	Giodila	Continuity	
P0137	F102	76	Ground	Not existed	
P0157	1 102	80	Ground	Not existed	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1356, "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. Refer to EX-5. "Exploded View".

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

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742505

1. INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

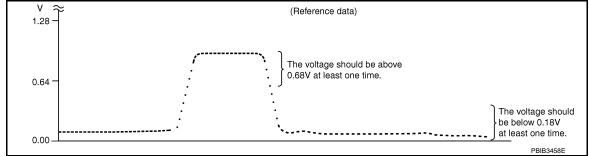
YES >> GO TO 2.

NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

(I) With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- 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

- 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.
- 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			
E102	76 [HO2S2 (bank 1)]	9.4	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)]	04		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.

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ECM					
Connector	+ -		Condition	Voltage	
Connector	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)]	84	Kooping angine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.	
1 102	80 [HO2S2 (bank 2)]	84	Keeping engine at idle for 10 minutes	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 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

ECM					
Connector	+ -		Condition	Voltage	
	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)]	84	Coasting from 80 km/h (50 MPH) in D po-	The voltage should be above 0.68 V at least once during this procedure.	
F 102	80 [HO2S2 (bank 2)]	04	sition	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. Refer to <u>EX-5</u>, "<u>Exploded View</u>".

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

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P0138, P0158 HO2S2

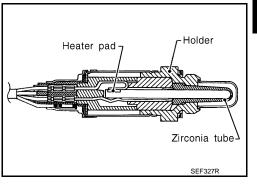
Description

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.



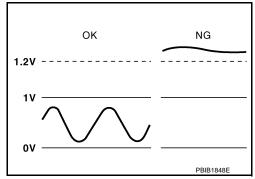
DTC Logic

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.

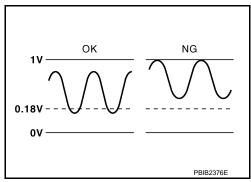
MALFUNCTION A

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition 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 voltage	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 	

[VQ25HR FOR MEXICO]

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	
P0158	(bank 2) circuit high voltage	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 	

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.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

$2.\mathsf{PERFORM}$ 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.
- 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 minutes.
- 7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1362, "Diagnosis Procedure".

NO-1 >> With CONSULT: GO TO 3.

NO-2 >> Without CONSULT: GO TO 5.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

(P) With CONSULT

NOTE:

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

- 1. Start engine and warm it up to the normal operating temperature.
- 2. 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. 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.
- 7. Select "DATA MONITOR" mode with CONSULT.
- 8. Check 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).
- 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.
- 11. Follow the instruction of CONSULT.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT screen?

OK >> INSPECTION END

NG >> Go to EC-1362, "Diagnosis Procedure".

CONNOT BE DIAGNOSED>>GO TO 4.

P0138, P0158 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

f 4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

- Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- Perform DTC confirmation procedure again.

>> GO TO 3.

${f 5.}$ PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

⋈ Without CONSULT

Perform component function check. Refer to EC-1361, "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-1362, "Diagnosis Procedure".

Component Function Check

1.PERFORM COMPONENT FUNCTION CHECK-I

♥Without CONSULT

- 1. Start engine and warm it up to the normal operating temperature.
- Turn ignition switch OFF and wait at least 10 seconds. 2.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load. 3.
- Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

		ECM				
DTC	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	1 102	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	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 least once during this procedure.	
P0158	1 102	80	04	Recping engine at full for 10 millutes		

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.

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	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	least once during this procedure.		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1362, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007742509

1. INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-1359, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2

B >> GO TO 9.

2.check ground connection

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK HO2S2 CONNECTOR FOR WATER

- 1. Disconnect heated oxygen sensor 2 harness connector.
- Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace harness or connectors.

4. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	1	F102	84	Existed
P0158	2	F53	1	F102	F102 04	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 or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		EC	CM	Continuity	
БТО	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0138	1	F54	4	F102	76	Existed	
P0158	2	F53	4	1 102	80	Existed	

	RCUIT	DIAGNOS	SIS >	P0138	3, P0158 ———	HO252 [VQ25HR
		HO2S2				
DTC	Bank	Connector	Terminal	Ground	Continuity	
P0138	1	F54	4	Cround	Not evieted	-
P0158	2	F53	4	Ground	Not existed	
DTC	Conne	ECM ctor Termin	Grour	nd Conti	nuity	
P0138	F10	76	Grour	nd Not ex	vistod	
P0158	1 10	80	Gioui	IU NOLE	dsteu	
.CHECk	· · HFAT	-		_	id of Short	o power in harness or connectors.
efer to <u>E</u> the insp /ES >	C-1365 ection	ED OXYGI 5, "Compon result norm O 8.	EN SENSo ent Inspec	OR 2	iu di Silotti	o power in harness or connectors.
efer to <u>E</u> the insp /ES > NO >	C-1365 ection > GO T > GO T	ED OXYGI 5, "Compon result norm O 8.	EN SENSO ent Inspec al?	OR 2	iu di Silotti	o power in harness or connectors.

- re than 0.5 m (19.7
- en Sensor Thread nti-seize lubricant

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

9. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Clear the mixture ratio self-learning value. Refer to EC-1183, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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-1378, "DTC Logic".

NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect heated oxygen sensor 2 harness connector.

EC-1363 Revision: 2013 February 2012 G Sedan

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- Disconnect ECM harness connector.
- Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC		HO2S2		EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	1	F102	84	Existed
P0158	2	F53	1	F102	04	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

12.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

DTC	HO2S2			ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	4	F102	76	Existed
P0158	2	F53	4	F102	80	Existed

Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC	HO2S2			Ground	Continuity
ыс	Bank	Connector	Terminal	Giodila	Continuity
P0138	1	F54	4	Ground	Not existed
P0158	2	F53	4	Giodila	NOI EXISTED

DTC	EC	CM	Ground	Continuity	
DIC	Connector	Terminal	Oround	Continuity	
P0138	F102	76	Ground	Not existed	
P0158	F102	80	Giouna	INOL EXISTED	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1365, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15. >> GO TO 14. NO

14. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EX-5, "Exploded View".

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).

15. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

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1.INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

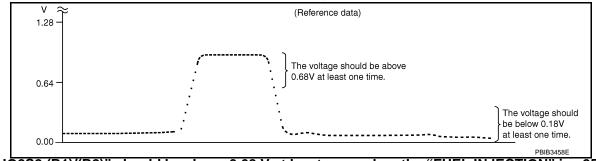
YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

(P)With CONSULT

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- 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 2-1

Without CONSULT

- 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 Terr	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. The voltage should be below 0.18 V at least once during this procedure.
	80 [HO2S2 (bank 2)]			

< DTC/CIRCUIT DIAGNOSIS >

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.

ECM				
Connector	+	_	Condition	Voltage
	Terminal	Terminal		
F102 —	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. The voltage should be below 0.18 V at least once during this procedure.
	80 [HO2S2 (bank 2)]			

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.

ECM					
Connector	+	_	Condition	Voltage	
Connector	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)]	84	Coasting from 80 km/h (50 MPH) in D position	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.	
	80 [HO2S2 (bank 2)]	84			

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to <u>EX-5, "Exploded View"</u>.

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

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P0139, P0159 HO2S2

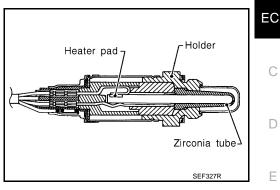
Description INFOID:0000000007742511

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 1V in richer conditions to 0V in leaner conditions.

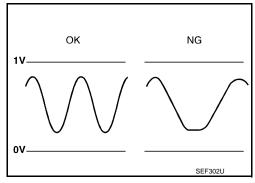
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



DTC Logic INFOID:0000000007742512

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 response	The switching time between rich and lean of a	 Harness or connectors (The sensor circuit is open or shorted) Heated oxygen sensor 2 	
P0159	Heated oxygen sensor 2 (bank 2) circuit slow response	heated oxygen sensor 2 signal delays more than the specified time computed by ECM.	Fuel systemEVAP systemIntake air system	

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YFS >> 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.

- Turn ignition switch OFF and wait at least 10 seconds. 1.
- Turn ignition switch ON.
- 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.

3. PERFORM DTC CONFIRMATION PROCEDURE

(P)With CONSULT

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT.
- 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.
- 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).
- 9. Drive the vehicle in a proper gear at 60 km/h (38MPH) and maintain the speed.

CAUTION:

Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.

CAUTION:

- Enable the engine brake.
- · Always drive carefully.
- Never apply brake when releasing the accelerator pedal.
- 11. Repeat step 9 and 10 at least 8 times.
- 12. Check the following item of "DATA MONITOR".

DTC	Data monitor item	Status
P0139	HO2 S2 DIAG1 (B1)	
F0139	HO2 S2 DIAG2 (B1)	CMPLT
P0159	HO2 S2 DIAG1 (B2)	CIVIFLI
F0159	HO2 S2 DIAG2 (B2)	

Is "CMPLT" displayed on CONSULT screen?

YES >> GO TO 6.

NO-1: "CMPLT" is not displayed on DIAG 1>>Perform DTC confirmation procedure again.

NO-2: "CMPLT" is not displayed on DIAG 2>>GO TO 4.

4. PERFORM DTC WORK SUPPORT

- 1. Open engine hood.
- Select "HO2S2 (B1) P0139" or "HO2S2 (B2) P0159" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT.
- Start engine and follow the instruction of CONSULT display.

NOTE:

It will take at most 10 minutes until "COMPLETED" is displayed.

Is "COMPLETED" displayed on CONSULT screen?

YES >> GO TO 6.

NO >> GO TO 5.

5.perform dtc confirmation procedure again

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- Perform DTC confirmation procedure again.

>> GO TO 3.

6. PERFORM SELF-DIAGNOSIS

(P)With CONSULT

Perform ECM self-diagnosis.

Is DTC "P0139" or "P0159" detected?

YES >> Proceed to EC-1370, "Diagnosis Procedure".

NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

P0139, P0159 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Perform component function check. Refer to EC-1369, "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 >> Proceed to EC-1370, "Diagnosis Procedure".

Component Function Check

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

- Start engine and warm it up to the normal operating temperature.
- 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.
- 4. Let engine idle for 1 minute.
- Check the voltage between ECM harness connector terminals under the following condition.

		ECM					
DTC	Connector	Terminal		Condition	Voltage		
Connector		+	_				
P0139	F102	76	84	Revving up to 4,000 rpm under no load at	3		
P0159	80		04	least 10 times	0.24 V for 1 second during this procedure.		

Is the inspection result normal?

>> INSPECTION END YES

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	Terminal		Condition	Voltage	
	Connector		_			
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 tale for 10 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	
		Connector	Terminal	Terminal			
	P0139	F102	76	84	Coasting from 80 km/h (50 MPH) on the	A change of voltage should be more than	Р
	P0159	1 102	80	04	suitable gear position	0.24 V for 1 second during this procedure.	

Is the inspection result normal?

>> INSPECTION END YES

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NO >> Proceed to EC-1370, "Diagnosis Procedure".

Diagnosis Procedure

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1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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-1183</u>. "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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-1374, "DTC Logic"</u> or <u>EC-1378, "DTC Logic"</u>.

NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 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
P0139	1	F54	1	F102	84	Existed
P0159	2	F53	1	1 102	04	LAISIEU

5. 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 HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between HO2S2 harness connector and ECM harness connector.

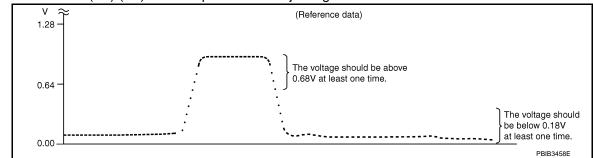
DTC		HO2S2		EC	Continuity	
ыс	Bank Connector		Terminal	Connector	Terminal	Continuity
P0139	1	F54	4	F102	76	Existed
P0159	2	F53	4	1 102	80	LXISIGU

Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity	
	Bank	Connector	Terminal	Ground	Continuity
P0139	1	F54	4	Ground	Not existed
P0159	2	F53	4	Giodila	Not existed

					T		Λ
DTC		ECM		Ground	Continuity		Α
	Bank	Connector	Terminal				
P0139	1	F102	76	Ground	Not existed		EC
P0159	2		80			•	
3. Also c			•	ower.			С
Is the insp YES >	> GO 1		<u>iai?</u>				
_			cuit, short	to ground	or short to	oower in harness or connectors.	
5.CHECK					•		D
Refer to E	C-1371	. "Compor	ent Inspe	ction".			
Is the insp		•	-				Е
	> GO T						_
_	> GO 1						
6.REPLA	CE HE	ATED OX	GEN SE	NSOR 2			F
Replace m		tioning hea	ted oxyge	n sensor 2	2.		
CAUTIONDiscard		eated oxy	gen sens	or which I	has been d	ropped from a height of more than 0.5 m (19.7	G
in) onto	a hard	surface s	uch as a	concrete	floor; use a	new one.	O
						xhaust system threads using Oxygen Sensor or J-43897-12)] and approved Anti-seize Lubri-	
		cial servic		ice tool (c	J-43097-10	or 3-43097-12)] and approved Anti-Seize Lubri-	Н
			,				
>	> INSP	ECTION E	ND				1
7.CHECK	INTER	RMITTENT	INCIDEN	JT			'
Refer to G	I-43, "I	ntermittent	Incident".				
							J
>	> INSP	ECTION E	ND				
Compon	ent Ir	nspection	า			INFOID:0000000007742515	Κ
1.INSPE	STION	CTART					
Will CONS							L
Will CONS							
	> GO 1 > GO 1						M
2. CHECK			EN SENS	OR 2			
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With CO			and selec	t "DATA M	IONITOR" n	node with CONSULT.	Ν
2. Start e	ngine a	and warm i	it up to the	normal o	perating ten		
					0 seconds.		0
		and keep th le for 1 mir		speed bet	ween 3,500	and 4,000 rpm for at least 1 minute under no load.	_
				CTIVE TES	ST" mode, a	and select "HO2S2 (B1)/(B2)" as the monitor item	
with C	ONSU	LT.				·	Р

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

- 1. Start engine and warm it up to the normal operating temperature.
- 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)] 80 [HO2S2	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. The voltage should be below 0.18 V at least once during this procedure.	
F102 -			least 10 times	_	

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.

ECM					
Connector	+ -		Condition	Voltage	
Connector	Terminal	Terminal			
F102	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.	
1 102	80 [HO2S2 (bank 2)]	04		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 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following condition.

ECM					
Connector	+ -		Condition	Voltage	
Connector	Terminal	Terminal			
F100	76 [HO2S2 (bank 1)]	84	Coasting from 80 km/h (50 MPH) in D position	The voltage should be above 0.68 V at least once during this procedure.	
F102	80 [HO2S2 (bank 2)]	04		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. Refer to <u>EX-5</u>, "<u>Exploded View</u>". **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

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P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

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 the A/F sensors 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 lights up 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.
- 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-1183</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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-1375, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

- Keep engine idle for at least 5 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> Go to EC-1375, "Diagnosis Procedure".

NO >> GO TO 5.

${f 5}$.PERFORM DTC CONFIRMATION PROCEDURE-III

Turn ignition switch OFF and wait at least 10 seconds.

2. Start engine.

Maintain the following conditions for at least 10 consecutive minutes. Hole 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.

Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-1375, "Diagnosis Procedure". YES

>> INSPECTION END NO

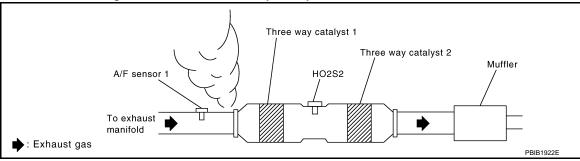
Diagnosis Procedure

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1.CHECK EXHAUST GAS LEAK

Start engine and run it at idle.

Listen for an exhaust gas leak before three way catalyst 1. 2.



Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

- Listen for an intake air leak after the mass air flow sensor.
- Check PCV hose connection.

Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 3.

3.check a/f sensor 1 input signal circuit

- Turn ignition switch OFF.
- Disconnect corresponding A/F sensor 1 harness connector. 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
P0171	1	F66	1		57	
10171	0171	100	2	F102	61	Existed
P0174	2	E67	1	1 102	65	LAISIEU
10174	2 F67 2			66		

Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

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DTC	A/F sensor 1			Ground	Continuity
DIC	Bank Connector Term		Terminal	Giodila	Continuity
P0171	1	F66	1	Ground	Not existed
P0171	'	F00	2		
P0174	2	F67	1	Giodila	Not existed
P0174	2	F67	2		

DTC	EC	ECM		Continuity
DIC	Connector	Terminal Groun		
P0171		57	Ground	Not existed
FUITI	F102	61		
P0174		65		
		66		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-1586, "Inspection".

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 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". Refer to .

NO >> Repair or replace malfunctioning part.

$\mathsf{6}.$ CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

- Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT. For specification, refer to <u>EC-1589</u>, "Mass Air Flow Sensor".

- Install all removed parts.
- Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to <u>EC-1589</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-1321</u>, "<u>Diagnosis Procedure</u>".

.CHECK FUNCTION OF FUEL INJECTOR

(I) With CONSULT

- Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Check that each circuit produces a momentary engine speed drop.

⋈Without CONSULT

1. Start engine and let it idle.

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Listen to each fuel injector operating sound.

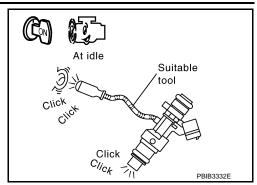
Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 8.

NO

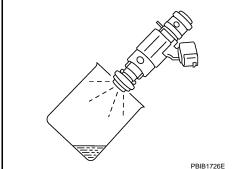
>> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-1521. "Diagnosis Procedure".



8. CHECK FUEL INJECTOR

- Turn ignition switch OFF.
- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- Disconnect all fuel injector harness connectors.
- Remove fuel tube assembly. Refer to EM-38, "Removal and Installation". 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.
- 8. Crank engine for about 3 seconds. For DTC P0171, check that fuel sprays out from fuel injectors on

For DTC P0174, check 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. Refer to EM-38, "Removal and Installation".

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

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P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

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 the A/F sensors 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 lights up 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 leaksIncorrect fuel pressureMass 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-1183</u>, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".
- 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-1379, "Diagnosis Procedure".

NO >> Remove spark plugs and check for fouling, etc. Refer to EM-47, "Removal and Installation".

4. PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Keep engine idle for at least 5 minutes.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1379, "Diagnosis Procedure".

NO >> GO TO 5.

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

5. PERFORM DTC CONFIRMATION PROCEDURE-III

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- Start engine.
- 3. Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.

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VHCL SPEED SE 50 - 120 km/h (31 - 75 mph)

CAUTION:

Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1379, "Diagnosis Procedure".

NO >> INSPECTION END

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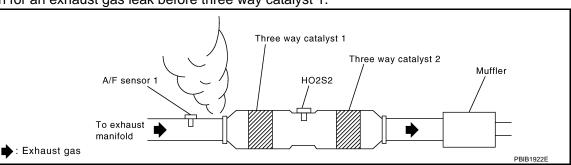
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Diagnosis Procedure

1. CHECK EXHAUST GAS LEAK

Start engine and run it at idle.

Listen for an exhaust gas leak before three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 2.

2.check for intake air leak

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

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.

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	F66	1		57	
10172	1 100	2	F102	61	Existed	
P0175	2	F67	1	1 102	65	LXISIEU
F0173	۷	107	2		66	

5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

harness connector.

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DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	Bank Connector Term		Giouna	Continuity
P0172	1	F66	1		Not existed
F0172	1 100	1 00	2	Ground	
P0175	2	F67	1	Giodila	NOI EXISTED
FU1/3		F0/	2		

DTC	ECM		Ground	Continuity
DIC	Connector	Terminal	Giodila	Continuity
P0172		57		Not existed
F0172	F102	61	Ground	
P0175		65		
F0175		66		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-1586, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace "fuel filter and fuel pump assembly". Refer to FL-6, "Removal and Installation".

CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT. For specification, refer to <u>EC-1589</u>, "Mass Air Flow Sensor".

With GST

- 1. Install all removed parts.
- 2. Check mass air flow sensor signal in "Service \$01" with GST. For specification, refer to EC-1589, "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 EC-1321, "Diagnosis Procedure".

6.CHECK FUNCTION OF FUEL INJECTOR

(P)With CONSULT

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- 3. Check that each circuit produces a momentary engine speed drop.

♥Without CONSULT

1. Start engine and let it idle.

P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Listen to each fuel injector operating sound.

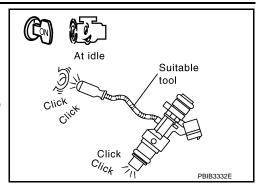
Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Perform

>> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-1521, "Diagnosis Procedure"</u>.



7. CHECK FUEL INJECTOR

 Remove fuel injector assembly. Refer to <u>EM-38, "Removal and Installation"</u>. Keep fuel hose and all fuel injectors connected to fuel tube.

- 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. Disconnect all ignition coil harness connectors.
- 5. Prepare pans or saucers under each fuel injectors.
- Crank engine for about 3 seconds. Check fuel 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. Refer to EM-38, "Removal and Installation".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

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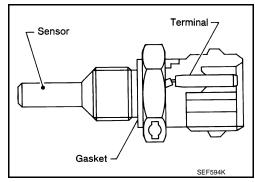
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P0197, P0198 EOT SENSOR

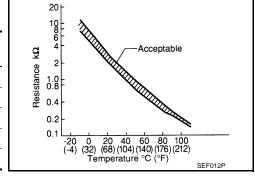
Description

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 (kΩ)
-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
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.)
P0198	Engine oil tempera- ture sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Engine oil 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

- Start engine and wait at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> Go to EC-1383, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

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CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK EOT SENSOR POWER SUPPLY

- Disconnect engine oil temperature (EOT) sensor harness connector.
- Turn ignition switch ON.
- Check the voltage between EOT sensor harness connector and ground.

EOT	sensor	Ground	Voltage (V)	
Connector	Terminal	Ground		
F38 ^{*1} F252 ^{*2}	1	Ground	Approx. 5	

*1: AWD models

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F61, F251 (2WD models)
- Harness for short between ECM and EOT sensor

>> Repair short to ground in harness or connector.

4.CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EOT sensor harness connector and ECM harness connector.

EOT sensor		EC	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
F38 ^{*1} F252 ^{*2}	2	F102	84	Existed

*1: AWD models

*2: 2WD models

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.

${f 5.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F61, F251 (2WD models)
- Harness for open or short between ECM and EOT sensor

^{*2: 2}WD models

P0197, P0198 EOT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

>> Repairr open circuit or short to groun or short to ground in harness or connector.

6. CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-1384, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace engine oil temperature sensor. Refer to EM-44, "Exploded View".

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

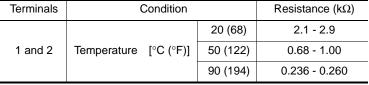
Component Inspection

INFOID:0000000007742537

1. CHECK ENGINE OIL TEMPERATURE SENSOR

- Turn ignition switch OFF.
- Disconnect engine oil temperature sensor harness connector.
- 3. Remove engine oil temperature sensor. Refer to EM-44, "Exploded View".
- 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

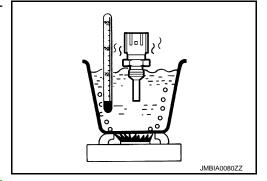


Is the inspection result normal?

YES >> INSPECTION END

NO

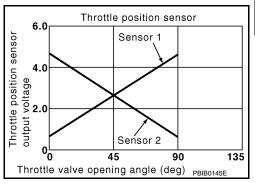
>> Replace engine oil temperature sensor. Refer to EM-44, "Exploded View".



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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



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 EC-1430, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 (bank 1) circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	
P0223	Throttle position sensor 1 (bank 1) circuit high input	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 input	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 input	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.
- 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.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1386, "Diagnosis Procedure".

NO >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Diagnosis Procedure

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1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

- 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	Electric throttle control actuator			Voltage (V)
ы	Bank	Connector	Terminal	Ground	voltage (v)
P0222, P0223	1	F6	1	Ground	Approx. 5
P2132, P2133	2	F27	1	Giodila	дрргох. 3

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electri	Electric throttle control actuator		ECM		Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0222, P0223	1	F6	4	F101	40	Existed	
P2132, P2133	2	F27	4	FIUI	48	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 or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			ECM		Continuity
DIO	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0222, P0223	1	F6	2	F101	30	Existed
P2132, P2133	2	F27	2	1 101	31	LAISIEU

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 or short to ground or short to power in harness or connectors.

${f 5.}$ CHECK THROTTLE POSITION SENSOR

Refer to EC-1387, "Component Inspection".

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-30. "Exploded View".

Go to EC-1387, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK THROTTLE POSITION SENSOR

- Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- Perform EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- Turn ignition switch ON.
- 5. Set selector lever to D position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM				
Connector	+ -		Condition	Voltage (V)
Connector	Terminal	Terminal		
	30	40	Accelerator pedal : Fully released	More than 0.36
	[TP sensor 1 (bank 1)]	40	Accelerator pedal : Fully depressed	Less than 4.75
•	31 [TP sensor 1 (bank 2)]	48	Accelerator pedal : Fully released	More than 0.36
F101		40	Accelerator pedal : Fully depressed	Less than 4.75
FIUI	34	40	Accelerator pedal : Fully released	Less than 4.75
	[TP sensor 2 (bank 1)]	40	Accelerator pedal : Fully depressed	More than 0.36
	35	48	Accelerator pedal : Fully released	Less than 4.75
	[TP sensor 2 (bank 2)]	40	Accelerator pedal : Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator.
- Go to EC-1387, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE [VQ25HR FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

DTC Logic INFOID:0000000007742543

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 on. If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

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 light 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 on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder 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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON. 3.
- Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and let it idle for about 15 minutes.
- Check 1st trip DTC.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Is 1st trip DTC detected?

YES >> Go to EC-1390, "Diagnosis Procedure".

NO >> GO TO 3.

${f 3.}$ PERFORM DTC CONFIRMATION PROCEDURE-II

- 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.
- Start engine and drive the vehicle under the 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.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed in the freeze frame data \pm 400 rpm		
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)	
Basic fuel schedule	Basic fuel schedule in 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).	
condition	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).	

The time to driving 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.

Is 1st trip DTC detected?

YES >> Go to EC-1390, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742544

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- Start engine and run it at idle speed.
- 2. Listen for the sound of the intake air leak.
- 3. Check PCV hose connection.

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.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 3.

YES-2 >> Without CONSULT: GO TO 4.

NO >> Repair or replace malfunctioning part.

3. PERFORM POWER BALANCE TEST

(P)With CONSULT

Start engine.

P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE [VQ25HR FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Check 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

- Start engine and let it idle.
- Listen to each fuel injector operating sound.

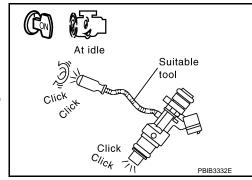
Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 5.

NO

>> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-1521, "Diagnosis Procedure".



5.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- 2. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

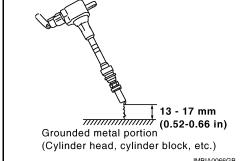
Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 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. Refer to EM-47, "Removal and Installation".
- 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.



CAUTION:

 Do not approach to the spark plug and the ignition coil within 0.5 m (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.



 It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.

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6. CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a known-good spark plug.
- 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 EC-1527, "Diagnosis Procedure".

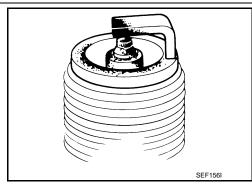
7.CHECK SPARK PLUG

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 EM-145, "Spark Plug".

NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

- 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?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-145, "Spark Plug".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-17, "Inspection".

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

- 1. Install all removed parts.
- Check fuel pressure. Refer to <u>EC-1586</u>, "Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

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". Refer to FL-6, "Removal and Installation".

NO >> Repair or replace malfunctioning part.

12. CHECK IDLE SPEED AND IGNITION TIMING

Check idle speed and ignition timing.

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[VQ25HR FOR MEXICO]

For procedure, refer to EC-1174, "BASIC INSPECTION: Special Repair Requirement". For specification, refer to EC-1589, "Idle Speed" and EC-1589, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Follow the EC-1174, "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			EC	Continuity	
Bank	Connector	Terminal Connector		Terminal	Continuity
1	1 F66 1 F102 F102		57		
ļ		2	E102	61	Existed
2		1	F102	65	Existed
2	г07	2		66	

Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

	A/F sensor 1			Continuity
Bank	Connector	Terminal	Ground	Continuity
1	F66	1		
ı	F00	2	Ground	Not existed
2	F67	1	Giodila	Not existed
2	F07	2	-	

ECM		Ground	Continuity	
Connector Terminal		Giodila		
	57			
F102	61	Ground	Not existed	
	65	Giodila		
	66			

Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK A/F SENSOR 1 HEATER

Refer to EC-1310, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace (malfunctioning) A/F sensor 1. Refer to EM-35, "Exploded View".

15. CHECK MASS AIR FLOW SENSOR

(P)With CONSULT

Revision: 2013 February

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT.

For specification, refer to EC-1589, "Mass Air Flow Sensor".

With GST

Check mass air flow sensor signal in Service \$01 with GST.

For specification, refer to EC-1589, "Mass Air Flow Sensor".

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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-1321</u>, "<u>Diagnosis Procedure</u>".

16. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-1574, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace malfunctioning part.

17.ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.

Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to <u>EC-1279</u>, "CONSULT Function" or <u>EC-1275</u>, "On Board Diagnosis Function".

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

Description INFOID:0000000007742545

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.

INFOID:0000000007742546

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock 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.)
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	Knock 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.
- Turn ignition switch ON.
- 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

- 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 EC-1395, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

1. CHECK GROUND CONNECTION

Turn ignition switch OFF.

Check ground connection M95. Refer to Ground Inspection in GI-46, "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

Disconnect knock sensor harness connector and ECM harness connector.

Check the continuity between knock sensor harness connector and ECM harness connector.

	Knock sensor		ECM		Continuity
,	Connector	Terminal	Connector	Terminal	Continuity
	F206	2	F102	72	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

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INFOID:0000000007742547

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< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 4. NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F65, F205
- · Harness for open or short between knock sensor and ECM
 - >> Repair open circuit or short to power in harness or connectors.

4. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F206	1	F102	73	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6. NO >> GO TO 5.

${f 5.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F65, F205
- · Harness for open or short between ECM and knock sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK KNOCK SENSOR

Refer to EC-1396, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning knock sensor. Refer to EM-119, "Exploded View".

7.check intermittent incident

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742548

1. CHECK KNOCK SENSOR

- 1. Turn ignition switch OFF.
- Disconnect knock sensor harness connector.
- Check resistance between knock sensor terminals as follows.

NOTE:

It is necessary to use an ohmmeter which can measure more than 10 M Ω .

Terminals	Resistance
1 and 2	Approx. 532 - 588 kΩ [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. Refer to EM-119, "Exploded View".

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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.

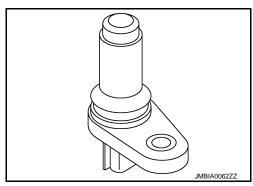
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

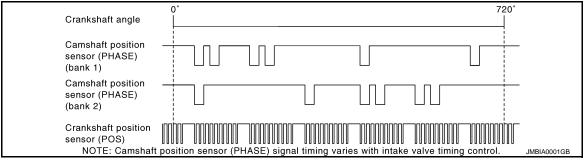
The changing gap causes the magnetic field near the sensor to change.

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.





DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (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 running. 	Harness or connectors [CKP sensor (POS) circuit is open or shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Battery current sensor Accelerator pedal position sensor Refrigerant pressure sensor Signal plate

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.

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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

1. 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-1398, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742551

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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.

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.

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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ECM		Sensor			
Connector	Terminal	Name	Connector	Terminal	
F101	46	CKP sensor (POS)	F2	1	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102	64	EVT control position sensor (bank 2)	F63	1	
		Battery current sensor	E21	1	
M407	103	APP sensor	E112	6	
M107 107		Refrigerant pressure sensor	E77	3	
YES >	> GO TO > Repair s	short to ground or short to power in	n harness or c	onnectors	

Check the following.

- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-1406, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to <u>EC-1439</u>, "Component Inspection".)
- Battery current sensor (Refer to EC-1468, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-1536, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-1499, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to EC-1499, "Special Repair Requirement".

>> INSPECTION END

8.CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F2	2	F101	47	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F2	3	F101	37	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.check crankshaft position sensor (pos)

Refer to EC-1400, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-96, "2WD : Exploded View"</u> (2WD models) or <u>EM-99, "AWD : Exploded View"</u> (AWD models).

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. Refer to EM-119, "Exploded View".

12. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742552

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

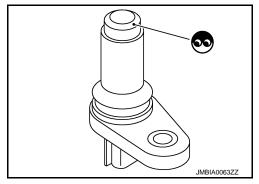
- 1. Turn ignition switch OFF.
- Loosen the fixing bolt of the sensor.
- 3. Disconnect crankshaft position sensor (POS) harness connector.
- Remove the sensor. Refer to <u>EM-96</u>, "<u>2WD</u>: <u>Exploded View</u>" (2WD models) or <u>EM-99</u>, "<u>AWD</u>: <u>Exploded View</u>" (AWD models).
- Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace

>> Replace crankshaft position sensor (POS). Refer to EM-96, "2WD : Exploded View" (2WD models) or EM-99, "AWD : Exploded View" (AWD models).



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]
2 (+) - 3 (-)	

Is the inspection result normal?

P0335 CKP SENSOR (POS)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> INSPECTION END

NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-96, "2WD : Exploded View"</u> (2WD models) or <u>EM-99, "AWD : Exploded View"</u> (AWD models).

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P0340, P0345 CMP SENSOR (PHASE)

Description INFOID:000000007742553

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.

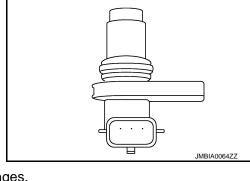
The sensor consists of a permanent magnet and Hall IC.

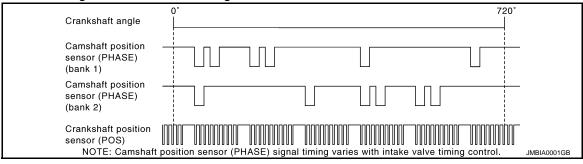
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1430, "DTC Logic".

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DTC No. Trouble diagnosis name		DTC detecting condition	Possible cause	
P0340	Camshaft position sensor (PHASE) (bank 1) circuit		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	
P0345	Camshaft position sensor (PHASE) (bank 2) circuit		Harness or connectors [CMP sensor (PHASE) (bank 2) circuit is open or shorted.]	
		 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 during engine running. The cylinder No. signal is not in the normal pattern during engine running. 	[CKP sensor (POS) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.]	
			(Battery current sensor circuit is shorted.) (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Camshaft position sensor (PHASE)	
			 (bank 2) Crankshaft position sensor (POS) Exhaust valve timing control position sensor (bank 2) 	
			Battery current sensor Accelerator pedal position sensor Refrigerant pressure sensor Camshaft (INT)	
			Starter motor Starting system circuit Dead (Weak) battery	

C 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.
- Turn ignition switch ON.
- 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 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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1404, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure-i

- Maintaining engine speed at more than 800 rpm for at least 5 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-1404, "Diagnosis Procedure".

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P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742555

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>STR-2, "Work Flow (With GR8-1200 NI)"</u> or <u>STR-5, "Work Flow (Without GR8-1200 NI)"</u>.

2. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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-i

- 1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
- Turn ignition switch ON.
- 3. Check the voltage between CMP sensor (PHASE) harness connector and ground.

DTC	CMP sensor (PHASE)			Ground	Voltage (V)
DIC	Bank	Connector	Terminal	Ground	voltage (v)
P0340	1	F5	1	Ground	Approx. 5
P0345	2	F18	1		

Is the inspection result normal?

YES >> GO TO 10.

NO-1 >> P0340: Repair open circuit or short to ground or short to power in harness or connectors.

NO-2 >> P0345: GO TO 4.

4. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

CMP sensor (PHASE)			EC	Continuity		
Bank	Connector	Terminal	Connector	Terminal	Continuity	
2	F18	1	F102	64	Existed	

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F106, F107
- Harness for open or short between CMP sensor (PHASE) and ECM

>> Repair open circuit or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
F101	46	CKP sensor (POS)	F2	1		
		CMP sensor (PHASE) (bank 2)	F18	1		
F102 64	64	EVT control position sensor (bank 2)	F63	1		
		Battery current sensor	E21	1		
M107		APP sensor	E112	6		
IVI 107	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 <u>EC-1400, "Component Inspection"</u>.)
- Exhaust valve timing control position sensor (bank 2) (Refer to <u>EC-1439</u>, "Component Inspection".)
- Battery current sensor (Refer to EC-1468, "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-1536, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace malfunctioning component.

8. CHECK APP SENSOR

Refer to EC-1499, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to EC-1499, "Special Repair Requirement".

>> INSPECTION END

10.check cmp sensor (phase) ground circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

DTC		CI	MP sensor (Pl	HASE)	EC	CM	Continuity
	ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
	P0340	1	F5	2	F102	96	Existed
	P0345	2	F18	2	F102	92	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.

NO-1 >> P0340: Repair open circuit or short to ground or short to power in harness or connectors.

NO-2 >> P0345: GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F106, F107
- Harness for open or short between CMP sensor (PHASE) and ECM

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>> Repair open circuit or short to power in harness or connectors.

12. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

DTC	CI	MP sensor (PI	HASE)	EC	CM	Continuity
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0340	1	F5	3	F102	59	Existed
P0345	2	F18	3	1 102	63	LXISIGU

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.

NO-1 >> P0340: Repair open circuit or short to ground or short to power in harness or connectors.

NO-2 >> P0345: GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F106, F107
- Harness for open or short between CMP sensor (PHASE) and ECM

>> Repair open circuit or short to power in harness or connectors.

14. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1406, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-68, "Exploded View".

15. CHECK CAMSHAFT (INT)

Check the following.

- · Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

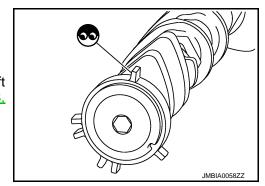
Is the inspection result normal?

YES >> GO TO 16.

NO

>> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to <u>EM-68</u>.

"Exploded View".



16. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742556

1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

- Turn ignition switch OFF.
- 2. Loosen the fixing bolt of the sensor.
- 3. Disconnect camshaft position sensor (PHASE) harness connector.
- 4. Remove the sensor. Refer to EM-68, "Exploded View".

P0340, P0345 CMP SENSOR (PHASE)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

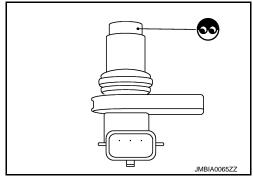
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace

>> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-68, "Exploded View".



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-68, "Exploded View".

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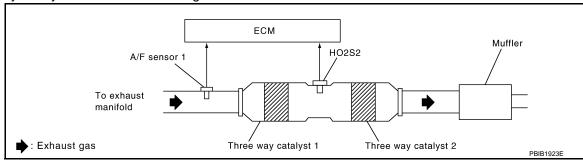
P0420, P0430 THREE WAY CATALYST FUNCTION

DTC Logic

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
P0430	Catalyst system efficiency below threshold (bank 2)	erate properly. Three way catalyst (manifold) does not have enough oxygen storage capacity.	Intake air leaksFuel injectorFuel injector leaksSpark plugImproper ignition timing

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.
- 2. Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

Will CONSULT be used?

YES >> GO TO 2. NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

(P)With CONSULT

TESTING CONDITION:

Do not hold engine speed for more than the specified minutes below.

- 1. Start engine and warm it up to the normal operating temperature.
- 2. 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. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- Let engine idle for 1 minute.
- 7. Select "DATA MONITOR" mode with CONSULT.
- Check 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).
- Open engine hood.
- 10. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT.

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS > 11. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive.

[VQ25HR FOR MEXICO]

pedal completely. 12. Check the indication of "CATALYST".	Α
Which is displayed on CONSULT screen?	
CMPLT >> GO TO 5.	EC
INCMP >> GO TO 3.	
3.PERFORM DTC CONFIRMATION PROCEDURE-II	0
 Wait 5 seconds at idle. Rev engine up to 2,000 to 3,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes). 	C
Does the indication change to "CMPLT"?	D
YES >> GO TO 5.	
NO >> GO TO 4.	Е
4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN	_
 Stop engine and cool it down to less than 70°C (158°F). Perform DTC CONFIRMATION PROCEDURE again. 	F
>> GO TO 2.	
5. PERFORM DTC CONFIRMATION PROCEDURE-III	G
Check 1st trip DTC.	
<u>Is 1st trip DTC detected?</u>	Н
YES >> Go to <u>EC-1410, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
6. PERFORM COMPONENT FUNCTION CHECK	
₩ Without CONSULT	1
Perform component function check. Refer to EC-1409, "Component Function Check".	
NOTE: Use component function check to check the overall function of the three way catalyst (manifold). During this	J
check, a 1st trip DTC might not be confirmed.	
Is the inspection result normal?	K
YES >> INSPECTION END	
NO >> Go to <u>EC-1410, "Diagnosis Procedure"</u> .	
Component Function Check	_
1.PERFORM COMPONENT FUNCTION CHECK	
®Without CONSULT	M
1. 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. 	Ν
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.	_
6. Let engine idle for 1 minute.7. Open engine hood.	0
8. Check the voltage between ECM harness connector terminals under the following condition.	
	D

Revision: 2013 February EC-1409 2012 G Sedan

P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

		ECM			
DTC	Connector	+	_	Condition	Voltage
	Connector	Terminal	Terminal		
P0420	F102	76 [HO2S2 (bank 1)]	- 84	Keeping engine speed at 2,500 rpm	The voltage fluctuation cycle takes more than 5 seconds.
P0430	1 102	80 [HO2S2 (bank 2)]		constant under no load	• 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1410, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007742559

1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

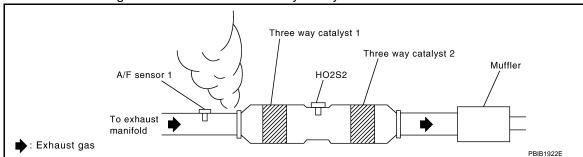
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2. CHECK EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. Listen for an exhaust gas leak before the three way catalyst 1.



Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 3.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace malfunctioning part.

NO >> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

Check idle speed and ignition timing.

For procedure, refer to EC-1174, "BASIC INSPECTION: Special Repair Requirement".

For specification, refer to EC-1589, "Idle Speed" and EC-1589, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the EC-1174, "BASIC INSPECTION: Special Repair Requirement".

CHECK FUEL INJECTORS

- 1. Stop engine and then turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as follows.

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	E	ECM		
	+	-	_	Voltage
Connector	Terminal	Connector Terminal		
	81			
	82	M107	128	Battery voltage
F102	85			
	86			
	89			
	90			

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform EC-1521, "Diagnosis Procedure".

 $oldsymbol{6}$.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

- Turn ignition switch OFF.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

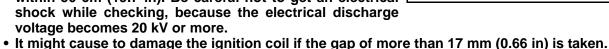
Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- 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. Refer to EM-47, "Removal and Installation".
- 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:

 Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical voltage becomes 20 kV or more.



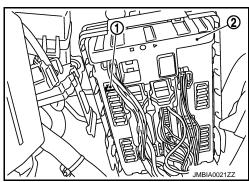
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

7.CHECK FUNCTION OF IGNITION COIL-II

Turn ignition switch OFF.



13 - 17 mm (0.52-0.66 in) Grounded metal portion

(Cylinder head, cylinder block, etc.)

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P0420, P0430 THREE WAY CATALYST FUNCTION

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

- Disconnect spark plug and connect a known-good spark plug.
- 3. Crank engine for approximately 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 8.

NO >> Check ignition coil, power transistor and their circuits. Refer to EC-1527, "Diagnosis Procedure".

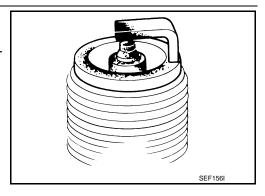
8. CHECK SPARK PLUG

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 EM-145. "Spark Plug".

NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for approximately 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?

YES >> INSPECTION END

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-145, "Spark Plug".

10. CHECK FUEL INJECTOR

- 1. Turn ignition switch OFF.
- Remove fuel injector assembly.

Refer to EM-38, "Removal and Installation".

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.
- Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> Replace the fuel injector(s) from which fuel is dripping. Refer to EM-38, "Removal and Installation".

NO >> GO TO 11.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace three way catalyst assembly. Refer to EX-5, "Exploded View".

NO >> Repair or replace harness or connector.

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

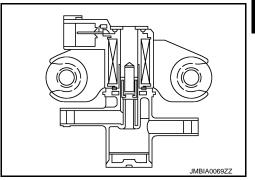
< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description INFOID:0000000007742570

The EVAP canister purge volume control solenoid valve uses a ON/ OFF duty 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.	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 solenoid 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.

>> GO TO 2.

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.

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-1413, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. 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.

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INFOID:0000000007742572

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P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VQ25HR FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

	ter purge vol- solenoid valve	Ground	Voltage
Connector	Terminal		
F7 1		Ground	Battery voltage

Is the inspection result normal?

YES >> 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 or 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.
- Disconnect ECM harness connector.
- Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge vol- ume control solenoid valve		EC	СМ	Continuity
Connector	Terminal	Connector	Terminal	
F7	2	F101	21	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 5.

YES-2 >> Without CONSULT: GO TO 6.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

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 or short to ground or short to power in harness or connectors.

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

(P)With CONSULT

- Reconnect all harness connectors disconnected.
- Start engine.
- Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YFS >> GO TO 7. NO >> GO TO 6.

$\mathsf{6}.$ CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1415, "Component Inspection".

Is the inspection result normal?

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VQ25HR FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 7.

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-14, "Exploded View".

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

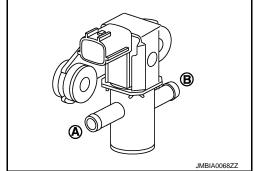
Component Inspection

${f 1}$.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

(P)With CONSULT

- 1. Turn ignition switch OFF.
- 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 C/V" in "ACTIVE TEST" mode with CONSULT.
- Touch "Qd" and "Qu" on CONSULT screen to adjust "PURG VOL CONT/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



(R) Without CONSULT

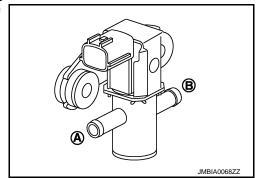
- Turn ignition switch OFF.
- Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the 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. Refer to FL-14, "Exploded View".



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[VQ25HR FOR MEXICO]

P0500 VSS

Description INFOID:000000007742611

ECM receives vehicle speed signals from two different paths via CAN communication line: One is from the ABS actuator and electric unit (control unit) via the combination unit and the other is from TCM.

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-1429</u>, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	At 20 km/h (13 MPH), ECM detects the following status continuously for 5 seconds or more: The difference between a vehicle speed calculated by a output speed sensor transmitted from TCM to ECM via CAN communication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).	Harness or connector (The CAN communication line is open or shorted.) Combination meter ABS actuator and electric unit (control unit) Wheel sensor TCM Output speed 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.
- 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 10 V or more at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine.
- 2. Shift the selector lever to D range and wait at least for 2 seconds.
- 3. Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more.

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.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1416, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742613

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-149, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.

P0500 VSS

[VQ25HR FOR MEXICO]

CDTC/CIRCUIT DIAGNOSIS >	[VQ25HR FOR MEXICO]
NO >> Perform trouble shooting relevant to DTC indicated.	
2 .CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONT	FROL UNIT)"
heck DTC with "ABS actuator and electric unit (control unit)". Refer to I	BRC-27, "CONSULT Function".
the inspection result normal?	
YES >> GO TO 3.	
NO >> Perform trouble shooting relevant to DTC indicated.	
CHECK DTC WITH "UNIFIED METER AND A/C AMP."	
check DTC with "unified meter and A/C amp.". Refer to MWI-38, "CONS	SULT Function (METER/M&A)".
s the inspection result normal? YES >> GO TO 4.	
NO >> Perform trouble shooting relevant to DTC indicated.	
CHECK OUTPUT SPEED SENSOR	
Check output speed sensor. Refer to TM-165, "DTC Logic".	
s the inspection result normal?	
YES >> GO TO 5.	
NO >> Replace or replace error-detected parts.	
CHECK WHEEL SENSOR	
heck wheel sensor. Refer to BRC-45, "DTC Logic".	
the inspection result normal?	
YES >> Check intermittent incident. Refer to <u>GI-43, "Intermittent Inci</u> NO >> Replace or replace error-detected parts.	<u>ident"</u> .
NO >> Neplace of replace effor-detected parts.	

P0506 ISC SYSTEM

Description INFOID:000000007742614

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

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 system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	Electric throttle control actuator Intake 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 target idle speed is out of the specified value, perform <u>EC-1180, "IDLE AIR VOLUME LEARNING: Special 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

- Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Restart engine and run it for at least 1 minute at idle speed.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1418, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742616

1. CHECK INTAKE AIR LEAK

- Start engine and let it idle.
- Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> GO TO 2.

P0506 ISC SYSTEM

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

2.REPLACE ECM

- 1. Stop engine.
- Replace ECM. Refer to <u>EC-1191</u>, "Component Parts Location".
 Go to <u>EC-1177</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

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P0507 ISC SYSTEM

Description INFOID:000000007742617

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

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 system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	Electric throttle control actuator Intake air leak PCV 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.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

If the target idle speed is out of the specified value, perform <u>EC-1180</u>, "IDLE AIR VOLUME LEARNING: <u>Special 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

- Start engine and warm it up to normal operating temperature.
- 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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1420, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742619

1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.

P0507 ISC SYSTEM

[VQ25HR FOR MEXICO] < DTC/CIRCUIT DIAGNOSIS > NO >> Repair or replace malfunctioning part. 2. CHECK INTAKE AIR LEAK Α Start engine and let it idle. 2. 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. C 3. REPLACE ECM 1. Stop engine. Replace ECM. Refer to EC-1191, "Component Parts Location". D 3. Go to EC-1177, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement". Е >> INSPECTION END F Н K L

EC-1421 Revision: 2013 February 2012 G Sedan

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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

DTC DETECTION LOGIC

NOTE:

If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-1430, "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

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.
- 2. Turn ignition switch ON.
- 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 at least 5 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1422, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742625

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK PSP SENSOR POWER SUPPLY CIRCUIT

- 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	Glodila	voltage (v)
F35	3	Ground	Approx. 5

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between PSP sensor harness connector and ECM harness connector.

PSP sensor		ECM		Continuity	
,	Connector	Terminal	Connector	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 or short to ground short to power in harness or connectors.

f 4.CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between PSP sensor harness connector and ECM harness connector.

PSP s	PSP sensor ECM Contin		ECM	
Connector	Terminal	Connector	Terminal	Continuity
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 or short to ground or short to power in harness or connectors.

5.CHECK PSP SENSOR

Refer to EC-1423, "Component Inspection".

Is the inspection result normal?

>> GO TO 6. YES

>> Replace PSP sensor. Refer to ST-56, "2WD: Exploded View" (2WD models) or ST-58, "AWD: NO Exploded View" (AWD models).

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. CHECK POWER STEERING PRESSURE SENSOR

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Start engine and let it idle.
- 4. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM		Condition		
Connector	+	_			Voltage (V)
Connector	Terminal	Terminal			
F102	87	96	Steering wheel Being turned		0.5 - 4.5
1 102	67	90	Steering wheel	Not being turned	0.4 - 0.8

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INFOID:0000000007742626

P0550 PSP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Is the inspection result normal?

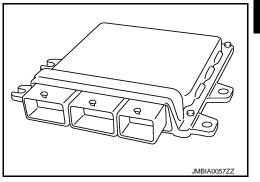
YES >> INSPECTION END

NO >> Replace power steering pressure sensor. Refer to <u>ST-56, "2WD : Exploded View"</u> (2WD models) or <u>ST-58, "AWD : Exploded View"</u> (AWD models).

P0603 ECM POWER SUPPLY

Description INFOID:0000000007742627

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 INFOID:0000000007742628

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
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.] 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.
- Turn ignition switch ON.
- 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.
- 2. Turn ignition switch OFF and wait at least 5 minutes.
- 3. Turn ignition switch OFF, wait at least 10 seconds.
- Repeat steps 2 and 3 for five times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-1425, "Diagnosis Procedure". YFS

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK ECM POWER SUPPLY

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the voltage between ECM harness connector terminals under the following conditions.

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P0603 ECM POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

	+	-		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 E25, F30
- 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-43, "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-1425</u>, "<u>DTC Logic"</u>.

Is the 1st trip DTC P0603 displayed again?

YES >> GO TO 5.

NO >> INSPECTION END

5. REPLACE ECM

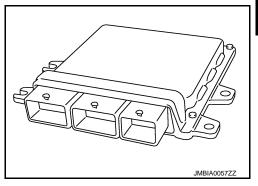
- Replace ECM. Refer to <u>EC-1191, "Component Parts Location"</u>.
- 2. Go to <u>EC-1177</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

P0605 ECM

Description INFOID:0000000007742630

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



DTC Logic INFOID:0000000007742631

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 Engine control module	A)	ECM calculation function is malfunctioning.		
	B)	ECM EEP-ROM system is malfunctioning.	• ECM	
		C)	ECM self shut-off function is malfunctioning.	

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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1428, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure for malfunction b

- Turn ignition switch ON and wait at least 1 second.
- Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1428, "Diagnosis Procedure".

NO >> GO TO 4.

f 4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

- Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- Repeat step 2 for 32 times.
- Check 1st trip DTC.

Is 1st trip DTC detected?

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P0605 ECM

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YES >> Go to EC-1428, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742632

1. INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See EC-1427, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

- 1. Replace ECM. Refer to EC-1191, "Component Parts Location".
- 2. Go to <u>EC-1177</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

[VQ25HR FOR MEXICO]

P0607 ECM

Description INFOID:0000000007742633

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:0000000007742634

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1429, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. INSPECTION START

- Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See EC-1429, "DTC Logic".
- Check DTC.

Is the DTC P0607 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

2.REPLACE ECM

- Replace ECM. Refer to EC-1191, "Component Parts Location".
- Go to EC-1177, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM): Special Repair Requirement".

>> INSPECTION END

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P0643 SENSOR POWER SUPPLY

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects a 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.] [EVT control position sensor (bank 1) circuit is shorted.] (PSP sensor circuit is shorted.) Accelerator pedal position sensor Throttle position sensor Camshaft position sensor (PHASE) (bank 1) Exhaust valve timing control position sensor (bank 1) Power steering 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-1430, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742637

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- Turn ignition switch ON.
- Check the voltage between APP sensor harness connector and ground.

APP s	ensor	Ground	Voltage (V)	
Connector Terminal		Ground	voltage (v)	
E112	5	Ground	Approx. 5	

P0643 SENSOR POWER SUPPLY

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[VQ25HR FOR MEXICO]

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>> GO TO 7. YES NO >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

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ECM		Sensor				
Connector	Terminal	Name	Connector	Terminal		
43		Electric throttle control actuator (bank 2)	F27	1		
F101	44	Electric throttle control actuator (bank 1)	F6	1		
		CMP sensor (PHASE) (bank 1)	F5	1		
F102	60	EVT control position sensor (bank 1)	F62	1		
		PSP sensor	F35	3		
M107	99	APP sensor	E112	5		
	41	1, 10	•			

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.

- Camshaft position sensor (PHASE) (bank 1) (Refer to EC-1406, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 1) (Refer to EC-1439, "Component Inspection".)
- Power steering pressure sensor (Refer to <u>EC-1423, "Component Inspection"</u>.)

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace malfunctioning component.

5.CHECK TP SENSOR

Refer to EC-1334, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 6.

$\mathsf{G}.\mathsf{REPLACE}$ ELECTRIC THROTTLE CONTROL ACTUATOR

- Replace electric throttle control actuator. Refer to EM-30, "Exploded View".
- Go to EC-1334, "Special Repair Requirement".

>> INSPECTION END

7. CHECK APP SENSOR

Refer to EC-1499, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 8.

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8.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to EC-1499, "Special Repair Requirement".

>> INSPECTION END

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

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P0643 SENSOR POWER SUPPLY

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>> INSPECTION END

P0850 PNP SWITCH

Description INFOID:0000000007742638

When the selector lever position is P or N, park/neutral position (PNP) signal from the TCM is sent to ECM.

DTC Logic INFOID:0000000007742639

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 is not changed in the process of engine starting and driving.	Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.] TCM

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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

Will CONSULT be used?

YES >> GO TO 2.

NO >> GO TO 4.

2.CHECK PNP SIGNAL

(P)With CONSULT

1. Turn ignition switch ON.

Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT. Then check the "P/N POSI SW" signal under the following conditions.

Position (Selector lever)	Known-good signal
N or P position	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-1434, "Diagnosis Procedure".

3. PERFORM DTC CONFIRMATION PROCEDURE

- Select "DATA MONITOR" mode with CONSULT.
- Start engine and warm it up to normal operating temperature.
- Maintain the following conditions for at least 50 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	1,200 - 6,375 rpm
COOLAN TEMP/S	More than 70 °C (158 °F)
B/FUEL SCHDL	1.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

Check 1st trip DTC.

Is 1st trip DTC detected?

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YES >> Go to EC-1434, "Diagnosis Procedure".

NO >> INSPECTION END

4. PERFORM COMPONENT FUNCTION CHECK

⋈ Without CONSULT

Perform component function check. Refer to EC-1434, "Component Function Check".

NOTE:

Use component function check to 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-1434, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007742640

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

- 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	109	128	Selector lever	P or N	Battery voltage	
IVI I O I	109	120	Selector level	Except above	Approx. 0	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1434, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007742641

1. CHECK DTC WITH TCM

Refer to TM-149, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

Does starter motor operate?

YES >> GO TO 3.

NO >> Check DTC with BCM. Refer to <u>BCS-16</u>, "COMMON ITEM : CONSULT Function (BCM - COM-MON ITEM)".

3.CHECK PNP SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect A/T assembly harness connector.
- Disconnect ECM harness connector.
- 4. Check the continuity between A/T assembly harness connector and ECM harness connector.

A/T ass	embly	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F51	9	M107	109	Existed

5. Also check harness for short to ground and short to power.

P0850 PNP SWITCH		
< DTC/CIRCUIT DIAGNOSIS >	[VQ25HR FOR MEXICO]	
Is the inspection result normal?	A	
YES >> GO TO 5. NO >> GO TO 4.	Λ.	
4. DETECT MALFUNCTIONING PART	EC	
Check the following. • Harness connectors F30, E25		
 Harness connectors E106, M6 	C	
 Harness for open or short between A/T assembly and ECM 	C	
>> Repair open circuit or short to ground or short to power in harness or	connectors.	i
5. CHECK INTERMITTENT INCIDENT		
Refer to GI-43, "Intermittent Incident".	E	
>> INSPECTION END		
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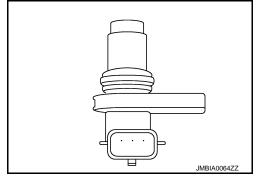
Description INFOID:0000000007742642

Exhaust valve timing control position sensor detects the concave groove of the exhaust camshaft rear end.

This sensor signal is used for sensing a position of the exhaust camshaft.

This sensor uses a Hall IC.

Based on the position of the exhaust camshaft, ECM controls exhaust valve timing control magnet retarder to optimize the shut/open timing of exhaust valve for the driving condition.



DTC Logic

DTC DETECTION LOGIC

NOTE:

If DTC P1078 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1430, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1078	Exhaust valve timing control position sensor (bank 1) circuit		Harness or connectors [EVT control position sensor (bank 1) circuit is open or shorted) Exhaust valve timing control position sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 1) Accumulation of debris to the signal pick-up portion of the camshaft
P1084	Exhaust valve timing control position sensor (bank 2) circuit	An excessively high or low voltage from the sensor is sent to ECM.	Harness or connectors [EVT control position sensor (bank 2) circuit is open or shorted) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Exhaust valve timing control position sensor (bank 2) Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Battery current sensor Accelerator pedal position sensor Refrigerant pressure sensor Accumulation of debris to the signal pick-up portion of the camshaft

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.

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>> GO TO 2.

2.perform dtc confirmation procedure

Start engine and let it idle for 10 seconds.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1437, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742644

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-I

- Disconnect exhaust valve timing control position sensor harness connector.
- Turn ignition switch ON. 2.
- Check the voltage between exhaust valve timing control position sensor harness connector and ground.

DTC	EVT	control position	Ground	Voltage (V)	
DIC	Bank	Connector	Terminal	Giodila	vollage (v)
P1078 1		F62	1	Ground	Approx. 5
P1084	2	F63	1	Giodila	дрріох. 3

Is the inspection result normal?

YES >> GO TO 8.

NO-1 >> P1078: Repair open circuit or short to ground or short to power in harness or connectors.

NO-2 >> P1084: GO TO 3.

3.check exhaust valve timing control position sensor power supply circuit-ii

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

EVT control position sensor			EC	Continuity	
Bank	Connector Terminal		Connector	Terminal	Continuity
2	F63	1	F102	64	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

f 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	46	CKP sensor (POS)	F2	1	

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ECM		Sensor			
Connector	Terminal	Name Connector Ter			
		CMP sensor (PHASE) (bank 2)	F18	1	
F102 64		EVT control position sensor (bank 2)	F63	1	
		Battery current sensor	E21	1	
M107	103	APP sensor	E112	6	
IVI I U /	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 <u>EC-1400, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-1406, "Component Inspection".)
- Battery current sensor (Refer to <u>EC-1468, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-1536, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-1499. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to EC-1499, "Special Repair Requirement".

>> INSPECTION END

8.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

DTC	EVT control position sensor		ECM		Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1078	1	F62	2	F102	88	Existed
P1084	2	F63	2	1 102	00	LAISIEU

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

$oldsymbol{9}.$ CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between exhaust valve timing control position sensor harness connector and ECM harness connector.

< DTC/CIRCUIT DIAGNOSIS >

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DTC	EVT control position sensor			ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1078	1	F62	3	F102	58	Existed
P1084	2	F63	3	1 102	62	LXISIGU

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Refer to EC-1439, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace malfunctioning exhaust valve timing control position sensor. Refer to EM-47, "Exploded

11. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-1400, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

>> Replace crankshaft position sensor (POS). Refer to EM-96, "2WD : Exploded View" (2WD mod-NO els) or EM-99, "AWD: Exploded View" (AWD models).

12. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1406, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-68, "Exploded View".

13. CHECK CAMSHAFT (EXH)

Check the following;

- Accumulation of debris to the signal plate of camshaft rear end
- · Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 14.

NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-68,

"Exploded View".

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14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

1. EXHAUST VALVE TIMING CONTROL POSITION SENSOR-I

Turn ignition switch OFF.

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- Disconnect exhaust valve timing control position sensor harness connector. 2.
- Loosen the fixing bolt of the sensor. 3.
- Remove the sensor. Refer to EM-47, "Exploded View".

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EC-1439

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

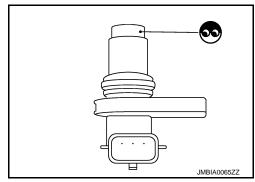
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Replace malfunctioning exhaust valve timing control position sensor. Refer to EM-47, "Exploded View".



$2.\mathsf{exhaust}$ valve timing control position sensor-ii

Check resistance exhaust valve timing control position sensor terminals as shown below.

Terminals	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]
2 (+) - 3 (-)	

Is the inspection result normal?

YES >> INSPECTION END

NO

>> Replace malfunctioning exhaust valve timing control position sensor. Refer to EM-47, "Exploded <a href="View".

P1211 TCS CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1211 TCS CONTROL UNIT

Description INFOID:0000000007742648

The malfunction information related to TCS is transferred through 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 INFOID:0000000007742649

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 a 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

- Start engine and let it idle for at least 60 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-1441, "Diagnosis Procedure"

NO >> INSPECTION END

Diagnosis Procedure

Go to TM-96, "Diagnosis Flow".

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P1212 TCS COMMUNICATION LINE

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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-1429</u>, "<u>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 shorted.) 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.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1442, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

Go to TM-96, "Diagnosis Flow".

Revision: 2013 February EC-1442 2012 G Sedan

INFOID:0000000007742653

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1217 ENGINE OVER TEMPERATURE

DTC Logic INFOID:0000000007742654

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 EC-1429, "DTC Logic".

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will

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 shorted.) IPDM E/R Cooling fan control module Cooling fan motor Radiator hose Radiator cap Water pump Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-9, "Draining" and CO-10, <u>"Refilling"</u>. Also, replace the engine oil. Refer to <u>LU-11, "Draining"</u>and <u>LU-12, "Refilling"</u>.

- Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-18, "FOR NORTH AMERICA: Anti-Freeze Coolant Mixture Ratio".
- 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-1443, "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 EC-1444, "Diagnosis Procedure".

Component Function Check

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.

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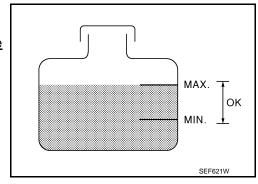
Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

<u>Is the coolant level in the reservoir tank and/or radiator below the proper range?</u>

YES >> Go to EC-1444, "Diagnosis Procedure".

NO >> GO TO 2.



2. PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Go to EC-1444, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform component function check-iii

(I) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Check that cooling fan speed varies according to the percent.

♥Without CONSULT

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1444, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007742656

1. CHECK COOLING FAN OPERATION

(II) With CONSULT

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Check that cooling fan speed varies according to the percent.

Without CONSULT

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>".
- Check that cooling fan operates.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-1515, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-9, "Inspection".

Is leakage detected?

YES >> GO TO 3.

NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.

- Hose
- Radiator
- Water pump

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-13, "RADIATOR CAP: Inspection".

Is the inspection result normal?

YES >> GO TO 5.

>> Replace radiator cap. Refer to CO-15, "Exploded View". NO

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-29, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace thermostat. Refer to CO-28, "Removal and Installation".

6.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1331, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace engine coolant temperature sensor. Refer to CO-32, "VQ37VHR: Exploded View".

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-18, "FOR NORTH AME ant Mixture Ratio"	ERICA : Anti-Freeze Cool-
	3	Coolant level	Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-9, "Inspection"
	4	Radiator cap	Pressure tester	107 kPa (1.1 kg/cm ² , 16 psi) (Limit)	CO-13, "RADIATOR CAP : Inspection"
ON* ²	5	Coolant leaks	Visual	No leaks	CO-9, "Inspection"
ON* ²	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-29, "Inspection"
ON* ¹	7	Cooling fan	CONSULT	Operating	EC-1515, "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 reservoir tank	Visual	No overflow during driving and idling	CO-9, "Inspection"
OFF* ⁴	10	Coolant return from reservoir tank to radiator	Visual	Should be initial level in reservoir tank	CO-9, "Inspection"
OFF	11	Cylinder head	Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-116, "Inspection"
	12	Cylinder block and pistons	Visual	No scuffing on cylinder walls or piston	EM-128, "Inspection"

^{*1:} Turn the ignition switch ON.

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^{*2:} Engine running at 3,000 rpm for 10 minutes.

^{*3:} Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

For more information, refer to CO-7, "Troubleshooting Chart".

>> INSPECTION END

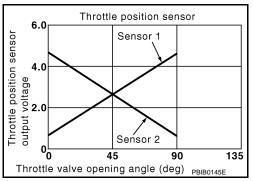
^{*4:} After 60 minutes of cool down time.

P1225, P1234 TP SENSOR

Description INFOID:0000000007742657

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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic INFOID:0000000007742658

DTC DETECTION LOGIC

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.
- 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.

2.PERFORM DTC CONFIRMATION PROCEDURE

Turn ignition switch ON.

>> GO TO 2.

- 2. Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1447, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

${f 1}$.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Turn ignition switch OFF.
- Remove the intake air duct. Refer to EM-28, "Removal and Installation".

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P1225, P1234 TP SENSOR

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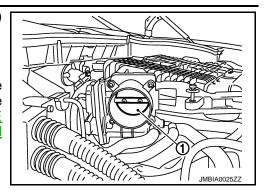
3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007742660

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

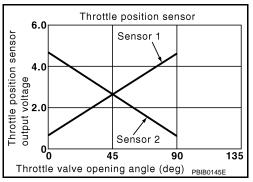
>> END

P1226, P1235 TP SENSOR

Description INFOID:0000000007742661

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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance (bank 1)	Closed throttle position learning is not performed	Electric throttle control actuator
P1235	Closed throttle position learning 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.

2.perform dtc confirmation procedure

1. Turn ignition switch ON.

>> GO TO 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.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1449, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- Remove the intake air duct. Refer to EM-28, "Removal and Installation".

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P1226, P1235 TP SENSOR

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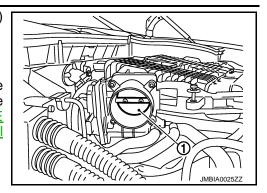
3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".



2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007742664

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1233, P2101 ELECTRIC THROTTLE CONTROL FUNCTION

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 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

DTC DETECTION LOGIC

NOTE:

If DTC P1233 or P2101 is displayed with DTC P1238, P1290, first perform the trouble diagnosis for DTC P1238, P2119. Refer to EC-1458, "DTC Logic".

If DTC P1233 or P2101 is displayed with DTC P2100, P2119, first perform the trouble diagnosis for DTC P1290, P2100. Refer to EC-1463, "DTC Logic".

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.
- Start engine and let it idle for 5 seconds.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1451, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

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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 follows.

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	ECM					
DTC	+		-		Condition	Voltage (V)
	Connector	Terminal	Connector	Terminal		
P1233	F102	52			Ignition switch OFF	Approx. 0
1 1233	1 102	32	M107	128	Ignition switch ON	Battery voltage
P2101	F101	3	IVITO	120	Ignition switch OFF	Approx. 0
F2101	1 101	3			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 3.

${f 3.}$ CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- 3. Disconnect IPDM E/R harness connector E7.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E7	70	F101	25	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.

- Harness connectors E25, F30
- Harness connectors F104, F105
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Check the continuity between IPDM E/R harness connector and ECM harness connector.

DTC	IPDM E/R		ECM		Continuity
ы	Connector	Terminal	Connector	Terminal	Continuity
P1233	E7	54	F102	52	Existed
P2101	E/	34	F101	3	Existed

2. Also check harness for short to ground and short to power.

<u>Is the inspection result normal?</u>

YES >> GO TO 7. NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- Harness for open or short between ECM and IPDM E/R
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

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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?

>> GO TO 8. YES

NO >> Replace 15 A fuse.

8 . CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

>> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation". YES

NO >> Repair or replace harness or connectors.

9.check throttle control motor output signal circuit for open or short

- Turn ignition switch OFF.
- Disconnect electric throttle control actuator harness connector.
- Disconnect ECM harness connector. 3.
- 4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electri	c throttle cont	rol actuator	Continuity		Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity		
			5		49	Existed		
P1233	2	F27	3	F102	50	Not existed		
F 1233		Γ21	6	F 102	49	Not existed		
			6	O	O		50	Existed
			6		2	Existed		
P2101	1	F6	б	0	F101	4	Not existed	
FZ101	'	1.0	5	1 101	2	Not existed		
			3		4	Existed		

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace malfunctioning part.

10.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- Remove the intake air duct. Refer to EM-28, "Removal and Installation".
- 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, and then perform throttle valve closed position learning. Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-1454, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 13.

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12. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunction electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000007742668

1. CHECK THROTTLE CONTROL MOTOR

- 1. Turn ignition switch OFF.
- Disconnect electric throttle control actuator harness connector.
- 3. Check resistance between electric throttle control actuator terminals as follows.

Resistance	Electric throttle control actuator		
ixesistance	Terminals	Bank	
Approx. 1 - 15 Ω [at 25°C (77°F)]	1 and 2	1	
Αρρίολ. 1 - 10 32 [αι 20 0 (77 1)]	5 and 6	2	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator. Refer to <u>EM-30, "Exploded View"</u>.
- Go to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007742669

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1180. "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

P1236, P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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P1236, P2118 THROTTLE CONTROL MOTOR

Description INFOID:0000000007742670

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

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.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1455, "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-46. "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.
- Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

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INFOID:0000000007742672

EC-1455

DTC	Electric	c throttle cont	rol actuator	tor ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
			5		49	Existed
P1236	2	F27	3	F102	Not existed	
F 1230	2	1 21	6		49	Not existed
			0		50	Existed
			6		2	Existed
P2118	1	F6	0	F101		Not existed
	'	1-0	5	2 Not	Not existed	
			5		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 malfunctioning part.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-1456, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness or connectors.

${f 5.}$ REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:0000000007742673

1. CHECK THROTTLE CONTROL MOTOR

- Turn ignition switch OFF.
- Disconnect electric throttle control actuator harness connector.
- 3. Check resistance between electric throttle control actuator terminals as follows.

Electric throttle	e control actuator	Resistance
Bank	Terminals	resistance
1	1 and 2	Approx. 1 - 15 Ω [at 25°C (77°F)]
2	5 and 6	Αρριολ. 1 - 10 <u>22 [at 25 G (77 T)]</u>

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. Refer to EM-30, "Exploded View".
- 2. Go to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

P1236, P2118 THROTTLE CONTROL MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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>> INSPECTION END	Α
Special Repair Requirement	
1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	EC
Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"	
	С
>> GO TO 2.	
2.PERFORM IDLE AIR VOLUME LEARNING	D
Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"	
>> END	Е
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P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description INFOID:000000007742675

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 the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

DTC Logic

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
P1238	Electric throttle control	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	
	actuator (bank 2)	B)	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
P2119	Electric throttle control	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	2 Electric throttle control actuator
	actuator (bank 1)	B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

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.

>> GO TO 2.

2.perform dtc confirmation procedure for malfunction a and b

- 1. Turn ignition switch ON and wait at least 1 second.
- Shift selector lever to D position and wait at least 3 seconds.
- 3. Shift selector lever to P position.
- 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 and wait at least 3 seconds.
- 7. Shift selector lever to P position.
- 8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 9. Check DTC.

Is DTC detected?

YES >> Go to EC-1459, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure for malfunction ${ t c}$

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Shift selector lever to D position and wait at least 3 seconds.
- 3. Shift selector lever to P position.

P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Start engine and let it idle for 3 seconds.

5. Check DTC.

Is DTC detected?

YES >> Go to EC-1459, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

INFOID:0000000007742677

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

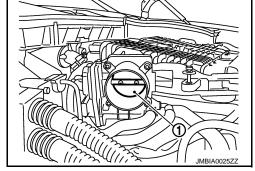
- Turn ignition switch OFF.
- Remove the intake air duct. Refer to EM-28, "Removal and Installation". 2.
- 3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

YES >> GO TO 2.

NO

>> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".



2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".
- 2. Go to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007742678

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING; Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

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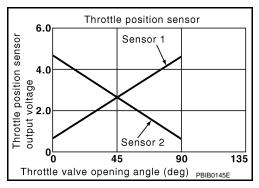
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P1239, P2135 TP SENSOR

Description INFOID:000000007742679

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 potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:0000000007742680

DTC DETECTION LOGIC

NOTE:

If DTC P1239 or P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1430, "DTC Logic".

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 and 2 circuit is open or shorted.)
P2135	Throttle position sensor (bank 1) circuit range/ performance	and TP sensor 2.	Electric throttle control actuator (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.
- 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

- Start engine and let it idle for 1 second.
- 2. Check DTC.

Is DTC detected?

YES >> Go to EC-1460, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742681

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

P1239, P2135 TP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

- Disconnect electric throttle control actuator harness connector.
- Turn ignition switch ON.
- Check the voltage between electric throttle control actuator harness connector and ground.

DTC	Electr	ic throttle cont	rol actuator	Ground Voltage (V)		
DIO	Bank	Connector	Terminal	Ground	voltage (v)	
P1239	2	F27	1	Ground	Approx. 5	
P2135	1	F6	1	Giodila	Αρρίολ. 5	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.check throttle position sensor ground circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

DTC	Electric throttle control actuator			EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1239	2	F27	4	F101	48	Existed
P2135	1	F6	4	FIUI	40	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

f 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	Electric throttle control actuator			ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1239	2	F27	2		31	
P1239		Γ21	3	F101	35	Existed
D242E	1	F6	2	FIUI	30	Existed
P2135	ı	го	3		34	

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Refer to EC-1334, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

O.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

Replace malfunctioning electric throttle control actuator. Refer to EM-30, "Exploded View".

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EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742682

1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal Terminal			
	30	40	Accelerator pedal: Fully released	More than 0.36
	[TP sensor 1 (bank 1)]	40	Accelerator pedal: Fully depressed	Less than 4.75
	31 [TP sensor 1 (bank 2)]	48	Accelerator pedal: Fully released	More than 0.36
F101			Accelerator pedal: Fully depressed	Less than 4.75
FIUI	34	40	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 1)]	40	Accelerator pedal: Fully depressed	More than 0.36
	35	48	Accelerator pedal: Fully released	Less than 4.75
	[TP sensor 2 (bank 2)]	40	Accelerator pedal: Fully depressed	More than 0.36

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.replace electric throttle control actuator

- Replace malfunctioning electric throttle control actuator. Refer to <u>EM-30, "Exploded View"</u>.
- 2. Go to EC-1462, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007742683

1. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement"

>> END

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description INFOID:0000000007742684

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

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.

- 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.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1463, "Diagnosis Procedure".

NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

- 1. Turn ignition switch ON and wait at least 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1463, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.

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P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

- 3. Disconnect IPDM E/R harness connector E7.
- 4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM	E/R	EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E7	70	F101	25	Existed

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 E25, F30
- Harness connectors F104, F105
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

${f 3.}$ CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Check the continuity between IPDM E/R sensor harness connector and ECM harness connector.

	10014 E/D E014				
DTC	IPDM	E/R	EC	JM.	Continuity
БТО	Connector	Terminal	Connector	Terminal	Continuity
P1290			F102	52	
P2100	E7	54	F101	3	Existed
P2103	= = <i>t</i>	54	F101	3	Existed
F2103			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 E25, F30
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or 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.

NO >> Replace 15 A fuse.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".

NO >> Repair or replace harness or connectors.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1550 BATTERY CURRENT SENSOR

Description INFOID:0000000007742687

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-12. "System Description".

CAUTION:

Do not 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 the battery discharge may occur.

DTC Logic INFOID:0000000007742688

DTC DETECTION LOGIC

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.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Accelerator pedal position 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.
- Turn ignition switch ON.
- 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

- Start engine and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-1466, "Diagnosis Procedure". YES

NO >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Diagnosis Procedure

INFOID:0000000007742689

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- 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	Glound	voltage (v)	
E21	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

3.check battery current sensor power supply circuit-ii

- 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	ECM		Continuity	
Connector	Terminal	Connector Terminal			
E21	1	F102	64	Existed	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open between battery current sensor and ECM

>> Repair open circuit.

5. 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	46	46 CKP sensor (POS)		1	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102	02 64	EVT control position sensor (bank 2)	F63	1	
		Battery current sensor	E21	1	
M107	103	APP sensor	E112	6	
IVITO7	107	Refrigerant pressure sensor	E77	3	

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> GO TO 6.

NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-1400, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-1406, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1439, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-1536, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

.CHECK APP SENSOR

Refer to EC-1499, "Component Inspection",

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1499, "Special Repair Requirement".

>> INSPECTION END

9.check battery current sensor ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	Battery current sensor ECM		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 11.

NO >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		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 13.

NO >> GO TO 12.

EC-1467 Revision: 2013 February 2012 G Sedan

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK BATTERY CURRENT SENSOR

Refer to EC-1468, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

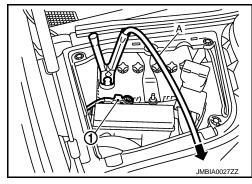
Component Inspection

INFOID:0000000007742690

1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 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 under the following conditions.

	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 $\underline{\text{PG-3. "How to Handle Battery"}}$.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace battery negative cable assembly.

P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1551, P1552 BATTERY CURRENT SENSOR

Description INFOID:0000000007742691

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-12. "System Description".

CAUTION:

Do not 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 the battery discharge may occur.

DTC Logic INFOID:0000000007742692

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
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.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Battery current sensor • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 2) • Exhaust valve timing control position sensor (bank 2) • Accelerator pedal position sensor • Refrigerant pressure sensor	H I J K

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.
- 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 with ignition switch ON

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 10 seconds.
- 2. Check 1st trip DTC.

Is 1st trip DTC detected?

>> Go to EC-1470, "Diagnosis Procedure".

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P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742693

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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		voltage (v)	
E21	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

3.check battery current sensor power supply circuit-ii

- 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 current sensor		ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
E21	1	F102	64	Existed	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- · Harness for open between battery current sensor and ECM

>> Repair open circuit.

5. 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	F101 46 CKP sensor (POS)		F2	1	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102	02 64	EVT control position sensor (bank 2)	F63	1	
		Battery current sensor	E21	1	
M107	103	APP sensor	E112	6	
M107	107	Refrigerant pressure sensor	E77	3	

P1551 P1552 BATTERY CURRENT SENSOR

P1551, P1552 BATTERY CURRENT SE	
< DTC/CIRCUIT DIAGNOSIS >	[VQ25HR FOR MEXICO]
Is the inspection result normal? YES >> GO TO 6.	Α
NO >> Repair short to ground or short to power in harness or connector	
6.CHECK COMPONENTS	
Check the following. Crankshaft position sensor (POS) (Refer to EC-1400, "Component Inspection Camshaft position sensor (PHASE) (bank 2) (Refer to EC-1406, "Componed Exhaust valve timing control position sensor (bank 2) (Refer to EC-1439, "Componed Refrigerant pressure sensor (Refer to EC-1536, "Diagnosis Procedure".)	ent Inspection".)
Is the inspection result normal? YES >> GO TO 7.	D
NO >> Replace malfunctioning component.	
7.CHECK APP SENSOR	F
Refer to EC-1499, "Component Inspection".	
Is the inspection result normal? YES >> GO TO 14. NO >> GO TO 8.	F
8. REPLACE ACCELERATOR PEDAL ASSEMBLY	
 Replace accelerator pedal assembly. Refer to <u>ACC-3, "Removal and Ins</u> Go to <u>EC-1499, "Special Repair Requirement"</u>. 	tallation".
>> INSPECTION END	Н
9. CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN	I AND SHORT
Turn ignition switch OFF.	
Disconnect ECM harness connector.	
3. Check the continuity between battery current sensor harness connector	
Battery current sensor ECM	J
Connector Terminal Connector Terminal	
E21 2 F102 95 Existed	K
4. Also check harness for short to ground and short to power.	
Is the inspection result normal?	L
YES >> GO TO 11. NO >> GO TO 10.	
10. DETECT MALFUNCTIONING PART	M
Check the following.	_
 Harness connectors F30, E25 Harness for open or short between battery current sensor and ECM 	N
>> Repair open circuit or short to ground or short to power in harnes 11.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR	

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		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 13.

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P1551, P1552 BATTERY CURRENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK BATTERY CURRENT SENSOR

Refer to EC-1480, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

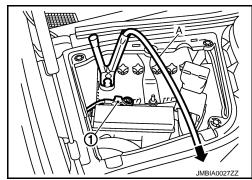
Component Inspection

INFOID:0000000007742694

1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 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 under the following conditions.

Connector	Voltage (V)			
Connector	Terminal	Terminal	1	
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.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1553 BATTERY CURRENT SENSOR

Description INFOID:0000000007742695

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-12. "System Description".

CAUTION:

Do not 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 the battery discharge may occur.

DTC Logic INFOID:0000000007742696

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	(-
P1553	Battery current sensor performance	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.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Accelerator pedal position sensor Refrigerant pressure sensor	F

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.
- 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

- Start engine and wait at least 10 seconds.
- Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1474, "Diagnosis Procedure".

NO >> INSPECTION END

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Diagnosis Procedure

INFOID:0000000007742697

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- 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		
E21	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

3.check battery current sensor power supply circuit-ii

- 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 current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E21	1	F102	64	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open between battery current sensor and ECM

>> Repair open circuit.

5. 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	46	CKP sensor (POS)	F2	1	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102	F102	64	EVT control position sensor (bank 2)	F63	1
		Battery current sensor	E21	1	
M107	103	APP sensor	E112	6	
WITO7	107	Refrigerant pressure sensor	E77	3	

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> GO TO 6.

NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-1400, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-1406, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1439, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-1536, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

.CHECK APP SENSOR

Refer to EC-1499, "Component Inspection",

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3. "Removal and Installation".
- 2. Go to EC-1499, "Special Repair Requirement".

>> INSPECTION END

9.check battery current sensor ground circuit for open and short

- Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		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 11.

NO >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		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 13.

NO >> GO TO 12. EC

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK BATTERY CURRENT SENSOR

Refer to EC-1480, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

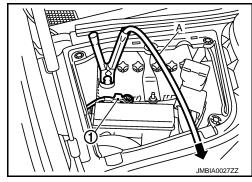
Component Inspection

INFOID:0000000007742698

1. CHECK BATTERY CURRENT SENSOR

- 1. Turn ignition switch OFF.
- 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 under the following conditions.

Connector	+ -			
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.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

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INFOID:0000000007742701

P1554 BATTERY CURRENT SENSOR

Description INFOID:0000000007742699

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-12, "System Description".

CAUTION:

Do not 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 the battery discharge may occur.

DTC Logic (INFOID:000000007742700

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	Harness or connectors (Battery current sensor circuit is open or shorted.) [CKP sensor (POS) circuit is shorted.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Battery current sensor Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Accelerator pedal position sensor Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <a>EC-1477, "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 EC-1478, "Diagnosis Procedure".

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.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

>> GO TO 2.

$2.\mathsf{PERFORM}$ COMPONENT FUNCTION CHECK

(I) With CONSULT

- Start engine and let it idle.
- Select "BAT CUR SEN" in "DATA MONITOR" mode with CONSULT.
- 3. Check "BAT CUR SEN" indication for 10 seconds.
 - "BAT CUR SEN" should be above 2,300 mV at least once.

♥Without CONSULT

- 1. Start engine and let it idle.
- 2. Check the voltage between ECM harness connector terminals as follows.

	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-1478, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007742702

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- 2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- Disconnect battery current sensor harness connector.
- 2. Turn ignition switch ON.
- Check the voltage between battery current sensor harness connector and ground.

Battery cur	rent sensor	Ground	Voltage (V)	
Connector Terminal		Glound	vollage (v)	
E21	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

3.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery curr	ent sensor	E	CM	Continuity
Connector	Terminal	Connector Terminal		Continuity
E21	1	F102	64	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open between battery current sensor and ECM

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>> Repair open circuit.

${f 5}$.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	46	CKP sensor (POS)	F2	1	
		CMP sensor (PHASE) (bank 2)	F18	1	
F102	64	EVT control position sensor (bank 2)	F63	1	
		Battery current sensor	E21	1	
M107	103	APP sensor	E112	6	
WHO7	107	Refrigerant pressure sensor	E77	3	

Is the inspection result normal?

>> GO TO 6. YES

NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-1400, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-1406, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1439, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-1536, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

.CHECK APP SENSOR

Refer to EC-1499, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 8.

8.replace accelerator pedal assembly

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to EC-1499, "Special Repair Requirement".

>> INSPECTION END

9.check battery current sensor ground circuit for open and short

1. Turn ignition switch OFF.

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- Disconnect ECM harness connector.
- 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

Also check harness for short to ground and short to power.

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- · Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. 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 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, E25
- Harness for open or short between battery current sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK BATTERY CURRENT SENSOR

Refer to EC-1480, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> Replace battery negative cable assembly.

14. CHECK INTERMITTENT INCIDENT

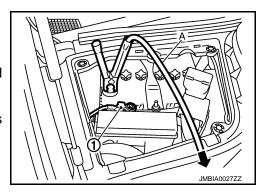
Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection 1.CHECK BATTERY CURRENT SENSOR

INFOID:0000000007742703

- 1. Turn ignition switch OFF.
- 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 under the following conditions.



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[VQ25HR FOR MEXICO]

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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[VQ25HR FOR MEXICO]

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 EC-1225, "System Description" for the ASCD function.

DTC Logic INFOID:000000007742705

DTC DETECTION LOGIC

NOTE:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1427, "DTC Logic".

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

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.
- Turn ignition switch ON.
- 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.
- 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
- 5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
- 6. Check DTC.

Is DTC detected?

YES >> Go to EC-1482, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742706

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

(II) With CONSULT

P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

- 1. Turn ignition switch ON.
- 2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT.
- 3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
WAIN SW	WAIN SWILCH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCLL SW	CANCLE SWILLI	Released	OFF
RESUME/ACC SW	RESUME/ACCEL-	Pressed	ON
RESONIE/ACC SW	ERATE switch	Released	OFF
SFT SW	SET/COAST switch	Pressed	ON
SLI SVV	SET/COAST SWICH	Released	OFF

W Without CONSULT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM			
Connector -	+ - Terminal Terminal		Condition	Voltage (V)
	101 (ASCD steering switch signal)	108	MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 1
M107			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.

3.check ascd steering switch ground circuit for open and short

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Disconnect combination switch (spiral cable) harness connector.
- 4. Check the continuity between combination switch (spiral cable) and ECM harness connector.

Combination sw	EC	CM	Continuity	
Connector Terminal		Connector	Terminal	Continuity
M303	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 or short to ground or short to power in harness or connectors.

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P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

${f 5.}$ CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between combination switch (spiral cable) and ECM harness connector.

Combination switch (spiral cable)		ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
M303	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 (spiral cable)

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-1484, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace ASCD steering switch. Refer to <u>SR-10</u>, "Exploded View".

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742707

1. CHECK ASCD STEERING SWITCH

- 1. Turn ignition switch OFF.
- 2. Disconnect combination switch (spiral cable) harness connector.
- 3. Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.

	ion switch cable)	Condition	Resistance (Ω)	
Connector	Terminals			
		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. 1,490	
		All ASCD steering switches: Released	Approx. 3,980	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD steering switch. Refer to <u>SR-10, "Exploded View"</u>.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1572 ASCD BRAKE SWITCH

Description INFOID:0000000007742708

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 this input of two kinds (ON/OFF signal).

Refer to EC-1225, "System Description" for the ASCD function.

DTC Logic INFOID:0000000007742709

DTC DETECTION LOGIC

NOTE:

• If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1427, "DTC Logic".

 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 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 vehicle is driving.	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.
- Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

(P)With CONSULT

- Start engine (VDC switch OFF).
- Select "DATA MONITOR" mode with CONSULT.
- 3. Press MAIN switch and check that CRUISE is indicated on the information display on the combination meter.
- 4. 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.

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< DTC/CIRCUIT DIAGNOSIS >

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position

Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-1486, "Diagnosis Procedure".

NO >> GO TO 3.

3.perform dtc confirmation procedure

(P)With CONSULT

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.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

Check 1st trip DTC.

With GST

Follow the procedure "With CONSULT" above.

Is 1st trip DTC detected?

YES >> Go to EC-1486, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742710

1.CHECK OVERALL FUNCTION-I

(II) With CONSULT

- 1. Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition	Indication	
DDAKE SW4	Brake pedal	Slightly depressed	OFF
DIVARL SWI	Brake pedar	Fully released	ON

W Without CONSULT

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals as follows.

ECM					
Connector +		_	Condition Voltage		Voltage (V)
Connector Terminal		Terminal			
M107	126	128	Brake pedal	Slightly depressed	Approx. 0
WITOT	(ASCD brake switch signal)	ke switch signal)		Fully released	Battery voltage

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> GO TO 2. NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

(P) With CONSULT

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
	Бтаке рецаг	Fully released	OFF

Check the voltage between ECM harness connector terminals under the following conditions.

ECM						
Connector +		_	Condition		Voltage (V)	
Terminal		Terminal				
M107	122	128	Brake pedal	Slightly depressed	Battery voltage	
	(Stop lamp switch signal)	120	Diake pedal	Fully released	Approx. 0	

Is the inspection result normal?

YES >> GO TO 13.

NO >> GO TO 8.

3.check ascd brake switch power supply circuit

- Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ke switch	Ground	Voltage	
Connector Terminal		Giodila	voltage	
E109	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

f 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

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD brake switch		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E109	2	M107	126	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

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< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> GO TO 7. NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- Harness for open or short to between ASCD brake switch and ECM
 - >> Repair open circuit or short to ground in harness or connectors.

7.CHECK ASCD BRAKE SWITCH

Refer to EC-1489, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace ASCD brake switch. Refer to BR-18, "Exploded View".

8.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 Terminal		Giodila	voltage	
E119	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. 7)
- Harness for open or short between stop lamp switch and battery
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

10.check stop lamp switch input signal circuit for open and short

- Disconnect ECM harness connector.
- Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lam	Stop lamp switch		ECM	
Connector	Terminal	Connector Terminal		Continuity
E119	2	M107	122	Existed

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.

- Fuse block (J/B) connectors E103, M2
- · Harness for open or short between ECM and stop lamp switch
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

12. CHECK STOP LAMP SWITCH

Refer to EC-1489, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace stop lamp switch. Refer to BR-18, "Exploded View".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

1.CHECK ASCD BRAKE SWITCH-I

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector. 2.
- Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
T dild 2	Drake pedar	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

- Adjust ASCD brake switch installation. Refer to BR-19, "Inspection and Adjustment".
- Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
	brake pedar	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to BR-18, "Exploded View".

Component Inspection (Stop Lamp Switch)

1.CHECK STOP LAMP SWITCH-I

- Turn ignition switch OFF.
- Disconnect stop lamp switch harness connector. 2.
- Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake nedal	Fully released	Not existed
1 4110 2	Brake pedal	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

- Adjust stop lamp switch installation. Refer to BR-7, "Inspection and Adjustment".

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Check the continuity between stop lamp switch terminals under the following conditions.

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
	Diake pedai	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to .

P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1574 ASCD VEHICLE SPEED SENSOR

Description INFOID:0000000007742713

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 ASCD control. Refer to EC-1225, "System Description" for ASCD functions.

INFOID:0000000007742714

DTC Logic

DTC DETECTION LOGIC

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 EC-1416, "DTC Logic".
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1427, "DTC Logic".
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1429, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	(
P1574	ASCD vehicle speed sensor	ECM detects a difference between 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	ı

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.
- Turn ignition switch ON.
- Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

- Start engine (VDC switch OFF).
- Drive the vehicle at more than 40 km/h (25 MPH).

CAUTION:

Always drive vehicle at a safe speed.

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.

Check DTC.

Is DTC detected?

YES >> Go to EC-1491, "Diagnosis Procedure".

>> INSPECTION END NO

Diagnosis Procedure

Revision: 2013 February

1. CHECK DTC WITH TCM

Is the inspection result normal?

Check DTC with TCM. Refer to TM-149, "Diagnosis Description".

EC-1491

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P1574 ASCD VEHICLE SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

 $2.\mathsf{CHECK}$ DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"

Refer to BRC-27, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

 ${\bf 3.}$ CHECK DTC WITH "UNIFIED METER AND A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

>> INSPECTION END

P1715 INPUT SPEED SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

P1715 INPUT SPEED SENSOR

Description INFOID:0000000007742716

ECM receives input speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

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DTC DETECTION LOGIC

NOTE:

DTC Logic

- If DTC P1715 is displayed with DTC UXXXX first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-1397, "DTC Logic".
- If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to <u>EC-1402</u>, "<u>DTC Logic"</u>.
- If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1427, "DTC Logic".
- If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-1429</u>, "<u>DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input speed signal is different from the theoretical value calculated by ECM from output speed sensor signal and engine rpm signal.	Harness or connectors (The CAN communication line is open or shorted) Harness or connectors (Input speed sensor circuit is open or shorted) TCM

Diagnosis Procedure

INFOID:0000000007742718

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-149, "Diagnosis Description".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to TM-273, "Removal and Installation".

>> INSPECTION END

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P1805 BRAKE SWITCH

Description INFOID:0000000007742719

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 driving.

DTC Logic

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 extremely long time while the vehicle is driving.	Harness or connectors (Stop lamp switch circuit is open or shorted.) Stop lamp switch

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- Fully depress the brake pedal for at least 5 seconds.
- Erase the DTC.
- 4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1494, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742721

1. CHECK STOP LAMP SWITCH CIRCUIT

- 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	Giodila	voltage
E119	1	Ground	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/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

2012 G Sedan

 Harness for open or short between stop lamp switch and battery Α >> Repair open circuit or short to ground or short to power in harness or connectors. f 4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT EC Disconnect stop lamp switch harness connector. Disconnect ECM harness connector. 2. Check the continuity between stop lamp switch harness connector and ECM harness connector. **ECM** Stop lamp switch Continuity Connector Terminal Connector Terminal D E119 M107 122 Existed Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 6. NO >> GO TO 5. ${f 5.}$ DETECT MALFUNCTIONING PART Check the following. Fuse block (J/B) connector E103, M2 · Harness for open or short between ECM and stop lamp switch >> Repair open circuit or short to ground or short to power in harness or connectors. 6.CHECK STOP LAMP SWITCH Refer to EC-1495, "Component Inspection (Stop Lamp Switch)". Is the inspection result normal? YES >> GO TO 7. NO >> Replace stop lamp switch. Refer to BR-18, "Exploded View". 7. CHECK INTERMITTENT INCIDENT Refer to GI-43, "Intermittent Incident". K >> INSPECTION END Component Inspection (Stop Lamp Switch) INFOID:0000000007742722 1.CHECK STOP LAMP SWITCH-I 1. Turn ignition switch OFF. Disconnect stop lamp switch harness connector. 2. Check the continuity between stop lamp switch terminals under the following conditions. N **Terminals** Condition Continuity Fully released Not existed 1 and 2 Brake pedal Slightly depressed Existed Is the inspection result normal? YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

- Adjust stop lamp switch installation. Refer to BR-19, "Inspection and Adjustment".
- Check the continuity between stop lamp switch terminals under the following conditions.

P1805 BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
	Diake pedai	Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch. Refer to <u>BR-18</u>, "Exploded View".

Accelerator pedal position sensor

Accelerator pedal operation

Release -

Sensor 1

Sensor 2

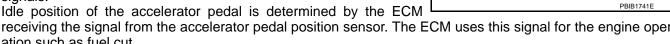
→ Depress

P2122, P2123 APP SENSOR

Description INFOID:0000000007742723

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 potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals 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.



DTC Logic INFOID:0000000007742724

receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

DTC DETECTION LOGIC

NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1430, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal position 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 position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	Accelerator pedal position 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.
- 2. Turn ignition switch ON.
- 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

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

YES >> Go to EC-1497, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

EC-1497 Revision: 2013 February 2012 G Sedan

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INFOID:0000000007742725

[VQ25HR FOR MEXICO]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

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 so	ensor	Ground	Voltage (V)
Connector	Terminal	Glound	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 or 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	al Connector Terminal		Continuity
Ī	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 or short to ground or short to power in harness or connectors.

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 sensor		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.

P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M6, E106
- Harness for open or short between ECM and accelerator pedal position sensor

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>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-1499, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- Go to EC-1499, "Special Repair Requirement".

>> INSPECTION END

10.check intermittent incident

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742726

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Turn ignition switch ON.
- Check the voltage ECM harness connector terminals under the following conditions.

'	ECM				
Connector	+ -		Condition		Voltage (V)
Connector	Terminal	Terminal			
	97 (APP sensor 1)	100	Accelerator podal	Fully released	0.45 - 1.0
M107	37 (Al 1 3611301 1)			Fully depressed	4.4 - 4.8
WHO	98 (APP sensor 2)	104	Accelerator pedal	Fully released	0.22 - 0.50
	96 (AFF SellSUI 2)			Fully depressed	2.1 - 2.5

Is the inspection result normal?

YES >> INSPECTION END

>> GO TO 2. NO

2.replace accelerator pedal assembly

- Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1499, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007742727

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-1179, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

EC-1499 Revision: 2013 February 2012 G Sedan

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>> GO TO 2.

$2. {\tt PERFORM\ THROTTLE\ VALVE\ CLOSED\ POSITION\ LEARNING}$

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

Accelerator pedal position sensor

Release ←

Sensor 1

Sensor 2

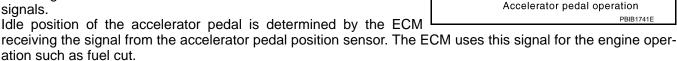
→ Depress

P2127, P2128 APP SENSOR

Description INFOID:0000000007742728

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 potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals 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.



DTC Logic INFOID:0000000007742729

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 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 position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	[CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) (bank 2) • Exhaust valve timing control position sensor (bank 2) • Battery current 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.

- Turn ignition switch OFF and wait at least 10 seconds.
- Turn ignition switch ON.
- 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

- Start engine and let it idle for 1 second.
- Check DTC.

Is DTC detected?

EC-1501 Revision: 2013 February 2012 G Sedan

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P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

YES >> Go to EC-1502, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007742730

2012 G Sedan

1. CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "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.
- Check the voltage between APP sensor harness connector and ground.

APP so	ensor	Ground	Voltage (V)	
Connector	Terminal	Glound	voitage (v)	
E112	6	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 3.

${f 3.}$ 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		EC	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 APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
F101	46	CKP sensor (POS)	F2	1
		CMP sensor (PHASE) (bank 2)	F18	1
F102 64	64	EVT control position sensor (bank 2)	F63	1
		Battery current sensor	E21	1

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

EC	CM	Sensor		
Connector	Terminal	Name	Connector	Terminal
M107	103	APP sensor	E112	6
WHO7	107	Refrigerant pressure sensor	E77	3

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Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair short to ground or short to power in harness or connectors.

6. CHECK COMPONENTS

Check the following.

- Crankshaft position sensor (POS) (Refer to <u>EC-1400, "Component Inspection"</u>.)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-1406, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1439, "Component Inspection".)
- Battery current sensor (Refer to <u>EC-1468, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to EC-1536, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning component.

7.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity	
Connector	Terminal	Connector Terminal		Continuity	
E112	2	M107	104	Existed	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

$oldsymbol{\mathsf{S}}.\mathsf{DETECT}$ MALFUNCTIONING PART

Check the following.

- Harness connectors M6, E106
- · Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
E112	1	M107	98	Existed

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 M6, E106
- Harness for open or short between ECM and accelerator pedal position sensor

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Revision: 2013 February

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK APP SENSOR

Refer to EC-1504, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

12. REPLACE ACCELERATOR PEDAL ASSEMBLY

- 1. Replace accelerator pedal assembly. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1504, "Special Repair Requirement".

>> INSPECTION END

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000007742731

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

- Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals under the following conditions.

	ECM		Condition		Voltage (V)
Connector	+	-			
Connector	Terminal	Terminal			
	97 (APP sensor 1)	100	- Accelerator pedal	Fully released	0.45 - 1.0
M107	97 (AFF SellSOI I)			Fully depressed	4.4 - 4.8
MITO	98 (APP sensor 2)	104	Accelerator pedar	Fully released	0.22 - 0.50
	96 (AFF Sellsol 2)			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. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1510, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007742732

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-1179, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

P2127, P2128 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

3.perform idle air volume learning

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

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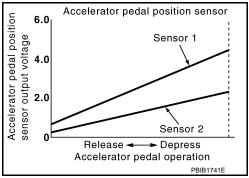
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P2138 APP SENSOR

Description INFOID.000000007742733

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 potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals 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 the engine operation 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 EC-1430, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position 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.] [CMP sensor (PHASE) (bank 2) circuit is shorted.] [EVT control position sensor (bank 2) circuit is shorted.] (Battery current sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) Accelerator pedal position sensor (APP sensor 2) Crankshaft position sensor (POS) Camshaft position sensor (PHASE) (bank 2) Exhaust valve timing control position sensor (bank 2) Battery current 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.

- 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.

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

P2138 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

1. Start engine and let it idle for 1 second.

Check DTC.

Is DTC detected?

YES >> Go to EC-1507, "Diagnosis Procedure".

NO >> INSPECTION END

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Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

2. Check ground connection M95. Refer to Ground Inspection in GI-46, "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

- 1. Disconnect accelerator pedal position (APP) sensor harness connector.
- Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP se	ensor	Ground	Voltage (V)	
Connector	Terminal	Ground	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 or 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.
- 2. Check the voltage between APP sensor harness connector and ground.

APP se	ensor	Ground	Voltage (V)	
Connector	Terminal	Ciodila		
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

- Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP se	APP sensor		ECM	
Connector	Terminal	Connector Terminal		Continuity
E112	6	M107	103	Existed

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 7. NO >> GO TO 6.

6. 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.

7. 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	46	CKP sensor (POS)	F2	1		
		CMP sensor (PHASE) (bank 2)	F18	1		
F102	64	EVT control position sensor (bank 2)	F63	1		
		Battery current sensor	E21	1		
M407	103	APP sensor	E112	6		
M107	107	Refrigerant pressure sensor	E77	3		

Is the inspection result normal?

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-1400, "Component Inspection".)
- Camshaft position sensor (PHASE) (bank 2) (Refer to EC-1406, "Component Inspection".)
- Exhaust valve timing control position sensor (bank 2) (Refer to EC-1439, "Component Inspection".)
- Battery current sensor (Refer to EC-1468, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-1536, "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.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sei	nsor	ECM		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F112	4	M107	100	Existed
LIIZ	2	IVITO7	104	LAISIEU

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 M6, E106
- Harness for open or short between ECM and accelerator pedal position sensor

 Check t 	he continu	uity betwee	n APP se	nsor harnes	ss connector and ECM harness connector.	EC
		,				LC
APP se	ensor	EC	CM	Continuity		
Connector	Terminal	Connector	Terminal	Continuity		С
E112	3	M107	97 98	Existed		
2. Also che	-	ss for short		d and short	to nower	D
Is the inspec			t to groun	a and short	to power.	
YES >>	GO TO 13	3.				Е
	GO TO 12					
12. DETEC	CT MALFU	JNCTIONII	NG PART			_
Check the formalHarness c		M6 E106				-
				and accele	erator pedal position sensor	
	-					G
			or short to	ground or s	short to power in harness or connectors.	
13. CHEC	K APP SE	NSOR				Н
Refer to EC		•	nspection	"		
Is the inspec				- -		
		t normal?		_ ·		
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YES >> NO >> 14.REPLA 1. Replace 2. Go to E 15.CHECI Refer to GI- >> Compone 1.CHECK A 1. Turn igr 2. Reconn 3. Turn igr	GO TO 19 GO TO 19 GO TO 19 ACE ACCE Caccelera C-1510. "S INSPECT K INTERM 43. "Intern INSPECT CONTROLL CONTROLL	tor pedal a Special Reference Inches	ssembly. pair Requ NCIDENT dent".	ASSEMBLY Refer to AC irement".	C-3, "Removal and Installation".	L
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	ECM				Voltage (V)	
Connector	+	_	Condition			
Connector	Terminal	Terminal				
	97 (APP sensor 1)	100		Fully released	0.45 - 1.0	
M107			Accelerator pedal	Fully depressed	4.4 - 4.8	
WHO7	00 (ADD concer 2)	404	Accelerator pedar	Fully released	0.22 - 0.50	
	98 (APP sensor 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. Refer to ACC-3, "Removal and Installation".
- 2. Go to EC-1510, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000007742737

1. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to <u>EC-1179</u>, "ACCELERATOR PEDAL RELEASED POSITION LEARNING: Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-1180, "THROTTLE VALVE CLOSED POSITION LEARNING: Special Repair Requirement".

>> GO TO 3.

3.perform idle air volume learning

Refer to EC-1180, "IDLE AIR VOLUME LEARNING: Special Repair Requirement".

>> END

ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

ASCD BRAKE SWITCH

Description INFOID:0000000007742741

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 this input of two kinds (ON/OFF signal).

Refer to EC-1225, "System Description" for the ASCD function.

Component Function Check

CHECK ASCD BRAKE SWITCH FUNCTION

(II) With CONSULT

- 1. Turn ignition switch ON.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT.
- Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition	Indication	
BRAKE SW1	Brake pedal	Slightly depressed	OFF
DIVARL SWI	Brake pedal	Fully released	ON

₩ Without CONSULT

- 1. Turn ignition switch ON.
- Check the voltage between ECM harness connector terminals as follows.

	ECM				
Connector	+ -		Condition		Voltage (V)
Connector	Terminal	Terminal			
M107	126	128	Brake pedal	Slightly depressed	Approx. 0
WITOT	(ASCD brake switch signal)	120	brake pedar	Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1511, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector. 2.
- Turn ignition switch ON.
- Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ike switch	Ground	Voltage	
Connector	Terminal	Glound	voltage	
E109	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.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

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< DTC/CIRCUIT DIAGNOSIS >

>> Repair open circuit or short to ground in harness or connectors.

3.CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Disconnect ECM harness connector.
- Check the continuity between ASCD brake switch harness connector and ECM harness connector.

	ASCD brake switch		ECM		Continuity	
	Connector	Terminal	Connector Terminal		Continuity	
٠	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 5. NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- · Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD BRAKE SWITCH

Refer to EC-1512, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace ASCD brake switch. Refer to <u>BR-18</u>, "Exploded View".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

INFOID:0000000007742744

1. CHECK ASCD BRAKE SWITCH-I

- Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector.
- 3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK ASCD BRAKE SWITCH-II

- 1. Adjust ASCD brake switch installation. Refer to BR-19. "Inspection and Adjustment".
- 2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly depressed	Not existed

ASCD BRAKE SWITCH

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to BR-18, "Exploded View".

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ASCD INDICATOR

Description INFOID.000000007742745

The ASCD operation status is indicated by two indicators (CRUISE and SET on the information display) on the 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-1225, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000007742746

1. CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITIC	SPECIFICATION	
CRUISE	Ignition switch: ON	MAIN switch: Pressed at the 1st time →at the 2nd time	$ON \to OFF$
057	MAIN switch: ON	ASCD: Operating	ON
SET	When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1514, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007742747

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-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-113, "Removal and Installation".

NO >> Repair or replace malfunctioning part.

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COOLING FAN

Description INFOID:0000000007742748

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

1. CHECK COOLING FAN FUNCTION

With CONSULT

- 1. Turn ignition switch ON.
- Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT.
- 3. Check that cooling fan speed varies according to the percent.

Without CONSULT

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-9</u>, "<u>Diagnosis</u> <u>Description</u>".
- 2. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1515, "Diagnosis Procedure".

Diagnosis Procedure

1. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- Disconnect cooling fan control module harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module harness connector and ground.

Cooling fan c	ontrol module		Voltage	
Connector	Terminal		vollage	
E37	3	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK COOLING FAN CONTROL MODULE GROUND CIRCUIT

- 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	Terminal	Ground	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.

3.CHECK IPDM E/R GROUND CIRCUIT

- 1. Disconnect IPDM E/R harness connectors.
- 2. Check the continuity between IPDM E/R harness connector and ground.

IPDM	E/R	Ground	Continuity	
Connector Terminal		Ground	Continuity	
E5	12	Ground	Existed	
E6	41	Giodila	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.
- Check the continuity between IPDM E/R harness connector and cooling fan control module harness connector.

IPDM	IPDM E/R		Cooling fan control module	
Connector	Terminal	Connector Terminal		Continuity
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 or short to ground or short to power in harness or connectors.

5. CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT

- 1. Reconnect all harness connectors disconnected.
- Disconnect cooling fan control module harness connectors.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan control module harness connectors and ground.

Cooling fan d	ontrol module	Ground	Voltage	
Connector	Terminal	Glound	voltage	
E301 4		Ground	Battery voltage	
E302	6	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace cooling fan control module. Refer to CO-19, "Exploded View".

6.CHECK COOLING FAN MOTORS -1 AND -2

Refer to EC-1517, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace cooling fan motor. Refer to CO-19, "Exploded View".

7. CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect cooling fan relay harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between cooling fan relay harness connector and ground.

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Cooling	fan relay	Ground	Voltage		
Connector	Terminal	Giouna	voitage		
E17	1	Ground	Battery voltag	ge	
the insp	3 ection resu	ılt norma	12	<u>—</u>	
′ES >:	> GO TO 9 > GO TO 8	9.	<u> </u>		
.DETEC	T MALFU	NCTIONI	NG PART		
	following.				
	e (No. 42) R harness	connecto	or E7		
	ble link (le) L <i>1</i>		
Harness	for open o	or short be		ing fan relay and fuse	
Harness	for open o	or short be	etween coolii	ing fan relay and battery	
	•	•		ground or short to power in harness or connectors.	
CHECK	COOLIN	G FAN C	ONTROL MO	ODULE POWER SUPPLY CIRCUIT-III	
Turn iç	gnition swi	tch OFF.			
Discor	nect IPDI	И E/R haւ	rness connec		
Check	the contir	nuity betw	een cooling	fan relay harness connector and IPDM E/R harness connector.	
Cooling	fan relay	IDF	OM E/R		
cooming	Terminal	Connecto		Continuity	
E17	2	E6	42	Existed	
Check	the contin	uity betw	een cooling	fan relay harness connector and cooling fan control module harr	ness
conne		,	.	,	
Cooling t	fan relav	Cooling fa	ın control modul	le l	
onnector	Terminal	Connecto		— Continuity	
	5		3		
E17		E37		Existed	
			•	d and short to power.	
	ection resu		<u> </u>		
	> GO TO		iit or short to	ground or short to power in harness or connectors.	
_	CK COOLI	-		ground or short to power in marriess or confidencials.	
			•	<u>(Cooling Fan Relay)"</u> .	
	ection resu		<u>l?</u>		
	> GO TO		on roles: Def	for to EC 1101 "Component Derta Leastion"	
-	•	_	-	fer to .EC-1191, "Component Parts Location"	
			INCIDENT		
rform <u>G</u>	l-43, "Inter	mittent Ir	ncident".		
the inspe	ection resu	ult norma	l?		

Is the inspection result normal?

>> Replace IPDM E/R. Refer to <u>PCS-31, "Removal and Installation"</u>. >> Repair or replace harness connectors.

Component Inspection (Cooling Fan Motor)

1. CHECK COOLING FAN MOTOR

Turn ignition switch OFF.

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- 2. Disconnect cooling fan control module harness connectors.
- 3. Supply cooling fan control module harness connector terminals with battery voltage and check operation.

Cool	ling fan contro				
Motor	Connector	Terminal		Operation	
IVIOLOI	Connector	(+)	(-)		
1	E301	4	5	Cooling fan operates.	
2	E302	6	7	Cooling ian operates	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan motor. Refer to CO-19, "Exploded View".

Component Inspection (Cooling Fan Relay)

INFOID:0000000007742752

1. CHECK COOLING FAN RELAY

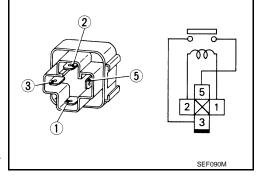
- 1. Turn ignition switch OFF.
- 2. Remove cooling fan relay. Refer to EC-1191, "Component Parts Location".
- 3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
J and J	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan relay. Refer to <u>EC-1191, "Component Parts Location"</u>.



ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

ELECTRICAL LOAD SIGNAL

Description INFOID:0000000007742753

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line.

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Component Function Check

1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- Turn ignition switch ON.
- 2. Connect CONSULT and select "DATA MONITOR" mode.
- Select "LOAD SIGNAL" and check indication under the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
LOAD GIONAL	Real William delogger switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-1519, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

Check "LOAD SIGNAL" indication under the following conditions.

Monitor item	Co	Indication	
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
	Lighting switch	OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to EC-1519, "Diagnosis Procedure".

${f 3}$.CHECK HEATER FAN CONTROL SWITCH FUNCTION

Select "HEATER FAN SW" and check indication under the following conditions.

Monitor item	Monitor item Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
TILATER TAN OW	Treater fair control switch	OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1519, "Diagnosis Procedure".

Diagnosis Procedure

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-1519, "Component Function Check".

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 DEF-3, "Work Flow"

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ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-4, "Work Flow".

>> INSPECTION END

4. CHECK HEATER FAN CONTROL SYSTEM

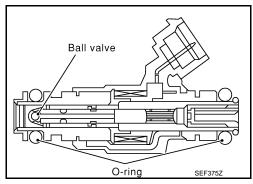
Refer to HAC-4, "Work Flow".

>> INSPECTION END

FUEL INJECTOR

Description INFOID:0000000007742756

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

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.

NO >> Go to EC-1521, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

(P)With CONSULT

- Start engine.
- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Check that each circuit produces a momentary engine speed drop.

®Without CONSULT

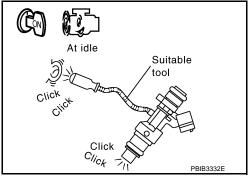
- Start engine.
- Listen to each fuel injector operating sound.

Clicking sound should be heard.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1521, "Diagnosis Procedure".



Diagnosis Procedure

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- Disconnect fuel injector harness connector.
- Turn ignition switch ON.
- Check the voltage between fuel injector harness connector and ground.

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	Fuel injecto	Ground	Voltage	
Cylinder	Connector	Terminal	Ground	voltage
1	F71	1		
2	F72	1		
3	F73	1	Ground	Battery voltage
4	F74	1	Ground	Ballery Vollage
5	F75	1		
6	F76	1		

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- IPDM E/R harness connector E7
- 10 A fuse (No. 44)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

${f 3.}$ CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F71	2		89	
2	F72	2		85	
3	F73	2	F102	81	Existed
4	F74	2	1 102	90	LAISIEU
5	F75	2		86	
6	F76	2		82	

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

Check the following.

- Harness connectors F106, F107
- Harness for open or short between fuel injector and ECM
 - >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL INJECTOR

Refer to EC-1523, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning fuel injector. Refer to EM-38, "Removal and Installation".

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".

NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Component Inspection

1. CHECK FUEL INJECTOR

Turn ignition switch OFF.

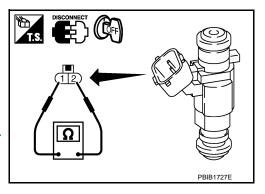
- 2. Disconnect fuel injector harness connector.
- Check resistance between fuel injector terminals as follows.

Terminals	Resistance
1 and 2	11.1 - 14.5 Ω [at 10 - 60°C (60 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END

>> Replace malfunctioning fuel injector. Refer to EM-38. NO "Removal and Installation".



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FUEL PUMP

Description INFOID:000000007742760

Sensor	Input signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay ↓
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 start ability. 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.	
Except as shown above	Stops.	

Component Function Check

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1. CHECK FUEL PUMP FUNCTION

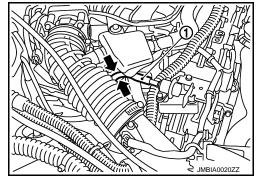
- Turn ignition switch ON.
- Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END

NO >> EC-1524, "Diagnosis Procedure".



INFOID:0000000007742762

Diagnosis Procedure

1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

- 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	СМ	Ground	Voltage	
Connector Terminal			vollage	
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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Check the voltage between IPDM E/R harness connector and ground.

IPDI	Л E/R	Ground	Voltage	
Connector	Connector Terminal		voltage	
E7	77	Ground	Battery voltage	

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Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 10.

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3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- Harness connectors F104, F105
- Harness for open or short between IPDM E/R and ECM

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>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- Reconnect all harness connectors disconnected.
- Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- Turn ignition switch ON.
- Check the voltage between "fuel level sensor unit and fuel pump (main)" harness connector and ground.

	— Ground	
Connector Terminal		Voltage
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.

$\mathbf{5}.$ CHECK 15 A FUSE

Turn ignition switch OFF.

- Disconnect 15 A fuse (No. 41) from IPDM E/R.
- Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuse.

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6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

- Disconnect IPDM E/R harness connector.
- Check the continuity between IPDM E/R harness connector and "fuel level sensor unit and fuel pump (main)" harness connector.

IPDM	E/R		uel level sensor unit and fuel pump (main)		
Connector	Terminal	Connector	Terminal		
E5	13	B22	1	Existed	

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.

>> GO TO 7. NO

.DETECT MALFUNCTIONING PART

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Check the following.

- Harness connectors E117, B9
- IPDM E/R harness connector E5
- Harness for open or short between IPDM E/R and "fuel level sensor unit and fuel pump (main)"
 - >> Repair open circuit or short to power in harness or connectors.

8. CHECK FUEL PUMP GROUND CIRCUIT

- 1. Turn ignition switch OFF.
- Check the continuity between "fuel level sensor unit and fuel pump (main)" harness connector and ground.

Fuel level sensor unit and fuel pump (main)			Ground	Continuity
Connecto	or	Terminal		
B22		3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair open circuit or short to power in harness or connectors.

9.CHECK FUEL PUMP

Refer to EC-1526, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace fuel pump. Refer to FL-6, "Removal and Installation".

10. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-31, "Removal and Installation".

NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:0000000007742763

1. CHECK FUEL PUMP

- Turn ignition switch OFF.
- 2. Disconnect "fuel level sensor unit and fuel pump (main)" harness connector.
- 3. Check resistance between "fuel level sensor unit and fuel pump (main)" terminals as follows.

Terminals	Resistance
1 and 3	0.2 - 5.0 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace "fuel level sensor unit and fuel pump (main)". Refer to FL-6, "Removal and Installation".

IGNITION SIGNAL

Description INFOID:0000000007742764

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.

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Component Function Check

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

Does the engine start?

YES-1 >> With CONSULT: GO TO 2.

YES-2 >> Without CONSULT: GO TO 3.

>> Go to EC-1527, "Diagnosis Procedure".

2.CHECK IGNITION SIGNAL FUNCTION

(P)With CONSULT

- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT.
- Check that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YFS >> INSPECTION END

NO >> Go to EC-1527, "Diagnosis Procedure".

3.check ignition signal function

W Without CONSULT

Let engine idle.

Read the voltage signal between ECM harness connector terminals under the following conditions with an oscilloscope.

ECM			
	-		Voltage signal
Terminal	Connector	Terminal	
11			
12			50mSec/div
15	M407	128	
16	M107		=
19			
20			2V/div JMBIA0035GB

NOTE:

Connector

F101

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1527, "Diagnosis Procedure".

Diagnosis Procedure

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

- Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
- Check the voltage between ECM harness connector terminals under the following conditions.

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INFOID:0000000007742766

Connector	+	_	Voltage
Connector	Terminal	Terminal	
M107	125	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to EC-1295, "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.

Condenser		Ground	Voltage	
Connector	Terminal	Ground	voltage	
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.
- 3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

IPDM E/R		Cond	Continuity	
Connector	or Terminal Connector Termina		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 EC-1295, "Diagnosis Procedure".

NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E25, F30
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Check the continuity between condenser harness connector and ground.

Condenser		Ground	Continuity	
Connector	Terminal	Oround	Continuity	
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.

IGNITION SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

6. CHECK CONDENSER

Refer to EC-1531, "Component Inspection (Condenser)"

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace condenser.

7.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

- Reconnect all harness connectors disconnected.
- 2. Disconnect ignition coil harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ignition coil harness connector and ground.

Ignition coil			Ground	Voltago	
Cylinder	Connector	Terminal	Giodila	Voltage	
1	F11	3			
2	F12	3		Battery voltage	
3	F13	3	Ground		
4	F14	3	Giodila	battery voltage	
5	F15	3			
6	F16	3	1		

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector E25, F30
- Harness for open or short between ignition coil and harness connector F30

>> Repair or replace harness or connectors.

$9.\mathsf{CHECK}$ IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal	Giodila	Continuity
1	F11	2		Existed
2	F12	2	Ground	
3	F13	2		
4	F14	2	Giodila	
5	F15	2		
6	F16	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit or short to power in harness or connectors.

10. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- 2. Check the continuity between ignition coil harness connector and ECM harness connector.

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Ignition coil			EC	Continuity	
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F11	1		20	
2	F12	1		16	
3	F13	1	F101	12	Existed
4	F14	1	F101	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 connector F104, F105
- · Harness for open or short between ignition coil and ECM

>> Repair or replace harness or connectors.

12. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-1530, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-47, "Removal and Installation"

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000007742767

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

- Turn ignition switch OFF.
- 2. Disconnect ignition coil harness connector.
- 3. Check resistance between ignition coil terminals as follows.

Terminals	Resistance [at 25°C (77°F)]	
1 and 2	Except 0 or $\infty\Omega$	
1 and 3	Except 0 Ω	
2 and 3	Except 0 s2	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to <u>EM-47, "Removal and Installation"</u>.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

Turn ignition switch OFF.

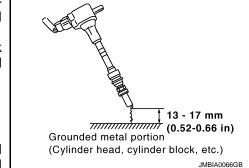
< DTC/CIRCUIT DIAGNOSIS >

- Reconnect all harness connectors disconnected.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

NOTE:

Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.

- Start engine.
- 5. After engine stalls, crank it two or three times to release all fuel pressure.
- 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. Refer to EM-47, "Removal and Installation".
- 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:

- Do not approach to the spark plug and the ignition coil within 0.5 m (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken. NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END

> >> Replace malfunctioning ignition coil with power transistor. Refer to EM-47, "Removal and Installation".

Component Inspection (Condenser)

1. CHECK CONDENSER

NO

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- Check resistance between condenser terminals as follows.

Terminals	Resistance
1 and 2	Above 1 M Ω [at 25°C (77°F)]

Is the inspection result normal?

>> INSPECTION END YES

NO >> Replace condenser.

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INFOID:0000000007742768

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INFORMATION DISPLAY (ASCD)

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

INFORMATION DISPLAY (ASCD)

Description INFOID.000000007742769

The ASCD operation status is indicated by two indicators (CRUISE and SET on the information display) on the 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. The set speed is also displayed on the information display.

SET indicator is displayed during ASCD control.

When the canceling conditions come into effect, the CRUISE and SET indications on the information display disappear.

Component Function Check

INFOID:000000007742770

1. CHECK INFORMATION DISPLAY

- 1. Start engine.
- 2. Press MAIN switch on ASCD steering switch.
- 3. Drive the vehicle at more than 40 km/h (25 MPH)

CAUTION:

Always drive vehicle at a safe speed.

- 4. Press SET/COAST switch.
- Check that the readings of the speedometer show the same values as the set speed indicated in the information display while driving the vehicle on a flat road.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1532, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007742771

1. CHECK DTC

Check that DTC UXXXX, P0500 or P1574 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.

NO-1 >> Perform trouble diagnosis for DTC UXXXX.

NO-2 >> Perform trouble diagnosis for DTC P0500. Refer to <u>EC-1416</u>, "<u>Diagnosis Procedure</u>".

NO-3 >> Perform trouble diagnosis for DTC P1574. Refer to EC-1491, "Diagnosis Procedure".

2.CHECK DTC WITH "UNITIED MATER & A/C AMP."

Refer to MWI-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Perform trouble diagnosis relevant to DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-113, "Removal and Installation".

NO >> Repair or replace.

MALFUNCTION INDICATOR LAMP

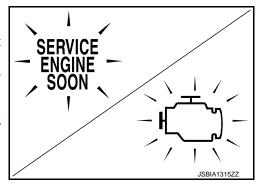
Description INFOID:000000007742772

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to <u>EC-1275</u>, "<u>DIAGNOSIS DESCRIPTION</u>: <u>Malfunction Indicator Lamp</u> (MIL)".



Component Function Check

1. CHECK MIL FUNCTION

- 1. Turn ignition switch ON.
- 2. Check that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-1533, "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-38, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-113, "Removal and Installation".

EC-1533

NO >> Repair or replace malfunctioning part.

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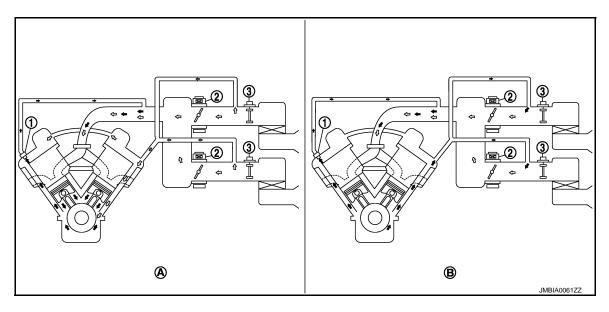
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INFOID:0000000007742774

2012 G Sedan

POSITIVE CRANKCASE VENTILATION

Description INFOID:000000007742779



- 1. PCV valve
- A. Normal condition
- : Fresh air
- = : Blow-by air

- 2. Electric throttle control actuator
- B. Hi-load condition
- 3. Mass air flow sensor

This system returns blow-by gas to the intake manifold.

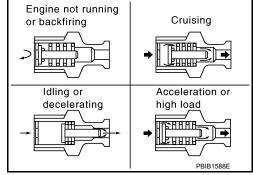
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.

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 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

1. CHECK PCV VALVE

INFOID:0000000007742780

POSITIVE CRANKCASE VENTILATION

< DTC/CIRCUIT DIAGNOSIS >

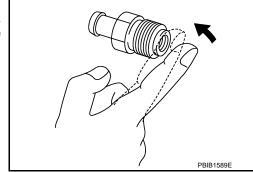
[VQ25HR FOR MEXICO]

With engine running at idle, remove PCV valve from rocker cover. Refer to <u>EM-47</u>, "<u>Exploded View</u>". 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. Refer to EM-47, "Exploded View".



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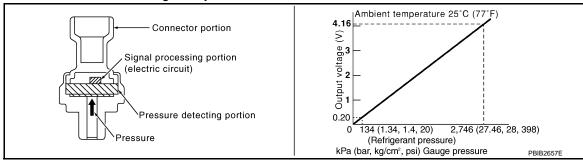
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REFRIGERANT PRESSURE SENSOR

Description

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:0000000007742782

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 under the following conditions.

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-1536, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007742783

1. CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

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	essure sensor	Ground	Voltage (V)	
Connector Terminal		Ground	voitage (v)	
E77	3	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 4. NO >> GO TO 3.

REFRIGERANT PRESSURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[VQ25HR FOR MEXICO]

${f 3.}$ DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M6, E106
- Harness for open or short between ECM and refrigerant pressure sensor

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>> Repair open circuit or short to ground or short to power in harness or connectors.

f 4.CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

- Turn ignition switch OFF.
- Disconnect ECM harness connector. 2.
- Check the continuity between refrigerant pressure sensor harness connector and ECM harness connec-

Refrigerant pre	essure sensor	ECM		Continuity
Connector	Terminal	Connector Terminal		Continuity
E77	1	M107	112	Existed

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M6, E106
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
E77	2	M107	105	Existed	

Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 7.

.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M6, E106
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to <u>HA-50, "REFRIGERANT PRESSURE SENSOR:</u> Removal and Installation".

NO >> Repair or replace malfunctioning part.

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ECU DIAGNOSIS INFORMATION

ECM

Reference Value

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 TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

Monitor Item	Co	ondition	Values/Status
ENG SPEED	Run engine and compare CONSUL	T value with the tachometer indication.	Almost the same speed as the tachometer indication
MAS A/F SE-B1	See EC-1287, "Description".		L
MAS A/F SE-B2	See EC-1287, "Description".		
B/FUEL SCHDL	See EC-1287, "Description".		
A/F ALPHA-B1	See EC-1287, "Description".		
A/F ALPHA-B2	See EC-1287, "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)	 Revving engine from idle 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 idle for 1 minute under no load 		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 (B2)	 Revving engine from idle 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 idle for 1 minute under no load 		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)	met Engine: After warming up	Engine: After warming upAfter keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at	
HO2S2 MNTR (B2)	met Engine: After warming up	Engine: After warming upAfter keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at	
VHCL SPEED SE	Turn drive wheels and compare CO tion.	NSULT value with the speedometer indica-	Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)	Ignition switch: ON (Engine stopped)	
ACCEL SEN 4	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.0 V
ACCEL SEN 1	(Engine stopped)	Accelerator pedal: Fully depressed	4.4 - 4.8 V
100EL 0EN 0±1	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.0 V
ACCEL SEN 2*1	(Engine stopped)	Accelerator pedal: Fully depressed	4.4 - 4.8 V

ECM

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	Accelerator pedal: Fully depressed	Less than 4.75 V	
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V	E
TP SEN 2-B1*1	(Engine stopped)Selector lever: D	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 temperature	
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow Ol$	N	$OFF \to ON \to OFF$	
CLED THI DOS	Ignition switch: ON	Accelerator pedal: Fully released	ON	
CLSD THL POS	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF	
-	- Foreign After warning was indicated	Air conditioner switch: OFF	OFF	
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates.)	ON	
D/N DOCL CW/	a Ignition quitable ON	Selector lever: P or N	ON	
P/N POSI SW	Ignition switch: ON	Selector lever: Except above	OFF	
DW/CT CICNIAL	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	
	.g	Rear window defogger switch and lighting switch: OFF	OFF	
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON \to OFF \to ON$	
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	
BRAKE 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 NAir conditioner switch: OFFNo 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 NAir conditioner switch: OFFNo load	2,000 rpm	1.9 - 2.9 msec	
	Engine: After warming up	Idle	12° - 16° BTDC	
IGN TIMING	Selector lever: P or NAir conditioner switch: OFFNo load	2,000 rpm	25° - 45° BTDC	
	Engine: After warming up	Idle	5% - 35%	
CAL/LD VALUE	Selector lever: P or NAir conditioner switch: OFFNo load	2,500 rpm	5% - 35%	
	Engine: After warming up	Idle	2.0 - 6.0 g/s	
MASS AIRFLOW	Selector lever: P or NAir conditioner switch: OFFNo load	2,500 rpm	7.0 - 20.0 g/s	

Monitor Item	Co	ondition	Values/Status
PURG VOL C/V	Engine: After warming up Selector lever: P or N Air conditioner switch: OFF	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	No load	2,000 rpm	_
	Engine: After warming up	Idle	−5° - 5°CA
INT/V TIM (B1)	Selector lever: P or NAir conditioner switch: OFFNo load	2,000 rpm	Approx. 0° - 30°CA
	Engine: After warming up	Idle	–5° - 5°CA
INT/V TIM (B2)	Selector lever: P or NAir conditioner switch: OFFNo load	2,000 rpm	Approx. 0° - 30°CA
	Engine: After warming up	Idle	–5° - 5°CA
EXH/V TIM B1	Selector lever: P or NAir conditioner switch: OFFNo load	Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA
	Engine: After warming up	Idle	–5° - 5°CA
EXH/V TIM B2	Selector lever: P or NAir conditioner switch: OFFNo load	Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA
	Engine: After warming up	Idle	0% - 2%
INT/V SOL (B1)	Selector lever: P or NAir conditioner switch: OFFNo load	2,000 rpm	Approx. 0% - 50%
	 Engine: After warming up Selector lever: P or N Air conditioner switch: OFF 	Idle	0% - 2%
INT/V SOL (B2)		2,000 rpm	Approx. 0% - 50%
		Idle	0% - 2%
VTC DTY EX B1	Air conditioner switch: OFF	Around 2,500 rpm while the engine speed is rising	Approx. 0% - 70%
		Idle	0% - 2%
VTC DTY EX B2		Around 2,500 rpm while the engine speed is rising	Approx. 0% - 70%
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B2	(Engine stopped)Selector lever: D	Accelerator pedal: Fully depressed	Less than 4.75 V
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B2*1	(Engine stopped) • Selector lever: D	Accelerator pedal: Fully depressed	Less than 4.75 V
		Air conditioner switch: OFF	OFF
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	For 1 seconds after turning ignitionEngine running or cranking		ON
	Except above		OFF
THRTL RELAY	Ignition switch: ON		ON
HO2S2 HTR (B1)	 Engine speed: Below 3,600 rpm aft Engine: After warming up Keeping the engine speed between idle for 1 minute under no load 	er the following conditions are met. 3,500 and 4,000 rpm for 1 minute and at	ON
TC DTY EX B1 TC DTY EX B2 P SEN 1-B2 P SEN 2-B2*1 IR COND RLY UEL PUMP RLY HRTL RELAY	Engine speed: Above 3,600 rpm		OFF

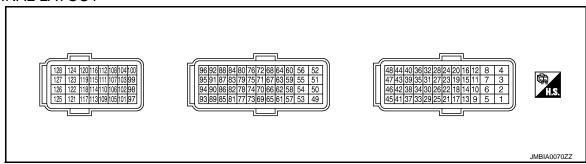
ECM

Monitor Item		Condition	Values/Status
HO2S2 HTR (B2)	- Engine: After warming up	after the following conditions are met. en 3,500 and 4,000 rpm for 1 minute and at	ON
	Engine speed: Above 3,600 rpm		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/l	h (12 MPH)	Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare C tion.	CONSULT value with the speedometer indica-	Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: Running	Idle air volume learning has not been performed yet.	YET
	g	Idle air volume learning has already been performed successfully.	CMPLT
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 turned ON.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)		Engine: After warming up, idle the engine (More than 140 seconds after starting engine)	
A/F S1 HTR (B2)			4 - 100%
AC PRESS SEN	 Engine: Idle Both A/C switch and blower fan switch: ON (Compressor operates) 		1.0 - 4.0 V
VHCL SPEED SE	Turn drive wheels and compare C tion.	CONSULT value with the speedometer indica-	Almost the same speed as the speedometer indication
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	 Both A/C switch and blower fan swi Turn drive wheels and compare CO tion. 	MAIN switch: Pressed	ON
WAIN SW		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
07 (IVOLE OVV	ignition switch. Oil	CANCEL switch: Released	OFF
RESUME/ACC SW	• Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
KESOWIL/ACC SW	Ignition switch. ON	RESUME/ACCELERATE switch: Released	OFF
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON
	ignition switch. On	SET/COAST switch: Released	OFF
BRAKE SW1	 Engine speed: Below 3,600 rpm after Engine: After warming up Keeping the engine speed between idle for 1 minute under no load Engine speed: Above 3,600 rpm Vehicle speed: More than 20 km/h (Turn drive wheels and compare COI tion. Engine: Running Engine: After warming up Ignition switch: ON Engine: After warming up, idle the engine: Engine: Running Engine: Running Ignition: Interval was and compare Colorion. Engine: Running Ignition switch: ON 	Brake pedal: Fully released	ON
DIVINE OVVI	ignition switch. On	Brake pedal: Slightly depressed	OFF
BRAKE SW2	Ignition switch: ON	Brake pedal: Fully released	OFF
(Stop lamp switch)	igilition ownor. Oil	Brake pedal: Slightly depressed	ON
DIST SW	Ignition switch: ON	DISTANCE switch: Pressed	ON
	-gindon outdon. Ott	DISTANCE switch: Released	OFF
VHCL SPD CUT	Ignition switch: ON		NON
LO SPEED CUT	Ignition switch: ON		NON
AT OD MONITOR	Ignition switch: ON		OFF
AT OD CANCEL	Ignition switch: ON		OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time \rightarrow at the 2nd time	$ON \to OFF$

Monitor Item	Co	ondition	Values/Status
	MAIN switch: ON	ASCD: Operating	ON
SET LAMP	When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF
EXH V/T LEARN	Engine: Running	Exhaust Valve Timing Control Learning has not been performed yet.	YET
LAIT V/T LLAIN	- Engine. Ruining	Exhaust Valve Timing Control Learning has not been performed yet.	CMPLT
BAT CUR SEN	 Engine speed: Idle Battery: Fully charged*² Selector lever: P or N Air conditioner switch: OFF No load 		Approx. 2,600 - 3,500 mV
AC EVA TEMP	 Engine: Idle Both A/C switch and blower fan switch: ON (compressor operates) 		Changes according to instructed value from Unified meter and A/C amp.
AC EVA TARGET	 Engine: Idle Both A/C switch and blower fan switch: ON (compressor operates) 		Changes according to instructed value from Unified meter and A/C amp.
ALT DUTY	Engine: Idle		0 - 80%
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%
ALT DUTY SIG	Power generation voltage variable of	control: Operating	ON
ALI DOTT SIG	Power generation voltage variable of	control: Not operating	OFF
THRTL STK CNT B1	This item is displayed but is not appropriately appro	olicable to this model.	

^{*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.

TERMINAL LAYOUT



PHYSICAL VALUES

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.

^{*2:} Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3. "How to Handle Battery".

Termir (Wire	nal No. color)	Description		Condition	Value	Α
+		Signal name	Input/ Output	Condition	(Approx.)	EC
1 (G)	128 (B)	A/F sensor 1 heater (bank 1)	Output	[Engine is running]Warm-up conditionIdle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★ 50mSec/div 5V/div JMBIA0030GB	C
2 (P)	4 (V)	Throttle control motor (Open) (bank 1)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★ 500μSec/div 5V/div JMBIA0031GB	E F
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	500µSec/div 5V/div JMBIA0032GB	Н
3 (R)	128 (B)	Throttle control motor relay power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	J
4 (V)	128 (B)	Throttle control motor (Close) (bank 1)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D Accelerator pedal: In the middle of releasing operation 	0 - 14 V★ 500μSec/div 5V/div JMBIA0033GB	K
5 (W)	128 (B)	A/F sensor 1 heater (bank 2)	Output	[Engine is running]Warm-up conditionIdle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★ 50mSec/div 5V/div JMBIA0030GB	M N
6 (SB)	128 (B)	Exhaust valve timing control magnet retarder (bank 1)	Output	 [Engine is running] Warm-up condition Idle speed [Engine is running] Warm-up condition Around 2,500 rpm while the engine speed is rising 	BATTERY VOLTAGE (11 - 14 V) 7 - 12 V 5V/div JMBIA0034GB	P

Termir (Wire		Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
7 (Y)	128 (B)	Exhaust valve timing control magnet retarder (bank 2)	Output	[Engine is running]Warm-up conditionAround 2,500 rpm while the engine speed is rising	7 - 12 V★ 5V/div JMBIA0034GB
8 (B)	_	ECM ground	_	_	_
11 (GR)		Ignition signal No. 4		[Engine is running]	0 - 0.2 V★ 50mSec/div
12 (L)		Ignition signal No. 3		Warm-up conditionIdle speedNOTE:	5
15 (LG)	128	Ignition signal No. 5		The pulse cycle changes depend- ing on rpm at idle	2V/div JMBIA0035GB
16 (G)	(B)	Ignition signal No. 2			0.1 - 0.4 V★
19 (BR) 20 (Y)		Ignition signal No. 6 Ignition signal No. 1			[Engine is running]Warm-up conditionEngine speed: 2,000 rpm
17 (P)	84 (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 5V/div JMBIA0037GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running]Warm-up conditionIdle speed	BATTERY VOLTAGE (11 - 14 V)
18 (W)	128 (B)	Intake valve timing control solenoid valve (bank 1)	Output	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	7 - 12 V★ 5V/div JMBIA1638GB

Termir (Wire	nal No. color)	Description			Value	А
+		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	C D
(V)	(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	E
				[Ignition switch: ON] • For 1 second after turning ignition switch ON	10V/div JMBIA0040GB 0 - 1.5 V	G H
22 (R)	128 (B)	Fuel pump relay	Output	[Engine is running][Ignition switch: ON]More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)	I
24 (SB)	128 (B)	ECM relay (Self shut-off)	Output	 [Engine is running] [Ignition switch: OFF] A few seconds after turning ignition switch OFF 	0 - 1.5 V	J
				[Ignition switch: OFF]More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)	K
25 (BG)	128 (B)	Throttle control motor relay	Output	[Ignition switch: ON \rightarrow OFF]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V	L
				[Ignition switch: ON] [Engine is running] • Warm-up condition • Idle speed	0 - 1.0 V BATTERY VOLTAGE (11 - 14 V)	N
29 (GR)	128 (B)	Intake valve timing control solenoid valve (bank 2)	Output	Idle speed[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	7 - 12 V★ 5V/div JMBIA1638GB	O P

	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
30	40	Throttle position sensor 1	Input	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully released	More than 0.36 V
(B)	(R)	(bank 1)		[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully depressed	Less than 4.75 V
31	48	Fhrottle position sensor 1 Input	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully released	More than 0.36 V	
(R)	(B)	(bank 2)	input -	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully depressed	Less than 4.75 V
33 (LG)		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 5V/div JMBIA0037GB
				[Ignition switch: ON]Engine stopped[Engine is running]Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
34	40	Throttle position sensor 2	Input	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully released	Less than 4.75 V
(G)	(R)	(bank 1)	mput	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully depressed	More than 0.36 V
35	48	Throttle position sensor 2	Input	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully released	Less than 4.75 V
(W)	(B)	(bank 2)	Input	[Ignition switch: ON]Engine stoppedSelector lever: DAccelerator pedal: Fully depressed	More than 0.36 V

Termir (Wire		Description		0	Value	,
+		Signal name	Input/ Output	Condition	(Approx.)	
37	47	Crankshaft position sensor		 [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)	(Y)	(POS)	Input	[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0 V★ 1mSec/div 2V/div JMBIA0042GB	
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 (W)	40 (R)	Sensor power supply [Throttle position sensor (bank 1)]	_	[Ignition switch: ON]	5 V	=
46 (R)	47 (Y)	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)]	_	_	_	=
49 (P)	128 (B)	Throttle control motor (Close) (bank 2)	Output	 [Ignition switch: ON] Engine stopped Selector lever: D Accelerator pedal: In the middle of releasing operation 	0 - 14 V★ 500μSec/div 5V/div JMBIA0033GB	1

Terminal No. (Wire color)		Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
50 (L)	128 (B)	Throttle control motor (Open) (bank 2)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully depressed	0 - 14 V★ 500µSec/div 5V/div JMBIA0031GB
				[Ignition switch: ON] • Engine stopped • Selector lever: D • Accelerator pedal: Fully released	0 - 14 V★ 500μSec/div 5V/div JMBIA0032GB
52 (R)	128 (B)	Throttle control motor relay power supply (bank 2)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
53 (W)	128 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
57 (L)	128 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2 V
58 (GR)	88 (LG)	Exhaust valve timing control position sensor (bank 1)	Input	 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 - 5.0 V★ 20mSec/div 2V/div 2V/div 2V/div
				[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	4.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0044GB

	nal No. color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
59	96	Camshaft position sensor	lagut	 [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 2V/div JMBIA0045GB	C
(LG)	(P)	(PHASE) (bank 1)	Input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0046GB	E
60 (R)	96 (P)	Sensor power supply [Camshaft position sensor (PHASE) (bank 1), Exhaust valve timing control position sensor (bank 1), Power steering pressure sensor]	_	[Ignition switch: ON]	5 V	G
61 (P)	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.	I
62	88	Exhaust valve timing con-		 [Engine is running] Warm-up condition Idle speed NOTE: The pulse cycle changes depending on rpm at idle 	4.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0043GB	J
(G)	(LG)		Input	[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	4.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0044GB	I. IV

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	nal No. color)	Description		Condition	Value (Approx.)	
+		Signal name	Input/ Output	Condition		
63	92	Camshaft position sensor	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 2V/div JMBIA0045GB	
(L)	(R)	(PHASE) (bank 2)		[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div 2V/div JMBIA0046GB	
64 (BR)	92 (R)	Sensor power supply [Camshaft position sensor (PHASE) (bank 2), Exhaust valve timing control position sensor (bank 2), Battery current sensor]	_	[Ignition switch: ON]	5 V	
65 (V)	128 (B)	A/F sensor 1 (bank 2)	Input	[Ignition switch: ON]	2.2 V	
66 (LG)	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 (Y)	68 (P)	Intake air temperature sensor (bank 1)	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.	
68 (P)	_	Sensor ground [Mass air flow sensor (bank 1), Intake air temperature sensor (bank 1)]	_	_	_	
71 (BG)	84 (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)	72 (—)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V* ¹	
76 (GR)	84 (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	

Termin (Wire	al No. color)	Description		Condition	Value	
+		Signal name	Input/ Output	Condition	(Approx.)	
77	68	Mass air flow sensor (bank	Input	[Engine is running]Warm-up conditionIdle speed	0.8 - 1.1 V	
(L)	(P)	1)	IIIput	[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.4 - 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.	
79	94	Mass air flow sensor (bank	Input	[Engine is running]Warm-up conditionIdle speed	0.8 - 1.1 V	
(W)	(B)	2)	прис	[Engine is running]Warm-up conditionEngine speed: 2,500 rpm	1.4 - 1.7 V	
80	84	Heated oxygen sensor 2	Input	 [Engine is running] Revving engine from idle to 3,000 rpm quickly after the following conditions are met Engine: after warming up 	0 - 1.0 V	
(BR)	(B)	(bank 2)	трис	Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		
81 (P)		Fuel injector No. 3			BATTERY VOLTAGE (11 - 14 V)★	
82 (V)		Fuel injector No. 6		[Engine is running]Warm-up conditionIdle speedNOTE:	50mSec/div	
85 (GR)	128	Fuel injector No. 2		The pulse cycle changes depend- ing on rpm at idle	10V/div JMBIA0047GB	
86 (BG)	(B)	Fuel injector No. 5	Output		BATTERY VOLTAGE (11 - 14 V)★	
89 (L)		Fuel injector No. 1		[Engine is running]Warm-up conditionEngine speed: 2,000 rpm	50mSec/div	
90 (BR)		Fuel injector No. 4			10V/div JMBIA0048GB	
83 (Y)	94 (B)	Intake air temperature sensor (bank 2)	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.	
84 (B)	_	Sensor ground (Heated oxygen sensor 2, Engine coolant tempera- ture sensor, Engine oil tem- perature sensor)	_	_	_	
87 (SB)	96 (P)	Power steering pressure sensor	Output	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5 V	
(00)	(1)	3011001		[Engine is running]Steering wheel: Not being turned	0.4 - 0.8 V	

Termir (Wire	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
88 (LG)	_	Sensor ground [Exhaust valve timing control position sensor (bank 1), Exhaust valve timing control position sensor (bank 2)]	_	_	_
91 (G)	95 (W)	Battery current sensor	Input	 [Engine is running] Battery: Fully charged*² Idle speed 	2.6 - 3.5 V
92 (R)	_	Sensor ground [Camshaft position sensor (PHASE) (bank 2)]	_	[Engine is running]Warm-up conditionIdle speed	0 V
93 (R)	128 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
94 (B)	_	Sensor ground [Mass air flow sensor (bank 2), Intake air temperature sensor (bank 2)]	_	_	_
95 (W)	_	Sensor ground (Battery current sensor)	_	_	_
96 (P)	_	Sensor ground [Camshaft position sensor (PHASE) (bank 1), Power steering pressure sensor]	_	_	_
97	100	Accelerator pedal position	Input	[Ignition switch: ON] Engine stopped Accelerator pedal: Fully released	0.45 - 1.0 V
(R)	(W)	sensor 1	put	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	4.4 - 4.8 V
98	104	Accelerator pedal position	Input	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully released	0.22 - 0.50 V
(P)	(V)	sensor 2	mpat	[Ignition switch: ON]Engine stoppedAccelerator pedal: Fully depressed	2.1 - 2.5 V
99 (L)	100 (W)	Sensor power supply (Accelerator pedal position sensor 1)	_	[Ignition switch: ON]	5 V
100 (W)	_	Sensor ground (Accelerator pedal position sensor 1)	_	_	_
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
101 (SB)	108 (Y)	ASCD steering switch	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V
(03)	(1)			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V

Termin (Wire		Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
103 (GR)	104 (V)	Sensor power supply (Accelerator pedal position sensor 2)	_	[Ignition switch: ON]	5 V
104 (V)	_	Sensor ground (Accelerator pedal position sensor 2)	_	_	_
105 (L)	112 (V)	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
106 (W)	128 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
107 (GR)	112 (V)	Sensor power supply (Refrigerant pressure sensor)	_	[Ignition switch: ON]	5 V
108 (Y)	_	Sensor ground (ASCD steering switch)	_	_	_
109	128	DND		[Ignition switch: ON] • Selector lever: P or N	BATTERY VOLTAGE (11 - 14 V)
(G)	(B)	DND cianal Innut			0 V
110 (R)	128 (B)	Engine speed signal output	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
				[Engine is running]Engine speed is 2,000 rpm	₹ ZV/div JMBIA0077GB
112 (V)	_	Sensor ground (Refrigerant pressure sensor)	_	_	_
113 (P)	_	CAN communication line	Input/ Output	_	_
114 (L)	_	CAN communication line	Input/ Output	_	_
117 (V)	_	Data link connector	Input/ Output	_	_
122	128	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
(P)	(B)			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)

	nal No. color)	Description		Condition	Value
+	Signal name Input/ Output		Condition	(Approx.)	
123 (B) 124 (B)	_	ECM ground	_	[Engine is running] • Idle speed	Body ground
125 (R)	128 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
126	128	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
(BR)	(B)	AGOD DIAKE SWILLII	Input	[Ignition switch: ON] • Brake pedal: Fully released	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.

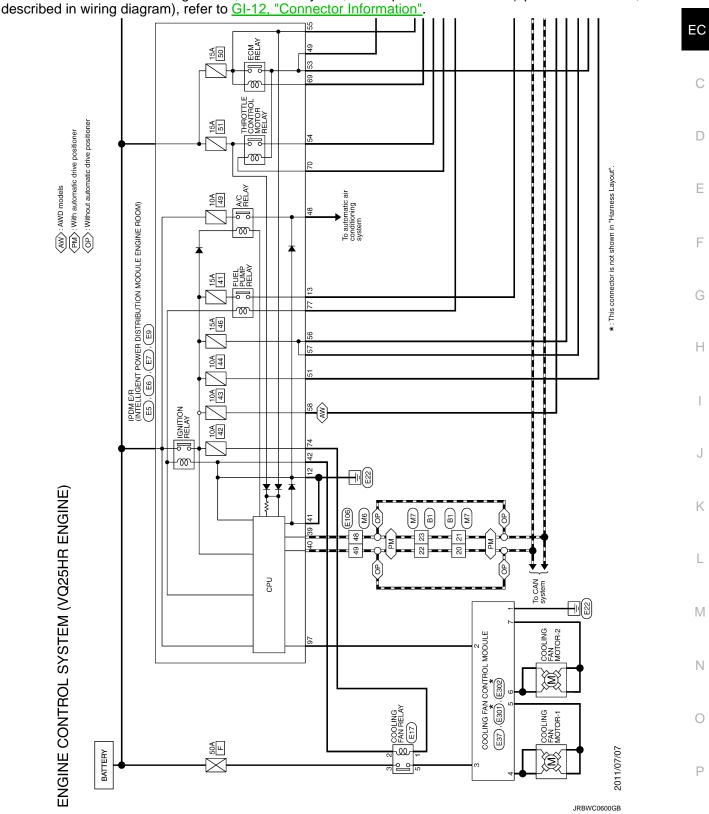
^{*2:} Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery".

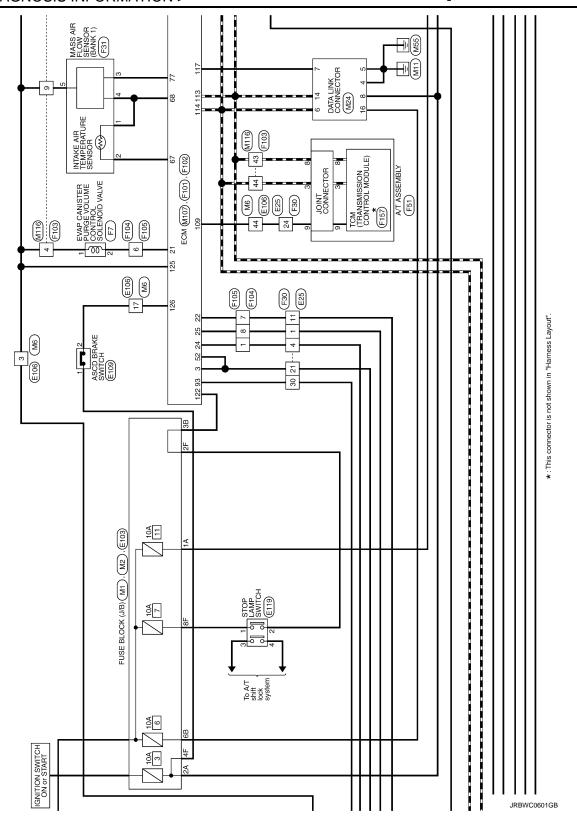
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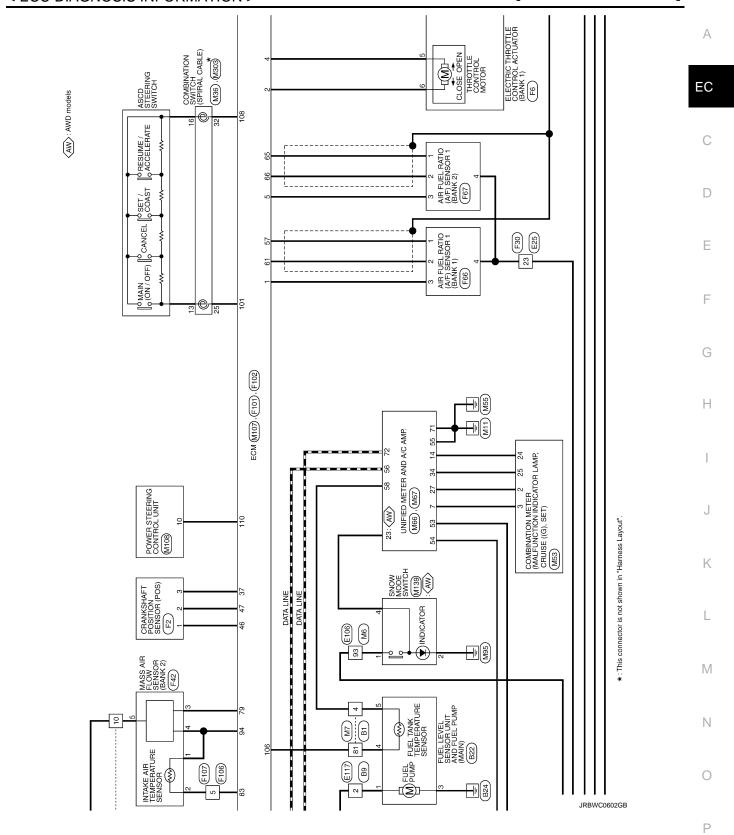
Α

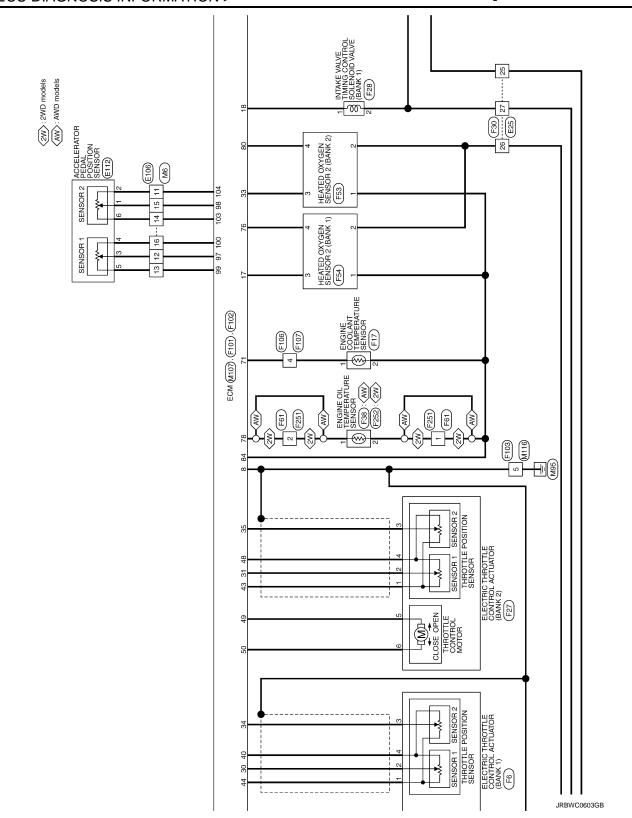
Wiring Diagram - ENGINE CONTROL SYSTEM -

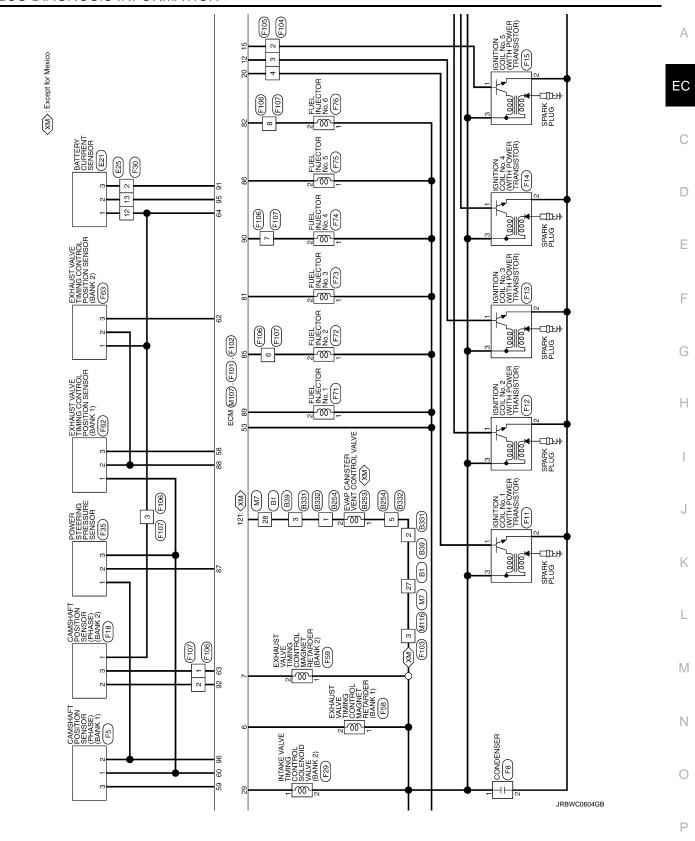
For connector terminal arrangements, harness layouts, and alphabets in a (option abbreviation; if not described in wiring diagram), refer to GL 12, "Connector Information"



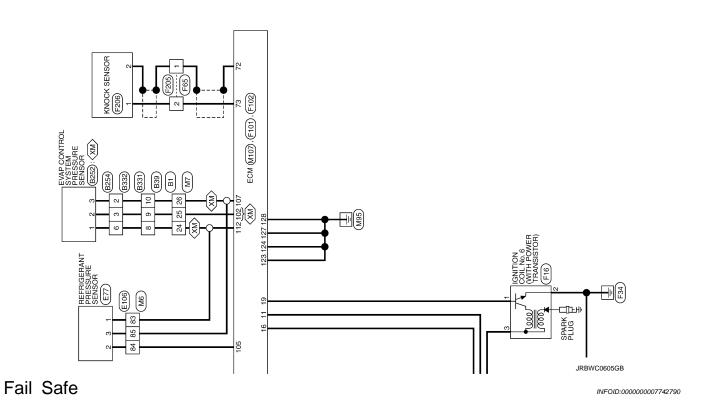








XM): Except for Mexico



NON DTC RELATED ITEM

D

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 lighting up MIL when there is malfunction on engine control system. 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 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.	Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page	А
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 fail-safe function. The fail-safe function also operates when above diagnoses except MIL	rise more than 2,500 rpm		driver by lighting up MIL when there is malfunction on engine control system.		EC
			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 fail-safe function.	EC-1533	С

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode				
P0011 P0021	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.				
P0014 P0024	Exhaust valve timing control	The signal is not energized to the exhaust valve timing control magnet retarder and the magnet retarder control does not function.				
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 condit CONSULT displays the engine coolant temperature decided by ECM.				
		Condition	Engine coolant temperature decided (CONSULT display)			
		Just as ignition switch is turned ON or START	40°C (104°F)			
		Approx. 4 minutes or more after engine 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 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. So, the acceleration will be poor.				
P0197 P0198	Engine oil temperature sensor	Exhaust valve timing control does no	ot function.			
P0500	Vehicle speed sensor	The cooling fan operates (Highest)	while engine is running.			
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.			
P0605	ECM	(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. ECM deactivates ASCD operation.				
P1233 P2101	Electric throttle control function	ECM stops the electric throttle contr fixed opening (approx. 5 degrees) b	ol actuator control, throttle valve is maintained at a			

DTC No.	Detected items	Engine operating condition in fail-safe mode			
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 actuator	 (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 driving, it slows down gradually by 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 confixed opening (approx. 5 degrees)	trol actuator control, throttle valve is maintained at a by the return spring.		
P1805	Brake switch	ECM controls the electric throttle cosmall range. Therefore, acceleration will be poo	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 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 norma condition. So, the acceleration will be poor.			

DTC Inspection Priority Chart

INFOID:0000000007742791

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)	А
1	 U0101 U1001 CAN communication line P0102 P0103 P010C P010D Mass air flow sensor P0112 P0113 Intake air temperature sensor P0117 P0118 Engine coolant temperature sensor P0122 P0123 P0222 P0223 P0227 P0228 P1225 P1226 P1234 P1235 P1239 P2132 P2133 P2135 Throttle position sensor P0197 P0198 Engine oil temperature sensor P0327 P0328 Knock sensor P0335 Crankshaft position sensor (POS) P0340 P0345 Camshaft position sensor (PHASE) 	EC
	 P0500 Vehicle speed sensor P0605 P0607 ECM P0643 Sensor power supply P0700 TCM 	D
	 P0705 Transmission range switch P0850 Park/neutral position (PNP) switch P1550 P1551 P1552 P1553 P1554 Battery current sensor P1610 - P1615 NATS 	Е
2	 P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater 	F
	 P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater P0075 P0081 Intake valve timing control solenoid valve P0078 P0084 Exhaust valve timing control magnet retarder P0130 P0131 P0132 P0133 P0150 P0151 P0152 P0153 Air fuel ratio (A/F) sensor 1 P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2 	G
	 P0444 EVAP canister purge volume control solenoid valve P0550 Power steering pressure sensor 	Н
	 P0603 ECM power supply P0710 P0717 P0720 P0729 P0730 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 P1078 P1084 Exhaust valve timing control position sensor P1217 Engine over temperature (OVERHEAT) P1233 P2101 Electric throttle control function 	I
	 P1236 P2118 Throttle control motor P1290 P2100 P2103 Throttle control motor relay P1805 Brake switch 	J
3	 P0011 P0021 Intake valve timing control P0014 P0024 Exhaust valve timing control P0171 P0172 P0174 P0175 Fuel injection system function P0300 - P0306 Misfire 	K
	 P0420 P0430 Three way catalyst function P0506 P0507 Idle speed control system P1211 TCS control unit P1212 TCS communication line 	L
	 P1238 P2119 Electric throttle control actuator P1564 ASCD steering switch P1572 ASCD brake switch 	M
	 P1574 ASCD vehicle speed sensor P1715 Input speed sensor 	Ν

DTC Index

×:Applicable —: Not applicable

Ρ

DT	C*1	Items				Reference
CONSULT GST* ²	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	page
U0101	0101*4	LOST COMM (ECM)	_	1	×	EC-1298
U1001	1001*4	CAN COMM CIRCUIT	_	2	_	EC-1299
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing* ⁶	_

DTC	C* ¹					D. C.
CONSULT GST*2	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	Referenc page
P0011	0011	INT/V TIM CONT-B1	×	2	×	EC-1300
P0014	0014	EXH/V TIM CONT-B1	_	2	×	EC-1304
P0021	0021	INT/V TIM CONT-B2	_	2	×	EC-1300
P0024	0024	EXH/V TIM CONT-B2	_	2	×	EC-1304
P0031	0031	A/F SEN1 HTR (B1)	_	2	×	EC-1308
P0032	0032	A/F SEN1 HTR (B1)	_	2	×	EC-1308
P0037	0037	HO2S2 HTR (B1)	_	2	×	EC-131
P0038	0038	HO2S2 HTR (B1)	_	2	×	EC-131
P0051	0051	A/F SEN1 HTR (B2)	_	2	×	EC-1308
P0052	0052	A/F SEN1 HTR (B2)	_	2	×	EC-130
P0057	0057	HO2S2 HTR (B2)	_	2	×	EC-131
P0058	0058	HO2S2 HTR (B2)	_	2	×	EC-131
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	EC-1314
P0078	0078	EX V/T ACT/CIRC-B1	_	2	×	EC-131
P0081	0081	INT/V TIM V/CIR-B2	_	2	×	EC-131
P0084	0084	EX V/T ACT/CIRC-B2	_	2	×	EC-131
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	EC-132
P0103	0103	MAF SEN/CIRCUIT-B1	_	1	×	EC-132
P010C	010C	MAF SEN/CIRCUIT-B2	_	1	×	EC-132
P010D	010D	MAF SEN/CIRCUIT-B2	_	1	×	EC-132
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	EC-132
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	EC-132
P0117	0117	ECT SEN/CIRC	_	1	×	EC-132
P0118	0118	ECT SEN/CIRC	_	1	×	EC-132
P0122	0122	TP SEN 2/CIRC-B1	_	1	×	EC-133
P0123	0123	TP SEN 2/CIRC-B1	_	1	×	EC-133
P0130	0130	A/F SENSOR1 (B1)	_	2	×	EC-133
P0131	0131	A/F SENSOR1 (B1)	_	2	×	EC-134
P0132	0132	A/F SENSOR1 (B1)	_	2	×	EC-134
P0133	0133	A/F SENSOR1 (B1)	×	2	×	EC-134
P0137	0137	HO2S2 (B1)	×	2	×	EC-135
P0138	0138	HO2S2 (B1)	×	2	×	EC-135
P0139	0139	HO2S2 (B1)	×	2	×	EC-136
P0150	0150	A/F SENSOR1 (B2)	_	2	×	EC-133
P0151	0151	A/F SENSOR1 (B2)	_	2	×	EC-134
P0152	0152	A/F SENSOR1 (B2)	_	2	×	EC-134
P0153	0153	A/F SENSOR1 (B2)	×	2	×	EC-134
P0157	0157	HO2S2 (B2)	×	2	×	EC-135
P0158	0158	HO2S2 (B2)	×	2	×	EC-135
P0159	0159	HO2S2 (B2)	×	2	×	EC-136
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	EC-1374
P0172	0172	FUEL SYS-RICH-B1	_	2	×	EC-1378

DTC*1		Itomo				Reference	
CONSULT GST* ²	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	page	
P0174	0174	FUEL SYS-LEAN-B2	_	2	×	EC-1374	
P0175	0175	FUEL SYS-RICH-B2	_	2	×	EC-1378	
P0197	0197	EOT SEN/CIRC	_	2	×	EC-1382	
P0198	0198	EOT SEN/CIRC	_	2	×	EC-1382	
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	EC-1385	
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	EC-1385	
P0227	0227	TP SEN 2/CIRC-B2	_	1	×	EC-1332	
P0228	0228	TP SEN 2/CIRC-B2	_	1	×	EC-1332	
P0300	0300	MULTI CYL MISFIRE	_	1 or 2	×	EC-1389	
P0301	0301	CYL 1 MISFIRE	_	1 or 2	×	EC-1389	
P0302	0302	CYL 2 MISFIRE	_	1 or 2	×	EC-1389	
P0303	0303	CYL 3 MISFIRE	_	1 or 2	×	EC-1389	
P0304	0304	CYL 4 MISFIRE	_	1 or 2	×	EC-1389	
P0305	0305	CYL 5 MISFIRE	_	1 or 2	×	EC-1389	
P0306	0306	CYL 6 MISFIRE	_	1 or 2	×	EC-1389	
P0327	0327	KNOCK SEN/CIRC-B1	_	2	_	EC-1395	
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	EC-1395	
P0335	0335	CKP SEN/CIRCUIT	_	2	×	EC-1397	
P0340	0340	CMP SEN/CIRC-B1	_	2	×	EC-1402	
P0345	0345	CMP SEN/CIRC-B2	_	2	×	EC-1402	
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-1408	
P0430	0430	TW CATALYST SYS-B2	×	2	×	EC-1408	
P0444	0444	PURG VOLUME CONT/V	_	2	×	EC-1413	
P0500	0500	VEHICLE SPEED SEN A*5	_	2	×	EC-1416	
P0506	0506	ISC SYSTEM		2	×	EC-1418	
P0507	0507	ISC SYSTEM	_	2	×	EC-1420	
P0550	0550	PW ST P SEN/CIRC	_	2		EC-1422	
P0603	0603	ECM BACK UP/CIRCUIT	_	2	×	EC-1425	
P0605	0605	ECM	_	1 or 2	× or —	EC-1427	
P0607	0607	ECM	_	1	×	EC-1429	
P0643	0643	SENSOR POWER/CIRC	_	1	×	EC-1430	
P0705	0705	T/M RANGE SENSOR A	_	2	×	<u>TM-160</u>	
P0710	0710	FLUID TENP SENSOR A	_	2	×	TM-162	
P0717	0717	INPUT SPEED SENSOR A		2	×	TM-163	
P0720	0720	OUTPUT SPEED SENSOR*5		2	×	TM-165	
P0729	0729	6GR INCORRECT RATIO		2	×	TM-169	
P0730	0730	INCORRECT GR RATIO		2	×	TM-171	
P0731	0731	1GR INCORRECT RATIO*7		2	×	TM-173	
P0732	0732	2GR INCORRECT RATIO	_	2	×	TM-175	
P0733	0733	3GR INCORRECT RATIO	_	2	×	TM-177	
P0734	0734	4GR INCORRECT RATIO	_	2 2	×	<u>TM-179</u>	

DTC	C* ¹	lto mo				D-4
CONSULT GST* ²	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	Referenc page
P0740	0740	TORQUE CONVERTER	_	2	×	TM-183
P0744	0744	TORQUE CONVERTER	_	2	×	TM-185
P0745	0745	PC SOLENOID A	_	2	×	TM-187
P0750	0750	SHIFT SOLENOID A	_	2	×	TM-188
P0775	0775	PC SOLENOID B	_	2	×	<u>TM-189</u>
P0780	0780	SHIFT	_	1	×	TM-190
P0795	0795	PC SOLENOID C	_	2	×	TM-192
P0850	0850	P-N POS SW/CIRCUIT	_	2	×	EC-143
P1078	1078	EXH TIM SEN/CIRC-B1	_	2	×	EC-143
P1084	1084	EXH TIM SEN/CIRC-B2	_	2	×	EC-143
P1211	1211	TCS C/U FUNCTN	_	2	_	EC-144
P1212	1212	TCS/CIRC	_	2	_	EC-144
P1217	1217	ENG OVER TEMP	_	1	×	EC-144
P1225	1225	CTP LEARNING-B1	_	2	_	EC-144
P1226	1226	CTP LEARNING-B1	_	2	_	EC-144
P1233	1233	ETC FNCTN/CIRC-B2	_	1	×	EC-145
P1234	1234	CTP LEARNING-B2	_	2	_	EC-144
P1235	1235	CTP LEARNING-B2	_	2	_	EC-144
P1236	1236	ETC MOT-B2	_	1	×	EC-145
P1238	1238	ETC ACTR-B2	_	1	×	EC-145
P1239	1239	TP SENSOR-B2	_	1	×	EC-146
P1290	1290	ETC MOT PWR-B2	_	1	×	EC-146
P1550	1550	BAT CURRENT SENSOR	_	2	_	EC-146
P1551	1551	BAT CURRENT SENSOR	_	2	_	EC-1469
P1552	1552	BAT CURRENT SENSOR	_	2	_	EC-1469
P1553	1553	BAT CURRENT SENSOR	_	2	_	EC-147
P1554	1554	BAT CURRENT SENSOR	_	2	_	EC-147
P1564	1564	ASCD SW	_	1	_	EC-148
P1572	1572	ASCD BRAKE SW	_	1	_	EC-148
P1574	1574	ASCD VHL SPD SEN	_	1	_	EC-149
P1610	1610	LOCK MODE	_	2	_	SEC-35
P1611	1611	ID DISCORD, IMMU-ECM	_	2	_	SEC-36
P1612	1612	CHAIN OF ECM-IMMU	_	2	_	SEC-38
P1614	1614	CHAIN OF IMMU-KEY	_	2	_	SEC-40
P1615	1615	DIFFERENCE OF KEY	_	2	_	SEC-43
P1715	1715	IN PULY SPEED	_	2	_	EC-149
P1730	1730	INTERLOCK	_	2	×	TM-197
P1734	1734	7GR INCORRECT RATIO	_	2	×	TM-199
P1805	1805	BRAKE SW/CIRCUIT	_	2	_	EC-149
P2100	2100	ETC MOT PWR-B1	_	1	×	EC-146
P2101	2101	ETC FNCTN/CIRC-B1	_	<u>'</u> 1	×	EC-145
P2103	2103	ETC MOT PWR		<u>'</u> 1	×	EC-146

DT	C* ¹	Items				Reference
CONSULT GST* ²	ECM*3	(CONSULT screen terms)	SRT code	Trip	MIL	page
P2118	2118	ETC MOT-B1	_	1	×	EC-1455
P2119	2119	ETC ACTR-B1	_	1	×	EC-1458
P2122	2122	APP SEN 1/CIRC	_	1	×	EC-1497
P2123	2123	APP SEN 1/CIRC	_	1	×	EC-1497
P2127	2127	APP SEN 2/CIRC	_	1	×	EC-1501
P2128	2128	APP SEN 2/CIRC	_	1	×	EC-1501
P2132	2132	TP SEN 1/CIRC-B2	_	1	×	EC-1385
P2133	2133	TP SEN 1/CIRC-B2	_	1	×	EC-1385
P2135	2135	TP SENSOR-B1	_	1	×	EC-1460
P2138	2138	APP SENSOR	_	1	×	EC-1506
P2713	2713	PC SOLENOID D	_	2	×	TM-207
P2722	2722	PC SOLENOID E	_	2	×	TM-208
P2731	2731	PC SOLENOID F	_	2	×	TM-209
P2807	2807	PC SOLENOID G	_	2	×	TM-210

^{*1: 1}st trip DTC No. is the same as DTC No.

Test Value and Test Limit

The following is the information specified in Service \$06 of SAE J1979/ISO 15031-5.

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. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

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INFOID:0000000007775520

Revision: 2013 February

^{*2:} This number is prescribed by SAE J2012/ISO 15031-6.

^{*3:} In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

^{*4:} The troubleshooting for this DTC needs CONSULT.

^{*5:} When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

^{*6:} When the ECM is in the mode of displaying SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

^{*7:} When erasing this DTC, always use CONSULT or GST.

Item	OBD- MID	Self-diagnostic test item	DTC	li	e and Test mit display) Unit and Scaling ID	Description
			P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	овн	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			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
			P0130	8BH	0BH	Difference in sensor output voltage
	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0133	8CH	83H	Response gain at the limited frequency
		(Balik I)	P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
HO2S			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P0138	07H	0CH	Minimum sensor output voltage for test cycle
		Heated oxygen sensor 2	P0137	08H	0CH	Maximum sensor output voltage for test cycle
	02H	(Bank 1)	P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0139	82H	11H	Rear O2 sensor delay response diagnosis
			P0143	07H	0CH	Minimum sensor output voltage for test cycle
	03H	Heated oxygen sensor 3 (Bank 1)	P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

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Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description
	MID	Ç		TID	Unitand Scaling ID	,
			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
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			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
		Air fuel ratio (A/F) sensor 1 (Bank 2)	P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
	05H		P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
HO2S			P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015C	92H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015D	93H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P0158	07H	0CH	Minimum sensor output voltage for test cycle
	22	Heated oxygen sensor 2	P0157	08H	0CH	Maximum sensor output voltage for test cycle
	06H	(Bank 2)	P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis
			P0163	07H	0CH	Minimum sensor output voltage for test cycle
	07H	Heated oxygen sensor 3 (Bank2)	P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage

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Item	OBD-	Self-diagnostic test item	DTC	(GST	display)	Description
пеш	MID	Self-diagnostic test item	ыс	TID	Unitand Scaling ID	Description
			P0420	80H	01H	O2 storage index
	241	Three way catalyst function (Bank1)	P0420	82H	01H	Switching time lag engine exhaust index value
	21H		P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
CATA-			P2423	84H	84H	O2 storage index in HC trap catalyst
LYST			P0430	80H	01H	O2 storage index
	22H	Three way catalyst function (Bank2)	P0430	82H	01H	Switching time lag engine exhaust index value
	2211		P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
			P0400	80H	96H	Low flow faults: EGR temp change rate (short term)
		EGR function	P0400	81H	96H	Low flow faults: EGR temp change rate (long term)
EGR SYSTEM	31H		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)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	35H	VVT Monitor (Bank1)	P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100A	84H	10H	VEL slow response diagnosis
VVT			P1090	85H	10H	VEL servo system diagnosis
SYSTEM			P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	36H	VVT Monitor (Bank2)	P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100B	84H	10H	VEL slow response diagnosis
			P1093	85H	10H	VEL servo system diagnosis

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Item	OBD- MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3ВН	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
EVAP			P0456	80H	05H	Leak area index (for more than 0.02 inch)
SYSTEM	3СН	EVAP control system leak (Very small leak)	P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of 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 current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric current to voltage
O2 SEN- SOR HEATER	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage
			P0411	80H	01H	Secondary air injection system incor- rect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
SEC- OND- ARY AIR	71H	Secondary air system	P2448	83H	01H	Secondary air injection system high airflow
7			Bank1: P2440 Bank2: P2442	84H	01H	Secondary air injection system switching valve stuck open
			P2440	85H	01H	Secondary air injection system switching valve stuck open
			P2444	86H	01H	Secondary air injection system pump stuck on
			P0171 or P0172	80H	2FH	Long term fuel trim
	81H	Fuel injection system function (Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped
FUEL			P117A	82H	03H	Cylinder A/F imbalance monitoring
SYSTEM			P0174 or P0175	80H	2FH	Long term fuel trim
	82H	Fuel injection system function	P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B	82H	03H	Cylinder A/F imbalance monitoring

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Item	OBD- MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description						
			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	
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder						
		Multiple cylinder misfires	P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder						
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders						
MIOFIDE			Multiple cylinder misfires	P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder					
MISFIRE	A1H			Wulliple Cyllider Illishes	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						

	OBD-			li	e and Test mit display)	
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
	A2H	No. 1 cylinder misfire	P0301	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	АЗН	No. 2 cylinder misfire	P0302	ОВН	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
MIOEIDE			P0304	0CH	24H	Misfire counts for last/current driving cycles
MISFIRE	A6H	No. 5 cylinder misfire	P0305	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 cylinder misfire	P0306	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 cylinder misfire	P0307	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 cylinder misfire	P0308	овн	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/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	y symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1524
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-1586
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-1521
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-1243
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-1534
	Incorrect idle speed adjustment						1	1	1	1		1			EC-1174
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-1451, EC-1458
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-1174
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1527
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			EC-1295
Mass air	flow sensor circuit	1			2										EC-1320
Engine o	coolant temperature sensor circuit	'					3			3					EC-1329
Air fuel r	ratio (A/F) sensor 1 circuit		1	2	3	2		2	2			2			EC-1336, EC-1340, EC-1344, EC-1348
Throttle	position sensor circuit						2			2					EC-1332, EC-1385, EC-1447, EC-1449, EC-1460
Accelera	ator pedal position sensor circuit			3	2	1									EC-1497, EC-1501, EC-1506
Knock se	ensor circuit			2								3			EC-1395
Engine o	pil temperature sensor			4		2						3			EC-1382
Cranksh	aft position sensor (POS) circuit	2	2												EC-1397

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

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	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/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 symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Camshaft position sensor (PHASE) circuit	3	2												EC-1402
Vehicle speed signal circuit		2	3		3						3			EC-1416
Power steering pressure sensor circuit		2					3	3						EC-1422
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-1425, EC-1427
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-1314
Exhaust valve timing control magnet retarder circuit		3	2		1	3	2	2	3		3			EC-1317
PNP signal circuit			3		3		3	3			3			EC-1433
Refrigerant pressure sensor circuit		2				3			3		4			EC-1536
Electrical load signal circuit							3							EC-1519
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-4
ABS actuator and electric unit (control unit)			4											BRC-5

^{1 - 6:} The numbers refer to the order of inspection. (continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

Revision: 2013 February EC-1575 2012 G Sedan

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		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/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
-	ymptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5				_	-	_	_	-			-		FL-13
	Fuel piping			5	5	5		5	5			5			<u>EM-43</u>
	Vapor lock		5												_
	Valve deposit	5		5	5	5		5	5			5			_
	Poor fuel (Heavy weight gasoline, Low octane)	3		3	3	3		3	3			3			_
Air	Air duct														EM-29
	Air cleaner							-							EM-29
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			<u>EM-29</u>
	Electric throttle control actuator	5			5		5			5					EM-30
	Air leakage from intake manifold/ Collector/Gasket	-													EM-34
Cranking	Battery		4	4		4		_	4						PG-117
	Generator circuit	1	1	1		1		1	1					1	CHG-30
	Starter circuit	3										1			STR-2 (With GR8- 1200 NI), STR-5 (Without GR8-1200 NI)
	Signal plate	6													<u>EM-128</u>
	PNP signal	4													EC-1433
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-116
	Cylinder head gasket		J	J	, 	J			J		4		3		<u> </u>
	Cylinder block														
	Piston												4		
	Piston ring	6	6	6	6	6		6	6			6			EM-128
	Connecting rod		U	U	U	J		U	J			U			<u>LIVI-120</u>
	Bearing														
	Crankshaft														

ENGINE CONTROL SYSTEM SYMPTOMS

< SYMPTOM DIAGNOSIS >

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		SYMPTOM													
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/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	symptom code	AA	AB	AC	AD	AE	AF	AG	АН	AJ	AK	AL	AM	НА	
Valve mecha- nism	Timing chain	5	5	5	5	5		5	5			5	3		EM-66
	Camshaft														EM-73
	Intake valve timing control														EM-66
	Exhaust valve timing control														EM-66
	Intake valve														EM-66
	Exhaust valve												3		<u>LIVI-00</u>
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			<u>EM-37,</u> <u>EX-6</u>
	Three way catalyst														<u>LX 0</u>
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-46, EM-98, EM-102, LU-18
	Oil level (Low)/Filthy oil														<u>LU-9</u>
Cooling	Radiator/Hose/Radiator cap	5	5					5							<u>CO-13</u> , <u>CO-13</u>
	Thermostat			5	5					5	4	5			<u>CO-29</u>
	Water pump					5			5 5						<u>CO-24</u>
	Water gallery														<u>CO-29</u>
	Cooling fan									_					<u>CO-20</u>
	Coolant level (Low)/Contaminated coolant									5					<u>CO-9</u>
IVIS (INFINITI Vehicle Immobilizer System — NATS)		1	1												SEC-5

^{1 - 6:} The numbers refer to the order of inspection.

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NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

[VQ25HR FOR MEXICO]

NORMAL OPERATING CONDITION

Description INFOID:0000000007742795

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,400 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled. **NOTE:**

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-1199.</u> "System Description".

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:

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never 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

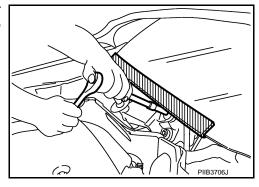
WARNING:

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the
 ignition ON or engine running, never 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

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions For Xenon Headlamp Service

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.
- 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.

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(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.

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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The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

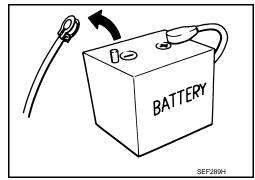
CAUTION:

- Be sure to 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 light up.
- Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will
 cause the MIL to light up 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-107</u>, "<u>Description</u>".
- Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube
 may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system,
 etc.
- Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.

General Precautions

INFOID:0000000007742800

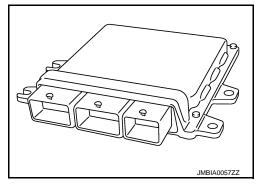
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.



- Do not disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

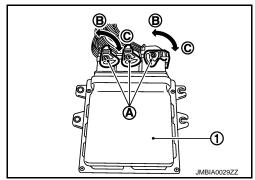
The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be lost 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 >

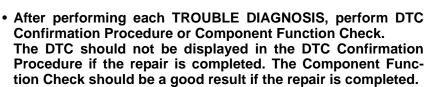
- When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.
 - 1. ECM
 - C. Loosen

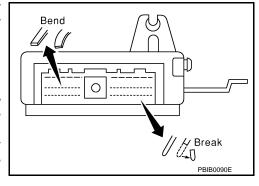


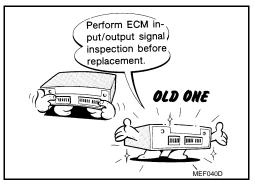
 When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).

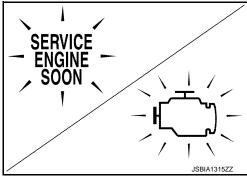
Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.

- 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 0.1 m (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 <u>EC-1538</u>, "<u>Reference Value</u>".
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).









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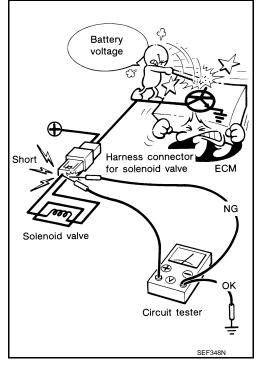
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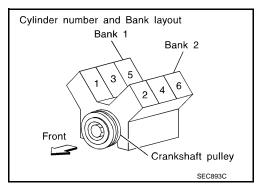
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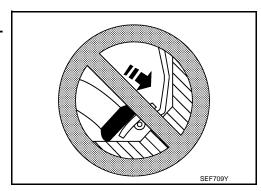
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
 - Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



- B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque.



- Do not depress accelerator pedal when starting.
- Immediately after starting, do not rev up engine unnecessarily.
- Do not rev up engine just prior to shutdown.

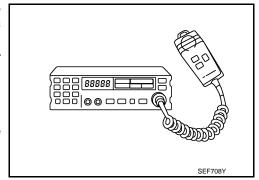


PRECAUTIONS

< PRECAUTION >

[VQ25HR FOR MEXICO]

- 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 0.2 m (8 in) away from the harness of electronic controls.
- Do not 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.



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PREPARATION

PREPARATION

Special Service Tools

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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	Checking fuel pressure

Commercial Service Tools

INFOID:0000000007742802

Tool name (Kent-Moore No.)		Description
Leak detector i.e.: (J-41416)	S-NT703	Locating the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)	S-NT704	Applying positive pressure through EVAP service port
Fuel filler cap adapter i.e.: (MLR-8382)	S-NT815	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	19 mm (0.75 in) More than 32 mm (1.26 in)	Removing and installing engine coolant temperature sensor

PREPARATION

< PREPARATION >

[VQ25HR FOR MEXICO]

Tool name (Kent-Moore No.)		Description
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	Mating surface shave cylinder	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with antiseize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex TM 133AR or equivalent meeting MIL specifica- tion MIL-A-907)	S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

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PERIODIC MAINTENANCE

FUEL PRESSURE

Inspection INFOID:000000007742803

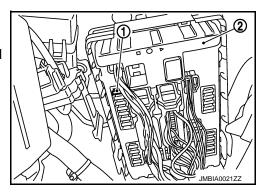
FUEL PRESSURE RELEASE

(P) With CONSULT

- 1. Turn ignition switch ON.
- Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT.
- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.

N Without CONSULT

- 1. Remove fuel pump fuse (1) located in IPDM E/R (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 V36 models do not have fuel return system.
- Use Fuel Pressure Gauge Kit [SST:(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.
- Read the indication of fuel pressure gauge.

At idling : Approximately 350 kPa (3.57 kg/cm², 51 psi)

If result is unsatisfactory, check fuel hoses and fuel tubes for clogging.

If OK, Replace "fuel filter and fuel pump assembly". Refer to <u>FL-6, "Removal and Installation"</u>. If NG, Repair or replace malfunctioning part.

EVAP LEAK CHECK

Inspection INFOID:0000000007742804

CAUTION:

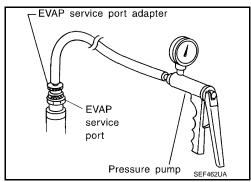
- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm², 0.6 psi) of pressure in EVAP system.

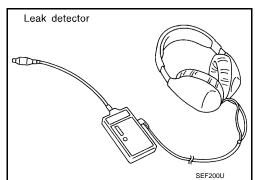
Do not start engine.

 Improper installation of EVAP service port adapter (commercial service tool) to the EVAP service port may cause a leak.

(P) WITH CONSULT

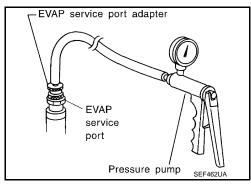
- 1. To locate the EVAP leak, install EVAP service port adapter (commercial service tool) and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- 3. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear 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 (commercial service tool) and hose with pressure pump.
- Locate the leak using a leak detector (commercial service tool).
 Refer to <u>EC-1243</u>, "System Diagram".





M WITHOUT CONSULT

- To locate the EVAP leak, install EVAP service port adapter (commercial service tool) 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.
- 3. 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).
- 4. Remove EVAP service port adapter (commercial service tool) and hose with pressure pump.



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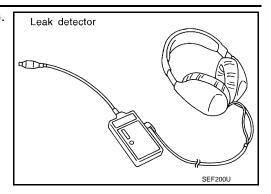
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EVAP LEAK CHECK

< PERIODIC MAINTENANCE >

[VQ25HR FOR MEXICO]

Locate the leak using a leak detector (commercial service tool).
 Refer to <u>EC-1243</u>, "System Diagram".



SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[VQ25HR FOR MEXICO]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

Condition	Specification
No load* (in P or N position)	$650\pm50~\mathrm{rpm}$

^{*:} Under the following conditions

- · A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- · Steering wheel: Kept in straight-ahead position

Ignition Timing

Condition	Specification			
No load* (in P or N position)	14 ± 2° BTDC			

^{*:} 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 or GST)

 At idle
 5 – 35%

 At 2,500 rpm
 5 – 35%

Mass Air Flow Sensor

Supply voltage	Battery voltage (11 – 14 V)					
Output voltage at idle	0.7 – 1.1 V*					
Mass air flow (Using CONSULT or GST)	2.0 – 6.0 g/sec at idle* 7.0 – 20.0 g/sec at 2,500 rpm*					

^{*:} Engine is warmed up to normal operating temperature and running under no load.

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