# SECTION ENGINE CONTROL SYSTEM o

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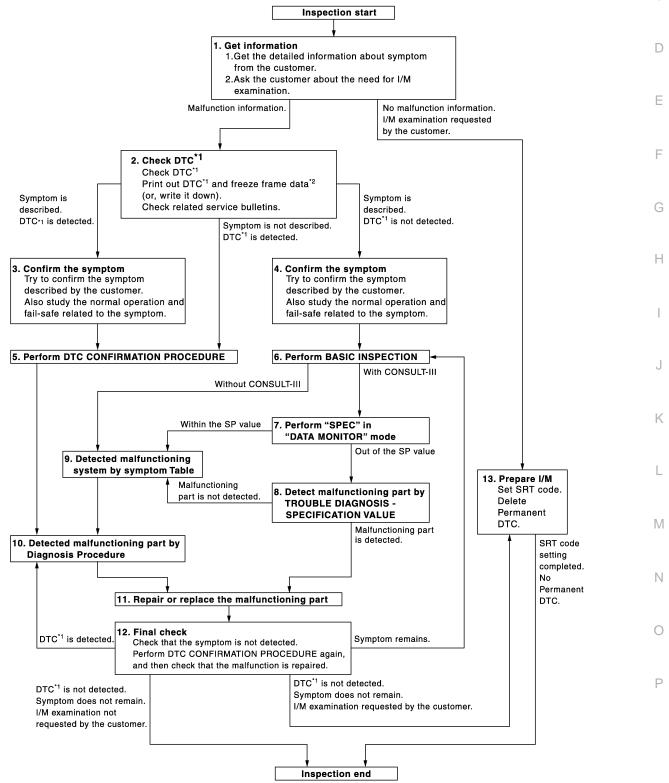
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SERVICE DATA AND SPECIFICATIONS (SDS)

# BASIC INSPECTION DIAGNOSIS AND REPAIR WORKFLOW

# Work Flow

# OVERALL SEQUENCE



INFOID:000000006352225

А

EC

\*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 <u>EC-12</u>, "<u>Diagnostic</u> <u>Work Sheet</u>".)
- 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

1. Check DTC.

- 2. Perform the following procedure if DTC is displayed.
- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC. (Refer to EC-151, "On Board Diagnosis Function" or EC-154, "CONSULT-III Function".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to <u>EC-620, "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-624</u>, "<u>Description</u>" and <u>EC-580, "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-624</u>, "<u>Description</u>" and <u>EC-580</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-582, "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?

# DIAGNOSIS AND REPAIR WORKFLOW

< BASI YES	>> GO TO 10.
NO	>> Check according to <u>GI-43, "Intermittent Incident"</u> .
<b>D.</b> PER	FORM BASIC INSPECTION
Perform	EC-14, "BASIC INSPECTION : Special Repair Requirement".
<u>Do you</u>	have CONSULT-III?
YES	>> GO TO 7.
NO 7	>> GO TO 9.
<b>/</b> .PER	FORM SPEC IN DATA MONITOR MODE
Make s 32" are	<b>CONSULT-III</b> ure that "MAS A/F SE-B1", "MAS A/F SE-B2", "B/FUEL SCHDL", "A/F ALPHA-B1", and "A/F ALPHA- within the SP value using CONSULT-III "SPEC" in "DATA MONITOR" mode. Refer to <u>EC-164, "Com-</u> Function Check".
	neasurement value within the SP value?
YES NO	>> GO TO 9. >> GO TO 8.
<b>8.</b> Det	ECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE
Detect	malfunctioning part according to EC-165, "Diagnosis Procedure".
	functioning part detected?
YES NO	>> GO TO 11. >> GO TO 9.
<b>^</b>	ECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE
	malfunctioning system according to <u>EC-620. "Symptom Table"</u> based on the confirmed symptom in
sten 4	
step 4,	and determine the trouble diagnosis order based on possible causes and symptoms.
step 4,	
	and determine the trouble diagnosis order based on possible causes and symptoms.
10.di	and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE
10.DI	and determine the trouble diagnosis order based on possible causes and symptoms.
10.DI Inspect NOTE: The Dia is also	and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE
<b>10.</b> DI Inspect <b>NOTE:</b> The Dia is also tion".	and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system. Ignosis Procedure in EC section described based on open circuit inspection. A short circuit inspection
<b>10.</b> DI Inspect <b>NOTE:</b> The Dia is also tion".	and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system. Ignosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46, "Circuit Inspector</u>
10.De Inspect <b>NOTE:</b> The Dia is also tion". Is a ma	and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system. Ignosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46</u> , "Circuit Inspec- Ifunctioning part detected? >> GO TO 11. >> Monitor input data from related sensors or check voltage of related ECM terminals using CON-
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO	and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system. Ingnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46</u> , " <u>Circuit Inspec-</u> <u>Ifunctioning part detected?</u> >> GO TO 11. >> Monitor input data from related sensors or check voltage of related ECM terminals using CON- SULT-III. Refer to <u>EC-543. "Reference Value"</u> .
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.RE	<ul> <li>and determine the trouble diagnosis order based on possible causes and symptoms.</li> <li>&gt;&gt; GO TO 10.</li> <li>ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE</li> <li>according to Diagnosis Procedure of the system.</li> <li>agnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection Inspection 11.</u></li> <li>&gt;&gt; GO TO 11.</li> <li>&gt;&gt; Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT-III. Refer to <u>EC-543. "Reference Value"</u>.</li> <li>EPAIR OR REPLACE THE MALFUNCTIONING PART</li> </ul>
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.Re 2. Re	and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system. Ingnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46</u> , "Circuit Inspec- Ifunctioning part detected? >> GO TO 11. >> Monitor input data from related sensors or check voltage of related ECM terminals using CON- SULT-III. Refer to <u>EC-543</u> , "Reference Value". EPAIR OR REPLACE THE MALFUNCTIONING PART Dair or replace the malfunctioning part. connect parts or connectors disconnected during Diagnosis Procedure again after repair and replace-
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.Re 2. Re me 3. Ch	and determine the trouble diagnosis order based on possible causes and symptoms. >> GO TO 10. ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system. Ingnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46</u> , "Circuit Inspec- Ifunctioning part detected? >> GO TO 11. >> Monitor input data from related sensors or check voltage of related ECM terminals using CON- SULT-III. Refer to <u>EC-543</u> , "Reference Value". EPAIR OR REPLACE THE MALFUNCTIONING PART Dair or replace the malfunctioning part. connect parts or connectors disconnected during Diagnosis Procedure again after repair and replace-
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.Re 2. Re me 3. Ch	<ul> <li>and determine the trouble diagnosis order based on possible causes and symptoms.</li> <li>&gt;&gt; GO TO 10.</li> <li>ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE</li> <li>according to Diagnosis Procedure of the system.</li> <li>agnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection</u> required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection</u>.</li> <li>functioning part detected?</li> <li>&gt;&gt; GO TO 11.</li> <li>&gt;&gt; Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT-III. Refer to <u>EC-543. "Reference Value"</u>.</li> <li>EPAIR OR REPLACE THE MALFUNCTIONING PART</li> <li>bair or replace the malfunctioning part.</li> <li>connect parts or connectors disconnected during Diagnosis Procedure again after repair and replace-nt.</li> <li>ack DTC. If DTC is displayed, erase it. Refer to <u>EC-151. "On Board Diagnosis Function"</u> or <u>EC-154, NSULT-III Function"</u>.</li> </ul>
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.Re 2. Re me 3. Ch <u>"CO</u>	and determine the trouble diagnosis order based on possible causes and symptoms.  >> GO TO 10.  ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system.  Ignosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection Functioning part detected? &gt;&gt; GO TO 11. &gt;&gt; Monitor input data from related sensors or check voltage of related ECM terminals using CON- SULT-III. Refer to <u>EC-543. "Reference Value"</u>. EPAIR OR REPLACE THE MALFUNCTIONING PART Dair or replace the malfunctioning part. connect parts or connectors disconnected during Diagnosis Procedure again after repair and replace- nt. eck DTC. If DTC is displayed, erase it. Refer to <u>EC-151. "On Board Diagnosis Function"</u> or <u>EC-154, DNSULT-III Function"</u>. &gt;&gt; GO TO 12.</u></u></u></u></u></u></u></u></u>
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.Re 2. Re me 3. Ch "CO	<ul> <li>and determine the trouble diagnosis order based on possible causes and symptoms.</li> <li>&gt;&gt; GO TO 10.</li> <li>ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE</li> <li>according to Diagnosis Procedure of the system.</li> <li>agnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection</u> required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection</u>.</li> <li>functioning part detected?</li> <li>&gt;&gt; GO TO 11.</li> <li>&gt;&gt; Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT-III. Refer to <u>EC-543. "Reference Value"</u>.</li> <li>EPAIR OR REPLACE THE MALFUNCTIONING PART</li> <li>bair or replace the malfunctioning part.</li> <li>connect parts or connectors disconnected during Diagnosis Procedure again after repair and replace-nt.</li> <li>ack DTC. If DTC is displayed, erase it. Refer to <u>EC-151. "On Board Diagnosis Function"</u> or <u>EC-154, NSULT-III Function"</u>.</li> </ul>
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.Re 2. Re 3. Ch "CO 12.FI When I Check a When s	and determine the trouble diagnosis order based on possible causes and symptoms.  >> GO TO 10.  ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system.  Ignosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection Functioning part detected? &gt;&gt; GO TO 11. &gt;&gt; Monitor input data from related sensors or check voltage of related ECM terminals using CON- SULT-III. Refer to <u>EC-543. "Reference Value"</u>. EPAIR OR REPLACE THE MALFUNCTIONING PART Dair or replace the malfunctioning part. connect parts or connectors disconnected during Diagnosis Procedure again after repair and replace- nt. eck DTC. If DTC is displayed, erase it. Refer to <u>EC-151. "On Board Diagnosis Function"</u> or <u>EC-154, DNSULT-III Function"</u>. &gt;&gt; GO TO 12.</u></u></u></u></u></u></u></u></u>
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.Re 2. Re 3. Ch 2. Re 3. Ch 3.	and determine the trouble diagnosis order based on possible causes and symptoms.  >> GO TO 10. ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE according to Diagnosis Procedure of the system.  gnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to GI-46. "Circuit Inspect  functioning part detected?  >> GO TO 11. >> Monitor input data from related sensors or check voltage of related ECM terminals using CON- SULT-III. Refer to EC-543. "Reference Value".  EPAIR OR REPLACE THE MALFUNCTIONING PART Dair or replace the malfunctioning part. connect parts or connectors disconnected during Diagnosis Procedure again after repair and replace- nt. ack DTC. If DTC is displayed, erase it. Refer to EC-151, "On Board Diagnosis Function" or EC-154, DNSULT-III Function".  >> GO TO 12. NAL CHECK DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function again, and then make sure that the malfunction have been completely repaired. ymptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure symptom is not detected.  detected and does symptom remain?
10.De Inspect NOTE: The Dia is also tion". Is a ma YES NO 11.Re 2. Re 3. Ch 2. Re 3. Ch 3. Ch 4. Ch 2. Re 3. Ch 5. Ch 4. Ch 5.	<ul> <li>and determine the trouble diagnosis order based on possible causes and symptoms.</li> <li>&gt;&gt; GO TO 10.</li> <li>ETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE</li> <li>according to Diagnosis Procedure of the system.</li> <li>Ignosis Procedure in EC section described based on open circuit inspection. A short circuit inspection required for the circuit check in the Diagnosis Procedure. For details, refer to <u>GI-46. "Circuit Inspection functioning part detected?</u></li> <li>&gt;&gt; GO TO 11.</li> <li>&gt;&gt; Monitor input data from related sensors or check voltage of related ECM terminals using CON-SULT-III. Refer to <u>EC-543. "Reference Value"</u>.</li> <li>IPAIR OR REPLACE THE MALFUNCTIONING PART</li> <li>Dair or replace the malfunctioning part.</li> <li>connect parts or connectors disconnected during Diagnosis Procedure again after repair and replace-nt.</li> <li>ack DTC. If DTC is displayed, erase it. Refer to <u>EC-151, "On Board Diagnosis Function"</u> or <u>EC-154, NNULT-III Function"</u>.</li> <li>&gt;&gt; GO TO 12.</li> <li>VAL CHECK</li> <li>DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function again, and then make sure that the malfunction have been completely repaired. symptom is not detected.</li> </ul>

# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

- 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 (Transmission Control Module). Refer to <u>EC-151, "On Board Diagnosis Function"</u> or <u>EC-154, "CONSULT-III Function"</u>.
- NO-2 >> I/M examination, requested from the customer: GO TO 13.

**13.** PREPARE FOR I/M EXAMINATION

- 1. Set SRT codes. Refer to EC-27, "SRT Set Driving Pattern".
- 2. Erase permanent DTCs. Refer or EC-154, "CONSULT-III Function".

>> 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 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.



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

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[VQ37VHR]

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# DIAGNOSIS AND REPAIR WORKFLOW

< BASIC INSPECTION >

#### WORKSHEET SAMPLE

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel	filler cap	<ul> <li>Vehicle ran out of fuel causing misfire</li> <li>Fuel filler cap was left off or incorrectly screwed on.</li> </ul>	
	☐ Startability	Impossible to start	nrottle position d by throttle position
Symptoms	Idling	□ No fast idle □ Unstable □ H □ Others [	High idle 🔲 Low idle
	Driveability	Stumble Surge Knock Intake backfire Exhaust backfi Others [	Lack of power ire ]
	Engine stall	At the time of start       While idling         While accelerating       While dece         Just after stopping       While loadi	lerating
Incident occurrence		Just after delivery     In the morning     At night	☐ In the daytime
Frequency		All the time Under certain conditions Sometimes	
Weather cond	ditions	□ Not affected	
	Weather	🗌 Fine 🗌 Raining 🗌 Snowing	Others [ ]
	Temperature	🗌 Hot 🗌 Warm 🗌 Cool 🗌	] Cold 🔲 Humid °F
		Cold During warm-up	After warm-up
Engine conditions		Engine speed 0 2,000	
Road conditions		🗌 In town 🗌 In suburbs 🗌 Hig	jhway 🗌 Off road (up/down)
Driving conditions		<ul> <li>Not affected</li> <li>At starting</li> <li>While idling</li> <li>While accelerating</li> <li>While decelerating</li> <li>While turning</li> </ul>	5
		Vehicle speed 0 10 20	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

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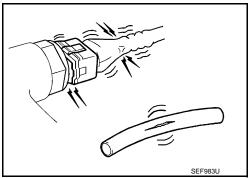
< BASIC INSPECTION >

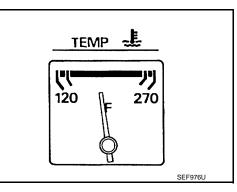
# INSPECTION AND ADJUSTMENT BASIC INSPECTION

# **BASIC INSPECTION : Special Repair Requirement**

**1.**INSPECTION START

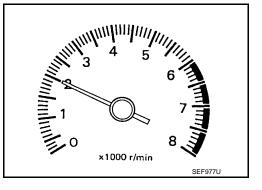
- 1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
- 2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses 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.
- 4. 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. Make sure that no DTC is displayed with CONSULT-III or GST.
- Are any DTCs detected?

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



# 2.REPAIR OR REPLACE

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

#### >> GO TO 3

# 3.CHECK IDLE SPEED

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

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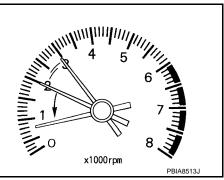
< BASIC INSPECTION >

# 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 <u>EC-18</u>, "IDLE SPEED : Special Repair <u>Requirement"</u>.
 For specification, refer to <u>EC-639</u>, "Idle Speed".

Is the inspection result normal?

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



	x1000 rpm PBIA8513J
4.perform accelerator pedal released position lear	
Stop engine.     Perform <u>EC-19, "ACCELERATOR PEDAL RELEASED POSITION</u>	N LEARNING : Special Repair Require-
<u>ment"</u> .	
>> GO TO 5.	
<b>D.</b> PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Perform <u>EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING</u>	<u>: Special Repair Requirement"</u> .
>> GO TO 6.	
6.PERFORM IDLE AIR VOLUME LEARNING	
Perform <u>EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Req</u>	uirement".
Is Idle Air Volume Learning carried out successfully?	
YES >> GO TO 7. NO >> Follow the instruction of Idle Air Volume Learning. Then G	O TO 4.
7.CHECK IDLE SPEED AGAIN	
<ol> <li>Start engine and warm it up to normal operating temperature.</li> <li>Check idle speed.</li> </ol>	
For procedure, refer to <u>EC-18, "IDLE SPEED : Special Repair Rec</u> For specification, refer to <u>EC-639, "Idle Speed"</u> .	quirement".
Is the inspection result normal?	
YES >> GO TO 10. NO >> GO TO 8.	
8. DETECT MALFUNCTIONING PART	
<ul> <li>Check the Following.</li> <li>Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-3</u>.</li> <li>Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-315</u>.</li> </ul>	
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,
<ul> <li>although this is rare.)</li> <li>Perform initialization of NVIS (NATS) system and registration of al SEC-9, "ECM RECOMMUNICATING FUNCTION : Special Repair</li> </ul>	

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

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#### < BASIC INSPECTION >

#### [VQ37VHR]

- 2. Check ignition timing with a timing light.
  - A :Timing indicator

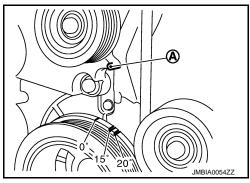
For procedure, refer to <u>EC-18</u>, "IGNITION TIMING : <u>Special</u> <u>Repair Requirement</u>".

For specification, refer to EC-639. "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.
- Perform EC-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

**13.** PERFORM IDLE AIR VOLUME LEARNING

Perform EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

- YES >> GO TO 14.
- NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.
- **14.**CHECK IDLE SPEED AGAIN
- 1. Start engine and warm it up to normal operating temperature.
- Check idle speed. For procedure, refer to <u>EC-18</u>, "IDLE SPEED : Special Repair Requirement". For specification, refer to <u>EC-639</u>, "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-18</u>, "<u>IGNITION TIMING</u>: <u>Special</u> <u>Repair Requirement</u>". For specification, refer to EC-639, "Ignition Timing".

For specification, refer to EC-639, "Ignition 11

Is the inspection result normal?

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

# ng".

# 16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-56, "Removal and Installation".

- Is the inspection result normal?
- YES >> GO TO 17.
- NO  $\implies$  Repair the timing chain installation. Then GO TO 4.

A

< BASIC INSPECTION >

17.DETECT MALFUNCTIONING PART	Δ
Check the following.	$\square$
<ul> <li>Check camshaft position sensor (PHASE) and circuit. Refer to <u>EC-319</u>, "<u>Component Inspection</u>".</li> <li>Check crankshaft position sensor (POS) and circuit. Refer to <u>EC-315</u>, "<u>Component Inspection</u>".</li> </ul>	
Is the inspection result normal?	EC
YES >> GO TO 18. NO >> Repair or replace. Then GO TO 4.	
18. CHECK ECM FUNCTION	С
1. Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident,	
although this is rare.)	D
<ol> <li>Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to SEC-9, "ECM RECOMMUNICATING FUNCTION : Special Repair Requirement".</li> </ol>	
	Е
>> GO TO 4.	
19.INSPECTION END	F
If ECM is replaced during this BASIC INSPECTION procedure, go to <u>EC-17, "ADDITIONAL SERVICE WHEN</u> REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".	Γ
<u>REPLACING CONTROL UNIT (ECIVI) : Special Repair Requirement.</u>	
>> INSPECTION END	G
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM)	
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Description	Н
When replacing ECM, the following procedure must be performed.	I
ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair	I
Requirement	
1. PERFORM INITIALIZATION OF NVIS (NATS) SYSTEM AND REGISTRATION OF ALL NVIS (NATS) IGNI-	J
TION KEY IDS	
Refer to SEC-9, "ECM RECOMMUNICATING FUNCTION : Special Repair Requirement".	Κ
>> GO TO 2.	L
2.PERFORM VIN REGISTRATION	
Refer to EC-19, "VIN REGISTRATION : Special Repair Requirement".	M
>> GO TO 3.	
3. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING	NI
Refer to EC-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".	Ν
>> GO TO 4.	0
4.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	
Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".	Ρ
<u>Is the vehicle with SynchroRev Match mode (S-MODE)?</u> YES >> GO TO 5.	
NO $>>$ GO TO 6.	
5. PERFORM M/T NEUTRAL POSITION LEARNING	

< BASIC INSPECTION > >> GO TO 6.

**Ó.**PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MODULE)

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MODULE) : Description INFOID:000000006352230

When replacing VVEL control module, the following procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MODULE) : Special Repair Requirement INFOID:00000006352231

**1**.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME 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

With CONSULT-III Check idle speed in "DATA MONITOR" mode with CONSULT-III. With GST Check idle speed with Service \$01 of GST.

>> INSPECTION END **IGNITION TIMING** 

**IGNITION TIMING : Description** 

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

1. Attach timing light to loop wire as shown.

#### [VQ37VHR]

INFOID:00000006352234

INFOID:00000006352235

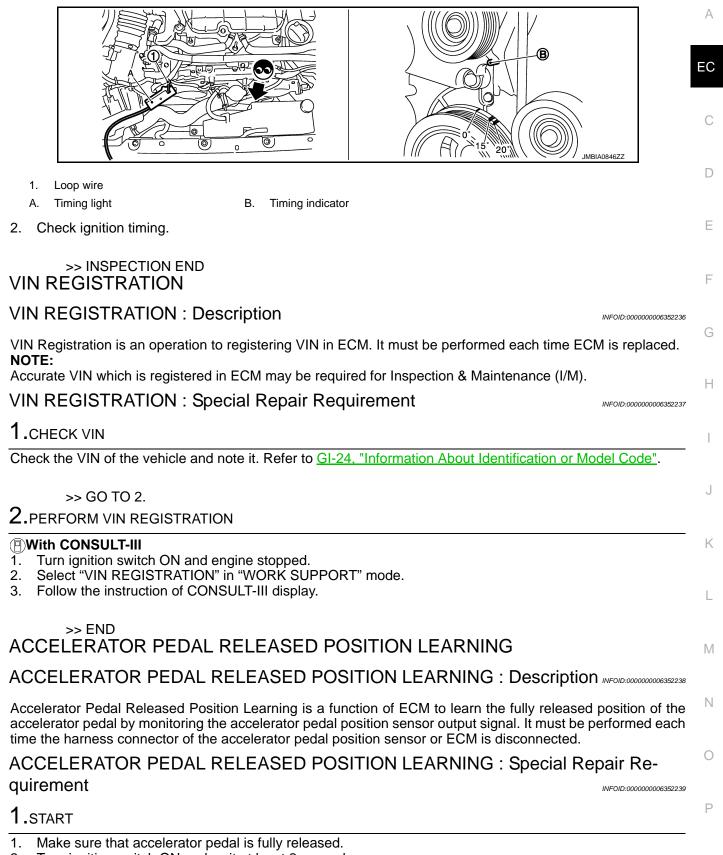
INFOID:00000006352232

INFOID:000000006352233

2011 370Z

#### < BASIC INSPECTION >

#### [VQ37VHR]



- Turn ignition switch ON and wait at least 2 seconds. 2.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON and wait at least 2 seconds.
- Turn ignition switch OFF and wait at least 10 seconds. 5.

< BASIC INSPECTION >

#### >> END THROTTLE VALVE CLOSED POSITION LEARNING

THROTTLE VALVE CLOSED POSITION LEARNING : Description

INFOID:000000006352240

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 inside is cleaned.

# THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement

INFOID:000000006352241

# 1.START

#### **WITH CONSULT-III**

- 1. Turn ignition switch ON.
- 2. Select "CLSD THL POS LEARN" in "WORK SUPPORT" mode.
- 3. Follow the instructions on the CONSULT-III display.
- 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-III**

1. Start the engine.

NOTE:

Engine coolant temperature is 25°C (77°F) or less before engine starts.

2. Warm up the engine.

# NOTE:

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.

#### >> 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 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

# 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)
- Selector lever: P or N (A/I 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

INFOID:000000006352242

INFOID:000000006352243

< BASIC INSPECTION >	[VQ37VHR]
<ul> <li>With CONSULT-III: Drive vehicle until "ATF TEMP SE 1" in "DATA MONITOR" mode of "A cates less than 0.9V.</li> <li>Without CONSULT-III: Drive vehicle for 10 minutes.</li> </ul>	/T" system indi- A
- M/T models	_
Drive vehicle for 10 minutes.	EC
Do you have CONSULT-III?	
YES >> GO TO 2. NO >> GO TO 3.	
	C
2.PERFORM IDLE AIR VOLUME LEARNING	
<ul> <li>With CONSULT-III</li> <li>Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-19. "ACCELEF</u> <u>RELEASED POSITION LEARNING : Special Repair Requirement"</u>.</li> </ul>	
<ol> <li>Perform Throttle Valve Closed Position Learning. <u>EC-20, "THROTTLE VALVE CLOS</u> <u>LEARNING : Special Repair Requirement".</u></li> </ol>	
<ol> <li>Start engine and warm it up to normal operating temperature.</li> </ol>	E
4. Select "IDLE AIR VOL LEARN" in "WORK SUPPORT" mode.	
5. Touch "START" and wait 20 seconds.	F
Is "CMPLT" displayed on CONSULT-III screen?	
YES >> GO TO 4. NO >> GO TO 5.	
<b>3.</b> PERFORM IDLE AIR VOLUME LEARNING	G
Without CONSULT-III NOTE:	Н
<ul> <li>It is better to count the time accurately with a clock.</li> </ul>	
<ul> <li>It is impossible to switch the diagnostic mode when an accelerator pedal position sen</li> </ul>	sor circuit has
a malfunction.	
1. Perform Accelerator Pedal Released Position Learning. Refer to <u>EC-19. "ACCELER</u>	RATOR PEDAL
<ul> <li><u>RELEASED POSITION LEARNING : Special Repair Requirement</u>.</li> <li>Perform Throttle Valve Closed Position Learning. <u>EC-20, "THROTTLE VALVE CLOS</u></li> </ul>	ED POSITION
LEARNING : Special Repair Requirement".	J
3. Start engine and warm it up to normal operating temperature.	
<ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds</li> </ol>	<b>.</b>
<ol> <li>Repeat the following procedure quickly five times within 5 seconds.</li> </ol>	s. K
- Fully depress the accelerator pedal.	
- Fully release the accelerator pedal.	
<ol> <li>Wait 7 seconds, fully depress the accelerator pedal for approx. 20 seconds until the MII and illuminates.</li> </ol>	_ stops blinking
<ol> <li>Fully release the accelerator pedal within 3 seconds after the MIL illuminates.</li> </ol>	
9. Start engine and let it idle.	N
10. Wait 20 seconds.	
Engine Run	un starts
Ignition ON	N
switch OFFL Approx.	
3 sec. 5 sec. Within 10 sec.	
	C
Accelerator Fully	
	F

>> 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.
- 2.

MIL

Blinking ON

OFF

ON

SEC897C

< BASIC INSPECTION >

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-639, "Idle Speed" and EC-639, "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 EC-164. "Description". 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

INFOID:000000006352244

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.

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

CAUTION:

It must be performed only on the replaced bank side.

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

#### VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Repair Requirement

INFOID:000000006352245

1.START

Do you have CONSULT-III?

Do you have CONSULT-III? YES

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

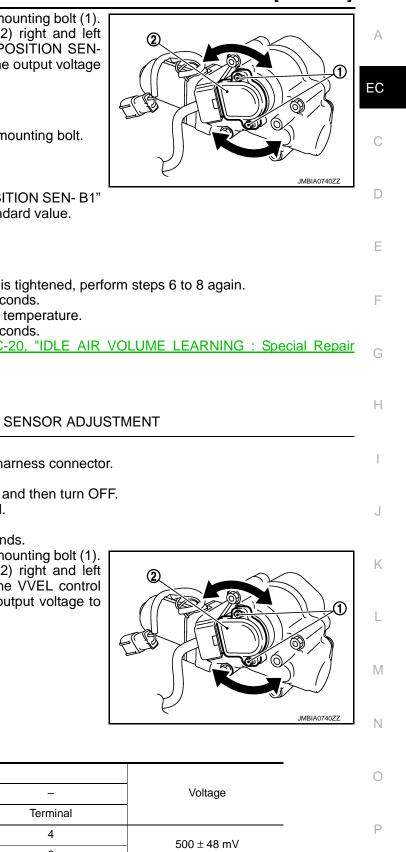
2.PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

#### () With CONSULT-III

- Turn ignition switch ON. 1.
- Select "VVEL POS SEN ADJ PREP" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Touch "Start" and wait a few seconds.
- 4. Make sure the "CMPLT" is displayed on CONSULT-III screen.
- 5. Select "VVEL POSITION SEN- B1" or "VVEL POSITION SEN- B2" in "DATA MONITOR" mode with CON-SULT-III.

#### < BASIC INSPECTION >

#### [VQ37VHR]



- Loosen the VVEL control shaft position sensor mounting bolt (1). 6.
- Turn the VVEL control shaft position sensor (2) right and left 7. while monitoring the output voltage of "VVEL POSITION SEN-B1" or "VVEL POSITION SEN-B2" and adjust the output voltage to be within the standard value.

#### Voltage : 500 ± 48 mV

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



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

#### Voltage : 500 $\pm$ 48 mV

#### NOTE:

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

- 10. Turn ignition switch OFF and wait at least 10 seconds.
- 11. Start engine and warm it up to normal operating temperature.
- 12. Turn ignition switch OFF and wait at least 10 seconds.
- 13. Perform idle air volume learning. Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

#### >> INSPECTION END

# ${f 3.}$ perform vvel control shaft position sensor adjustment

#### Without CONSULT-III

- 1. Disconnect VVEL control shaft position sensor harness connector.
- Remove VVEL actuator motor relay. 2.
- 3. 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.
- 7. Loosen the VVEL control shaft position sensor mounting bolt (1).
- Turn the VVEL control shaft position sensor (2) right and left 8. 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			0
	Bank	Connector	+	_	Voltage	
	Dalik	Connector	Terminal	Terminal		
-	1	E15	3	4	- 500 ± 48 mV	P
-	2		5	6	- 500 ± 40 mV	

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

#### : 7.0 N•m (0.71 kg-m, 62 in-lb) (U)

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

< BASIC INSPECTION >

		VVEL control module		
Bank Connector		+	_	Voltage
Darik	Connector	Terminal	Terminal	
1	1 E15	3	4	500 ± 48 mV
2		5	6	500 ± 40 mv

#### NOTE:

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

- 11. Turn ignition switch OFF and wait at least 10 seconds.
- 12. Start engine and warm it up to normal operating temperature.
- 13. Turn ignition switch OFF and wait at least 10 seconds.
- 14. Perform idle air volume learning. Refer to <u>EC-20</u>, "IDLE <u>AIR VOLUME LEARNING</u> : <u>Special Repair</u> <u>Requirement</u>".

#### >> INSPECTION END

#### MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:000000006352246

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:000000006352247

# **1.**START

#### With CONSULT-III

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

#### With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. 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. Make sure DTC P0102 is detected.
- 7. Select Service \$04 with GST to erase the DTC P0102.

#### >> END

# M/T NEUTRAL POSITION LEARNING

#### M/T NEUTRAL POSITION LEARNING : Description

M/T Neutral Position Learning is a function in which ECM learns the shift lever neutral position by monitoring output voltage of gear lever position sensor.

This must be performed when the following conditions are fulfilled.

- Gear lever position sensor is replaced
- ECM is replaced
- Shift position indicator "N" is blinking

#### M/T NEUTRAL POSITION LEARNING : Special Repair Requirement

#### INFOID:000000006352249

INFOID:00000006352248

**1**.START

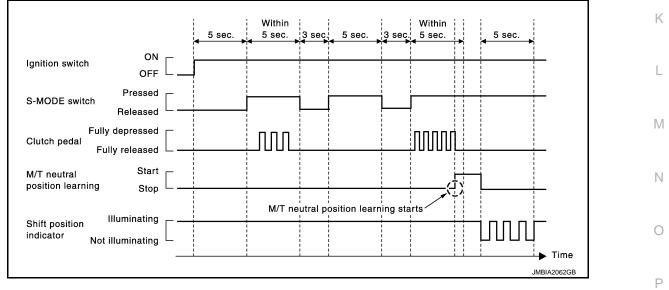
Do you have CONSULT-III? Do you have CONSULT-III?

INSPECTION AND ADJUSTMENT	
< BASIC INSPECTION > [VQ37VHR]	
YES >> GO TO 2. NO >> GO TO 3.	A
2.PERFORM M/T NEUTRAL POSITION LEARNING	
<ul> <li>With CONSULT-III</li> <li>Check that there is no sticking when shifting shift lever to the neutral position.</li> <li>Turn ignition quittee ON</li> </ul>	EC
<ol> <li>Turn ignition switch ON.</li> <li>Select "M/T NEUTRAL POS LEARN" in "WORK SUPPORT" mode with CONSULT-III.</li> <li>Touch "Start" and wait a few seconds.</li> <li>NOTE:</li> </ol>	С
<ul> <li>Never touch shift lever. Otherwise learning may not complete normally.</li> <li>5. Make sure the "COMPLETE" is displayed on CONSULT-III screen.</li> <li>NOTE:</li> </ul>	D
If "INCMP" is displayed, return to step 1 and repeat the procedures again.	
>> END	E
<b>3.</b> PERFORM M/T NEUTRAL POSITION LEARNING	
Without CONSULT-III	F
NOTE:	
<ul> <li>It is better to count the time accurately with a clock.</li> <li>It is impossible to switch the learning mode when a clutch interlock switch circuit has a malfunction.</li> <li>Check that there is no sticking when shifting shift lever to the neutral position.</li> <li>Turn ignition switch ON and wait 5 seconds.</li> </ul>	G
3. Within 5 seconds repeat the following operation 3 times. Fully depress and fully release clutch pedal while pressing and holding S-MODE switch.	Н
<ol> <li>Wait 3 seconds while S-MODE switch is released.</li> <li>Wait 5 seconds while pressing S-MODE switch.</li> </ol>	
6. Wait 3 seconds while S-MODE switch is released.	
<ol> <li>Within 5 seconds repeat the following operation 5 times. Fully depress and fully release clutch pedal while pressing and holding S-MODE switch.</li> </ol>	

- pressing and holding S-MODE switch.
  - ECM starts M/T Neutral Position Learning.

NOTE:

#### Never touch shift lever. Otherwise learning may not complete normally.



8. Shift position indicator on combination meter blinks for 5 seconds when the leaning is complete. **NOTE:** 

If shift position indicator does not blink or blinks continuously, return to step 1 and repeat the procedures again.

>> END

J

# HOW TO SET SRT CODE

#### < BASIC INSPECTION >

# HOW TO SET SRT CODE

# Description

INFOID:000000006912718

[VQ37VHR]

#### 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 <sup>*1</sup> (CONSULT-III indication)	Performance Priority <sup>*2</sup>	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
CATALYST	1	Three way catalyst function	P0420, P0430
EVAP SYSTEM	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-III screen, "HO2S HTR" is not SRT item.

\*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-III.

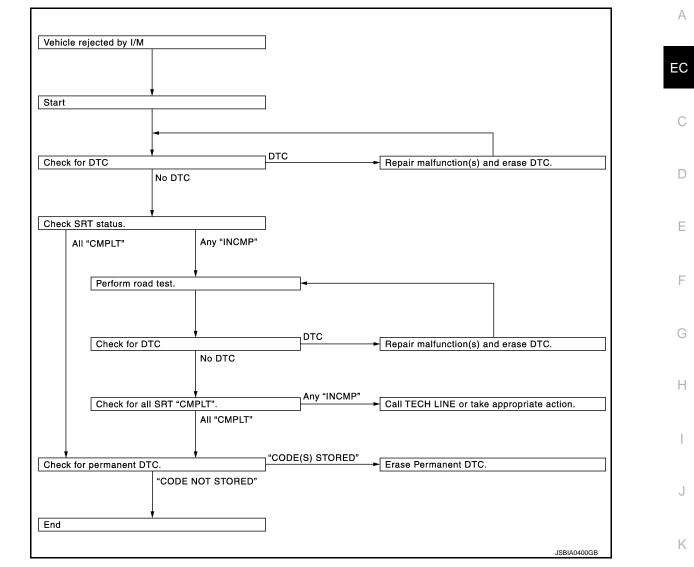
#### SRT SERVICE PROCEDURE

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.

# HOW TO SET SRT CODE

#### < BASIC INSPECTION >

[VQ37VHR]



# SRT Set Driving Pattern

**CAUTION:** 

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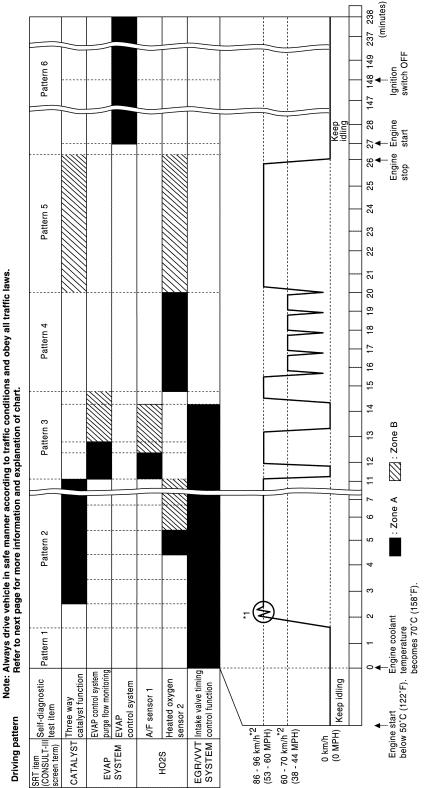
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Always drive the vehicle in safe manner according to traffic conditions and obey all traffic laws.



\*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.
- "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

HOW TO SET SRT CODE	
	Q37VHR]
*: Normal conditions - Sea level - Flat road - Ambient air temperature: 20 – 30°C (68 – 86°F)	A
<b>NOTE:</b> Diagnosis is performed as quickly as possible under normal conditions. However, under other or diagnosis may also be performed. [For example: ambient air temperature other than 20 – 30°C (68 -	
Work Procedure	D:000000006912720
Check DTC. <u>Is any DTC detected?</u>	D
YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-584, "DTC_Index"</u> . NO >> GO TO 2. <b>2.</b> CHECK SRT STATUS	E
With CONSULT-III     Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT-III.     Without CONSULT-III	F
Perform "SRT status" mode with <u>EC-151, "On Board Diagnosis Function"</u> .	G
Is SRT code(s) set?	
YES >> GO TO 12. NO-1 >> With CONSULT-III: GO TO 3. NO-2 >> Without CONSULT-III: GO TO 4.	Н
3. DTC CONFIRMATION PROCEDURE	I
<ol> <li>Select "SRT WORK SUPPORT" in "DTC &amp; SRT CONFIRMATION" mode with CONSULT-III.</li> <li>For SRT(s) that is not set, perform the corresponding "DTC CONFIRMATION PROCEDURE" ac the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-26. "Description"</u>.</li> <li>Check DTC.</li> </ol>	cording to
Is any DTC detected?	K
<ul> <li>YES &gt;&gt; Repair malfunction(s) and erase DTC. Refer to <u>EC-584, "DTC Index"</u>.</li> <li>NO &gt;&gt; GO TO 11.</li> </ul>	
4.PERFORM ROAD TEST	I
<ul> <li>Check the "Performance Priority" in the "SRT ITEM" table. Refer to <u>EC-26, "Description"</u>.</li> <li>Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to <u>EC-27, "SRT S</u> Pattern".</li> </ul>	
In order to set all SRTs, the SRT set driving pattern must be performed at least once.	M
>> GO TO 5. <b>5.</b> PATTERN 1	Ν
1. Check the vehicle condition;	
<ul> <li>Engine coolant temperature is –10 to 35°C (14 to 95°F).</li> <li>Fuel tank temperature is more than 0°C (32°F).</li> </ul>	0
<ol> <li>Start the engine.</li> <li>Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)</li> <li>NOTE:</li> <li>ECM terminal voltage is follows;</li> <li>Engine coolant temperature</li> <li>-10 to 35°C (14 to 95°F): 3.0 - 4.3 V</li> <li>70°(158°F): Less than 4.1 V</li> <li>Fuel tank temperature: Less than 1.4 V</li> <li>Refer to EC-543, "Reference Value".</li> </ol>	Ρ

Revision: 2011 October

< BASIC INSPECTION >

#### >> 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.

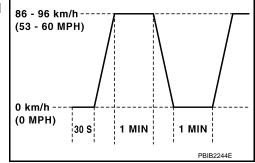
>> GO TO 7.

# 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).
 86 - 96 km (53 - 60 M

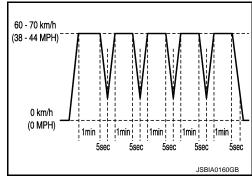
>> GO TO 8.



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

# EC-30

# HOW TO SET SRT CODE

HOW TO SET SRT CODE				
< BASIC INSPECTION >	[VQ37VHR]			
Without CONSULT-III Perform "SRT status" mode with <u>EC-151, "On Board Diagnosis Function"</u> . @With GST		A		
Select Service \$01 with GST.	ſ			
Is SRT(s) set?		EC		
YES >> GO TO 12. NO >> Call TECH LINE or take appropriate action.				
12.CHECK PERMANENT DTC		С		
NOTE:				
Permanent DTC cannot be checked with a tool other than CONSULT-III or GST.		D		
With CONSULT-III Select "SRT STATUS" in "DTC & SRT CONFIRMATION" mode with CONSULT-III.		D		
With GST				
Select Service \$0A with GST.		Е		
Is permanent DTC(s) detected?				
YES >> Go to <u>EC-26, "Description"</u> . NO >> END		F		
		G		
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#### < BASIC INSPECTION >

# HOW TO ERASE PERMANENT DTC

#### Description

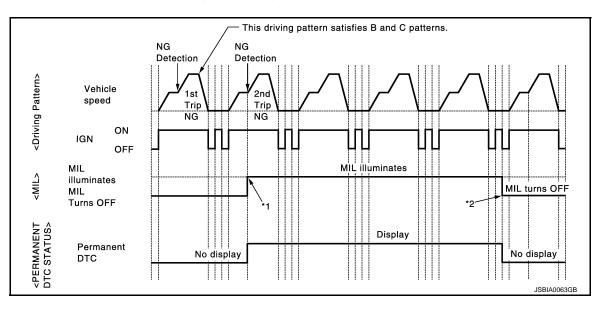
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[VQ37VHR]

#### 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. \*2: 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.

 $\times$ : Applicable —: Not applicable

*	Group <sup>*</sup> Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern	
Group		В	D
A	×	—	—
В		×	×

\*: For group, refer to <u>EC-584, "DTC Index"</u>.

#### PERMANENT DTC ITEM

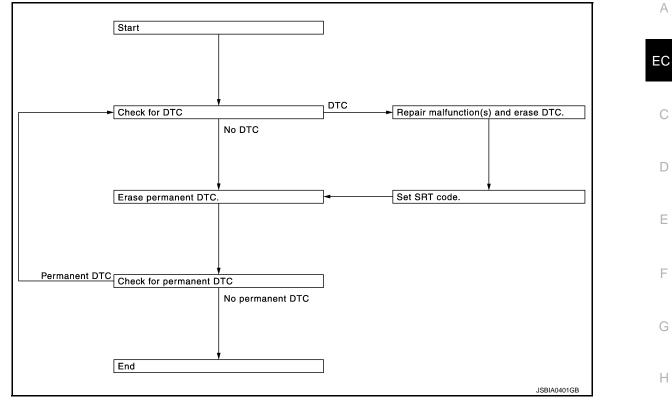
For permanent DTC items, MIL turns ON. Refer to EC-584, "DTC Index".

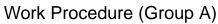
# HOW TO ERASE PERMANENT DTC

# < BASIC INSPECTION >

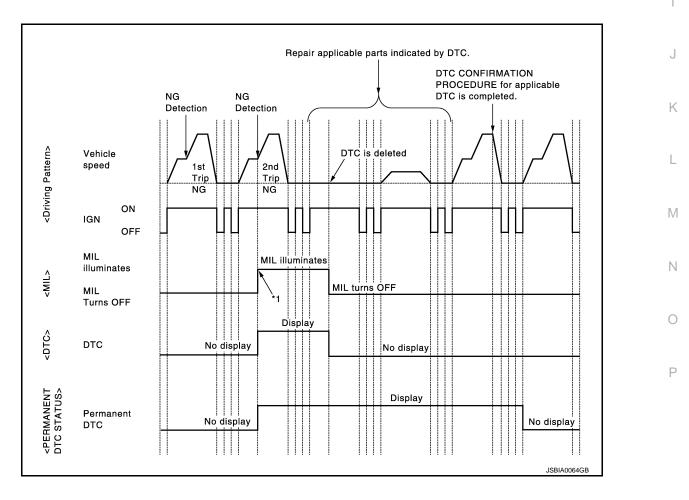
#### [VQ37VHR]

PERMANENT DTC SERVICE PROCEDURE









#### < BASIC INSPECTION >

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

# 1. СНЕСК DTC

#### Check DTC.

Is any DTC detected?

- YES >> Repair malfunction(s) and erase DTC. Refer to <u>EC-151, "On Board Diagnosis Function", EC-154,</u> <u>"CONSULT-III Function"</u>.
- NO >> GO TO 2.

2. CHECK PERMANENT DTC

#### With CONSULT-III

- 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. Select "PERMANENT DTC STATUS" mode with CONSULT-III.

With GST

- 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. Select Service \$0A with GST.

#### 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-584, "DTC Index".

>> GO TO 4.

#### **4.**CHECK PERMANENT DTC

#### (B)With CONSULT-III

- 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. Select "PERMANENT DTC STATUS" mode with CONSULT-III.

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.
- 5. Select Service \$0A with GST.
- Is any permanent DTC detected?
- YES >> GO TO 1.
- NO >> END

# HOW TO ERASE PERMANENT DTC

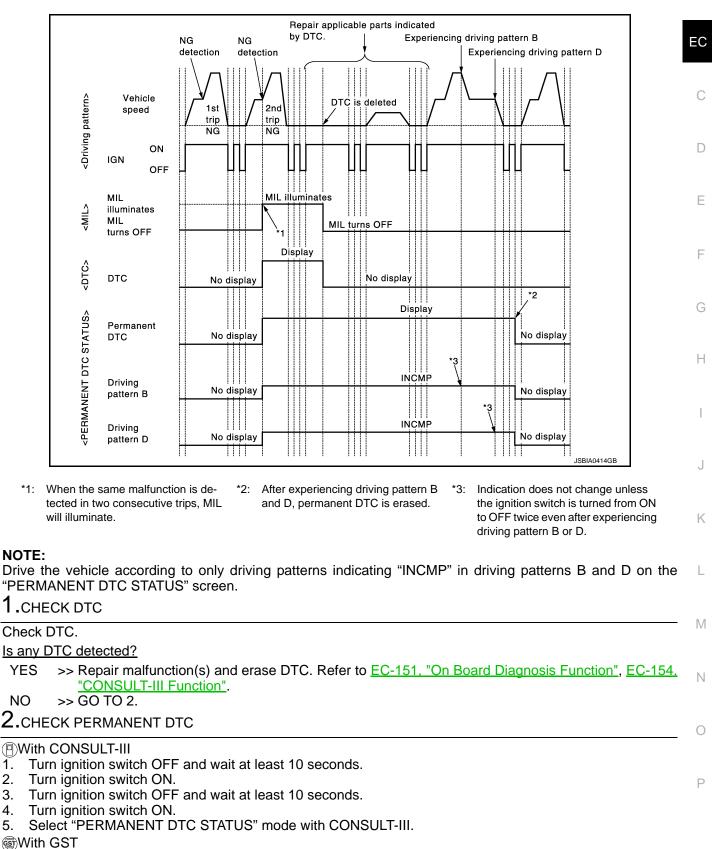
#### < BASIC INSPECTION >

# Work Procedure (Group B)



[VQ37VHR]

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

3. 4.

5.

# **EC-35**

# HOW TO ERASE PERMANENT DTC

< BASIC INSPECTION >

- 4. Turn ignition switch ON.
- 5. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3. NO >> END

**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.

With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- Use "PERMANENT DTC WORK SUPPORT" mode with CONSULT-III to drive the vehicle according to driving pattern B. Refer to <u>EC-154, "CONSULT-III Function", EC-148, "DIAGNOSIS DESCRIPTION : Driving Pattern"</u>.

@With GST

- 1. Start engine and warm it up to normal operating temperature.
- Drive the vehicle according to driving pattern B. Refer to <u>EC-148</u>, "<u>DIAGNOSIS DESCRIPTION</u>: <u>Driving</u> <u>Pattern</u>".

>> GO TO 4.

#### **4.**CHECK PERMANENT DTC

#### (B) With CONSULT-III

- 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. Select "PERMANENT DTC STATUS" mode with CONSULT-III.

With GST

- 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. Select Service \$0A with GST.

Is any permanent DTC detected?

YES >> GO TO 5. NO >> END

**5.** DRIVE DRIVING PATTERN D

#### 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.
- 1. Drive the vehicle according to driving pattern D. Refer to <u>EC-148. "DIAGNOSIS DESCRIPTION : Driving</u> <u>Pattern"</u>.

>> GO TO 6.

6.CHECK PERMANENT DTC

#### With CONSULT-III

- 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.

# HOW TO ERASE PERMANENT DTC

	[VQ37VHR]	
< BASIC INSPECTION >		
<ol> <li>Select "PERMANENT DTC STATUS" mode with CONSULT-III.</li> <li>With GST</li> </ol>	A	
1. Turn ignition switch OFF and wait at least 10 seconds.	~	-
2. Turn ignition switch ON.		
<ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Turn ignition switch ON.</li> </ol>	EC	
5. Select Service \$0A with GST.		
Is any permanent DTC detected?		
YES >> GO TO 1.	C	r
NO >> END		
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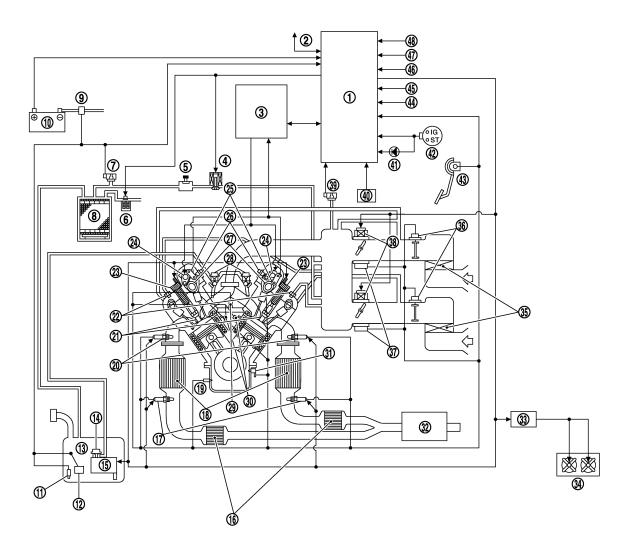
## < SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION ENGINE CONTROL SYSTEM

System Diagram

INFOID:000000006352250

[VQ37VHR]



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

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

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

#### < SYSTEM DESCRIPTION >

## [VQ37VHR]

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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	30.	Knock sensor
31.	Crankshaft position sensor (POS)	32.	Muffler	33.	Cooling fan control module
34.	Cooling fan	35.	Air cleaner	36.	Mass air flow sensor (with intake air temperature sensor)
37.	Electric throttle control actuator	38.	Throttle position sensor	39.	Manifold absolute pressure (MAP) sensor
40.	Brake booster pressure sensor	41.	MIL	42.	Ignition switch
43.	Accelerator pedal position sensor	44.	Power steering pressure sensor	45.	Refrigerant pressure sensor
46.	PNP signal	47.	Gear lever position sensor	48	Input speed sensor

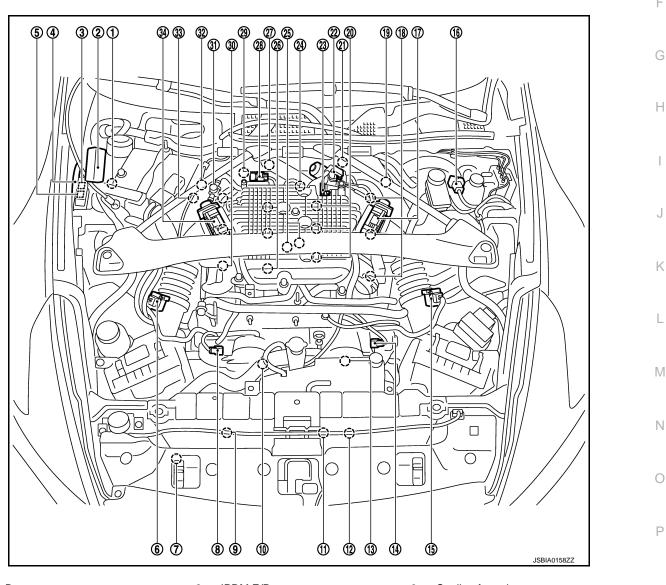
# System Description

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

# **Component Parts Location**

INFOID:000000006352252

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- 1. Battery current sensor
- VVEL control module 4.
- IPDM E/R 2.
- 5. VVEL actuator motor relay
- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)

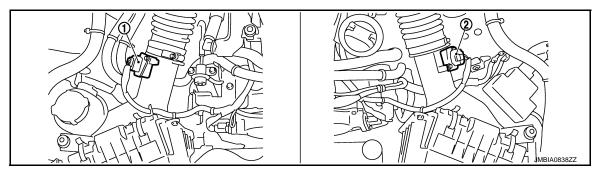
#### < SYSTEM DESCRIPTION >

[VQ37VHR]

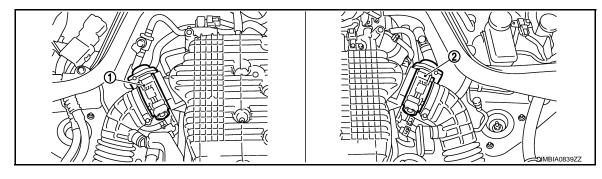
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- 13. Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve
- 31. EVAP service port
- 34. Electric throttle control actuator (bank 1)

- Camshaft position sensor (PHASE) 9. (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)
- 32. A/F sensor 1 (bank 1)

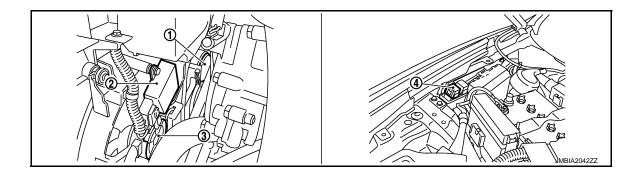
- Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)
- 33. Crankshaft position sensor (POS)



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



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



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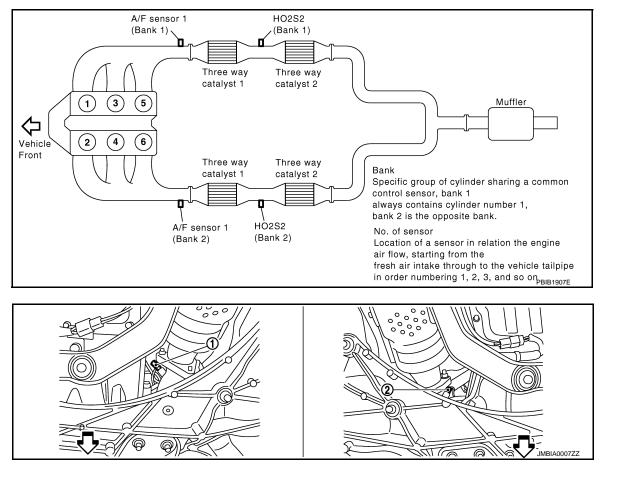
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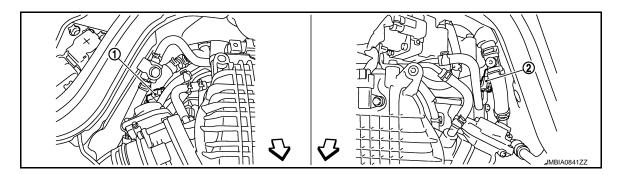
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- C: Vehicle front
- 1. Cooling fan motor-2
- 2. Cooling fan control module
- 3. Cooling fan motor-1

4. Cooling fan relay



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



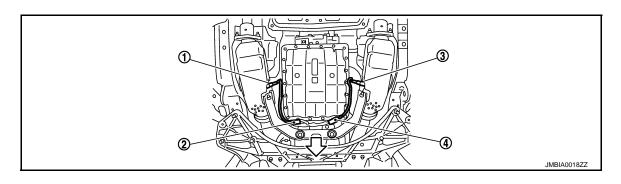
C: Vehicle front

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

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

# < SYSTEM DESCRIPTION >

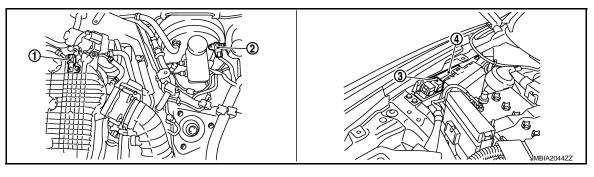
## [VQ37VHR]



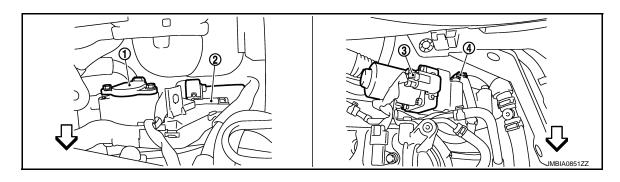
└□: Vehicle front

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

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



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



C: Vehicle front

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

VVEL control shaft position sensor 4. (bank 2)

#### < SYSTEM DESCRIPTION >

# [VQ37VHR]

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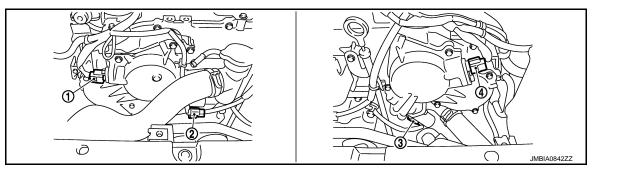
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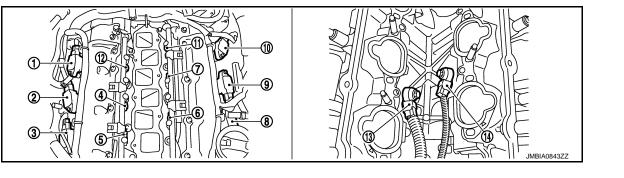
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- Camshaft position sensor (PHASE) 2. 1. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector



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

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

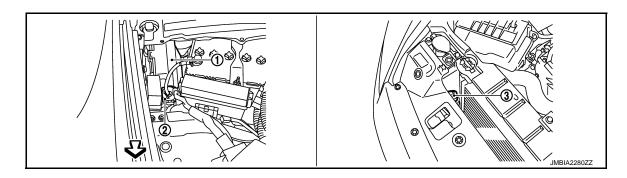
- - 3 JMBIA0844ZZ

C: Vehicle front

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

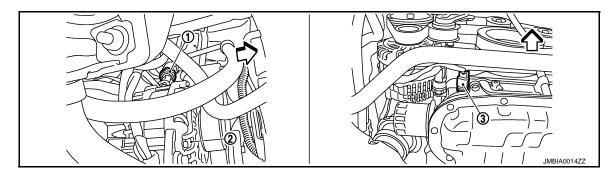
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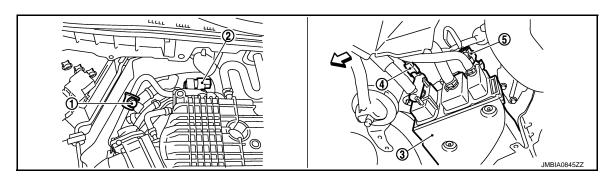
- C: Vehicle front
- 1. IPDM E/R

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



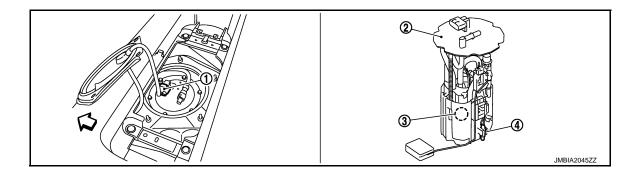
- : Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



#### $\triangleleft$ : Vehicle front

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



## < SYSTEM DESCRIPTION >

## [VQ37VHR]

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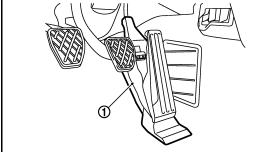
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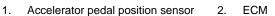
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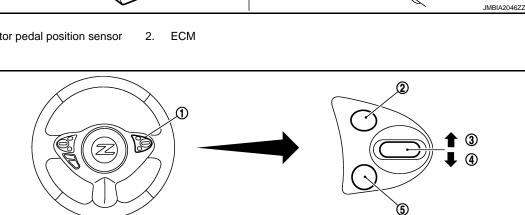
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- C: Vehicle front
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- 4. Fuel tank temperature sensor



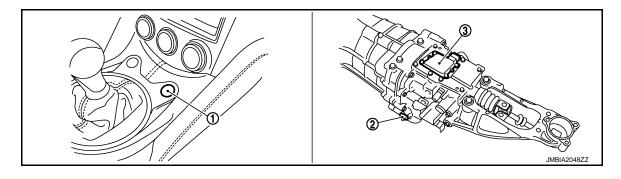




- ASCD steering switch 1.
- SET/COAST switch 4.
- CANCEL switch 2.
- MAIN switch 5.

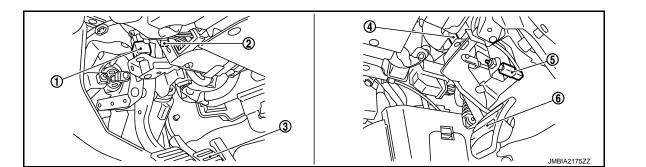
RESUME/ACCELERATE switch 3.

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1. S-mode switch

- 2. Input speed sensor
- 3. Gear lever position sensor



# < SYSTEM DESCRIPTION >

# [VQ37VHR]

- 1. Stop lamp switch
- 4. Clutch pedal position switch
- 2. ASCD brake switch
- 5. Clutch interlock switch
- 3. Brake pedal
- 6. Clutch pedal

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# **Component Description**

Component	Reference
A/F sensor 1	EC-242, "Description"
A/F sensor 1 heater	EC-188, "Description"
Accelerator pedal position sensor	EC-484, "Description"
ASCD brake switch	EC-464. "Description"
ASCD steering switch	EC-461, "Description"
Brake booster pressure sensor	EC-388, "Description"
Camshaft position sensor (PHASE)	EC-316. "Description"
Clutch pedal position switch	EC-411, "Description"
Clutch interlock switch	EC-406, "Description"
Cooling fan control module	EC-511. "Description"
Cooling fan motor	EC-511. "Description"
Crankshaft position sensor (POS)	EC-312, "Description"
Electric throttle control actuator	EC-454, "Description"
Engine coolant temperature sensor	EC-227, "Description"
Engine oil temperature sensor	EC-293, "Description"
EVAP canister purge volume control solenoid valve	EC-330, "Description"
EVAP canister vent control valve	EC-338. "Description"
EVAP control system pressure sensor	EC-346, "Description"
Fuel injector	EC-517, "Description"
Fuel level sensor	EC-366, "Description"
Fuel pump	EC-520, "Description"
Fuel tank temperature sensor	EC-286, "Description"
Gear lever position sensor (PHASE)	EC-401, "Description"
Heated oxygen sensor 2	EC-257, "Description"
Heated oxygen sensor 2 heater	EC-191, "Description"
Ignition signal	EC-523, "Description"
Input speed sensor	EC-498, "Description"
Intake air temperature sensor	EC-221, "Description"
Intake valve timing control solenoid valve	EC-201, "Description"
Knock sensor	EC-309, "Description"
Manifold absolute pressure (MAP) sensor	EC-215, "Description"
Mass air flow sensor	EC-194, "Description"
PCV valve	EC-534, "Description"
Power steering pressure sensor	EC-385, "Description"
Refrigerant pressure sensor	EC-536, "Description"
Stop lamp switch	EC-481, "Description"
Throttle control motor	EC-451, "Description"
Throttle control motor relay	EC-459, "Description"
Throttle position sensor	EC-230, "Description"

#### < SYSTEM DESCRIPTION >

# [VQ37VHR]

Component	Reference	
VVEL actuator motor	EC-429, "Description"	A
VVEL actuator motor relay	EC-433, "Description"	
VVEL control module	EC-474, "Description"	EC
VVEL control shaft position sensor	EC-425, "Description"	

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#### < SYSTEM DESCRIPTION >

# MULTIPORT FUEL INJECTION SYSTEM

# System Diagram

Crankshaft position sensor (POS)	Engine speed <sup>*2</sup> & 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		
	Density of oxygen in exhaust gas		
Air fuel ratio (A/F) sensor 1	Throttle position		Fuel injection &
Throttle position sensor	Accelerator pedal position	•	mixture ratio control
Accelerator pedal position sensor		ECM	► Fuel injector
Park/neutral position (PNP) switch (M/T models) TCM(A/T models)	Gear position		
Battery	Battery voltage <sup>*2</sup>	•	
Knock sensor	Engine knocking condition		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2 <sup>*1</sup>	Density of oxygen in exhaust gas	•	
ABS actuator and electric unit (control unit)	VDC/TCS operation command		
	Air conditioner operation & Vehicle speed		
Combination meter		1	
	the engine system under normal conditions.		
*2 : ECM determines the start signal s	tatus by the signals of engine speed and batter mmunication line	y voltage.	JMBIA2168GB

# System Description

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# INPUT/OUTPUT SIGNAL CHART

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

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

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#### < SYSTEM DESCRIPTION >

[VQ37VHR]

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

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

#### SYSTEM DESCRIPTION

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

#### VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

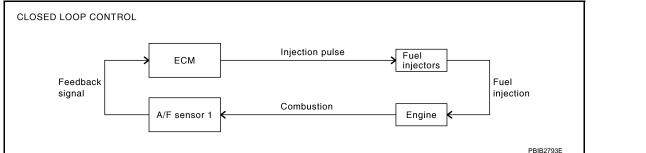
<Fuel increase>

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

<Fuel decrease>

- During deceleration
- During high engine speed operation

#### MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. K The three way catalyst 1 can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to <u>EC-242</u>, <u>"Description"</u>. This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture). This stage is referred to as the closed loop control condition.

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

Open Loop Control

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

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

#### MIXTURE RATIO SELF-LEARNING CONTROL

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

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#### < SYSTEM DESCRIPTION >

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

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

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

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

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

#### FUEL INJECTION TIMING

em	<ul> <li>Simultaneous multiport fuel injection system</li> </ul>
	No. 1 cylinder
	No. 2 cylinder
	No. 4 cylinder – JL – J
$\overline{}$	
Л	No. 5 cylinder – T No. 6 cylinder – T

Two types of systems are used.

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

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

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

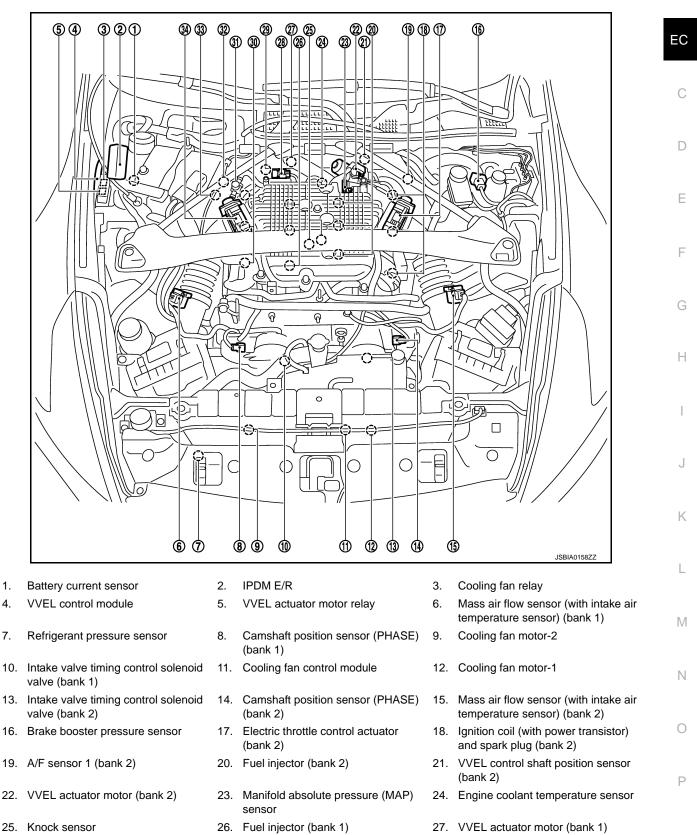
#### FUEL SHUT-OFF

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

#### < SYSTEM DESCRIPTION >

# **Component Parts Location**

[VQ37VHR] INFOID:000000006352256



- 28. EVAP canister purge volume control 29. VVEL control shaft position sensor solenoid valve (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

Revision: 2011 October

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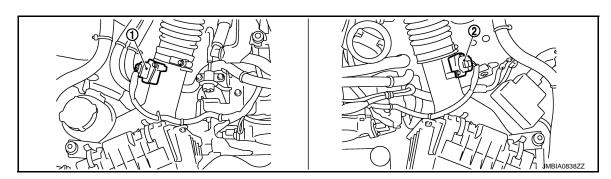
16.

#### < SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

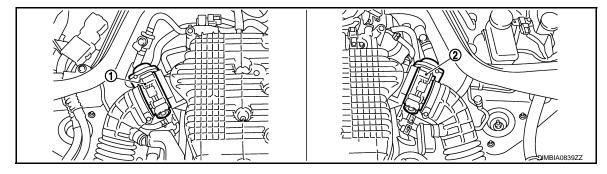
[VQ37VHR]

34. Electric throttle control actuator (bank 1)

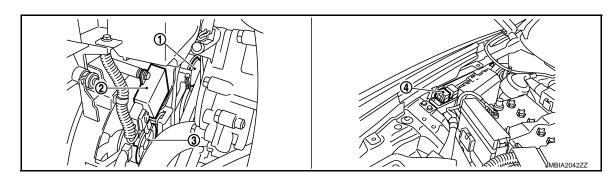


1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)

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



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

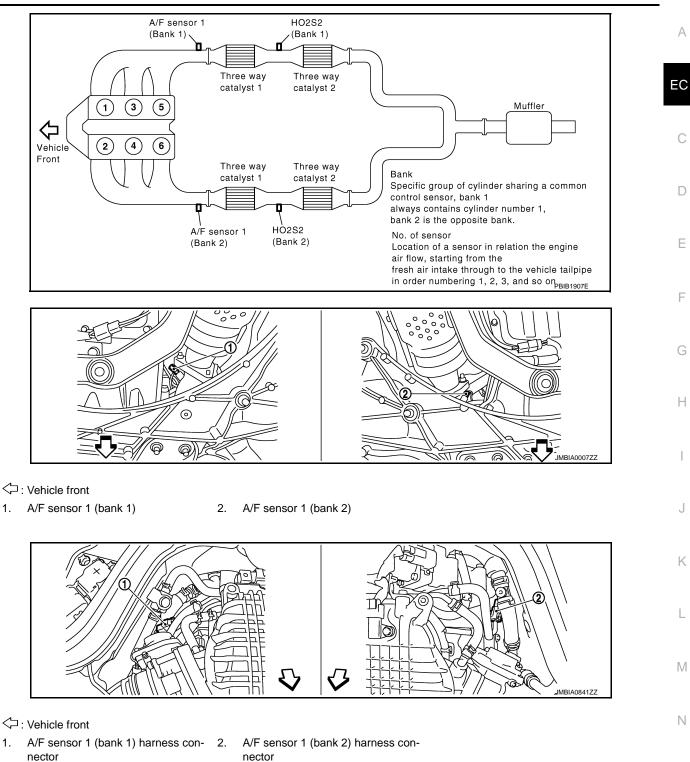


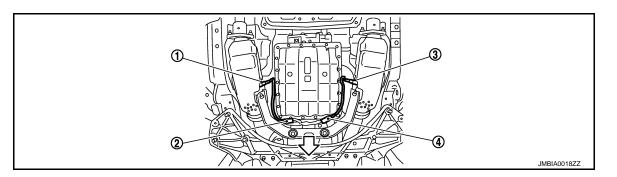
C: Vehicle front

- 1. Cooling fan motor-2
- 2. Cooling fan cont
- 4. Cooling fan relay

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

#### < SYSTEM DESCRIPTION >





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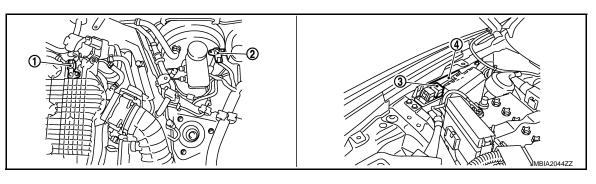
[VQ37VHR]

## < SYSTEM DESCRIPTION >

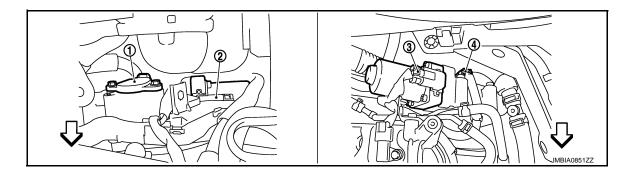
#### C: Vehicle front

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

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



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



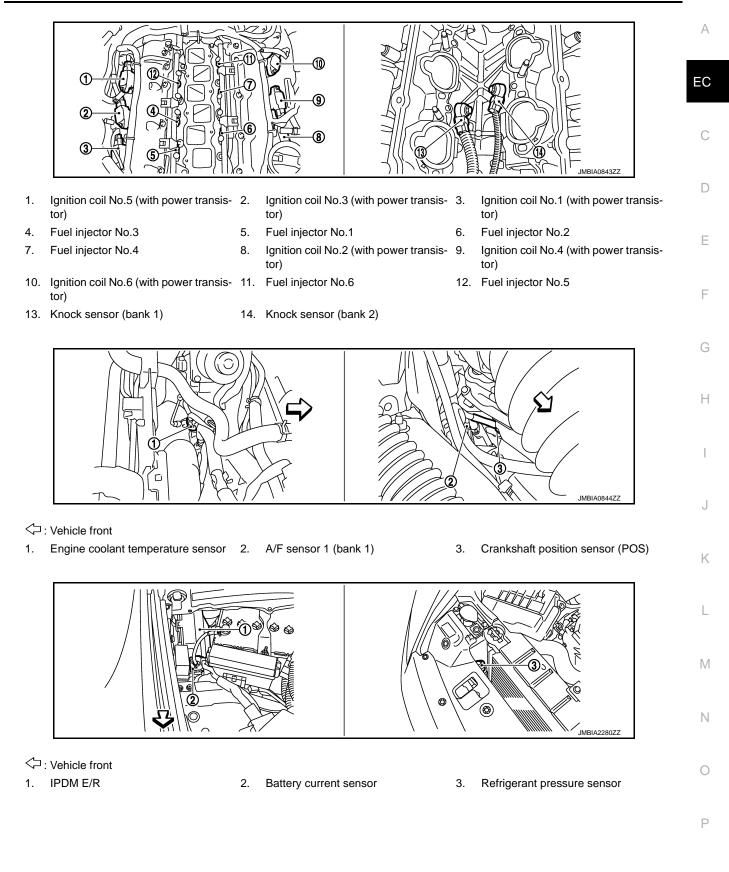
C: Vehicle front

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

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

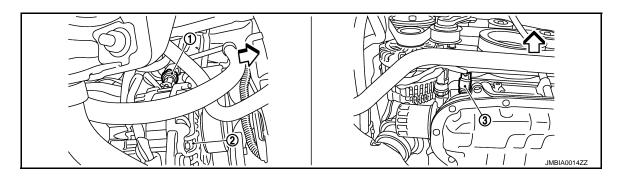
#### < SYSTEM DESCRIPTION >

# [VQ37VHR]



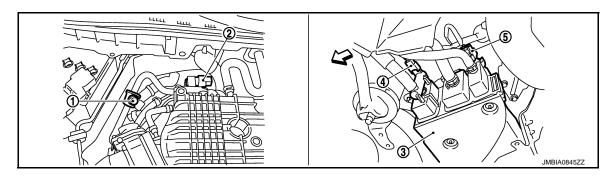
#### < SYSTEM DESCRIPTION >

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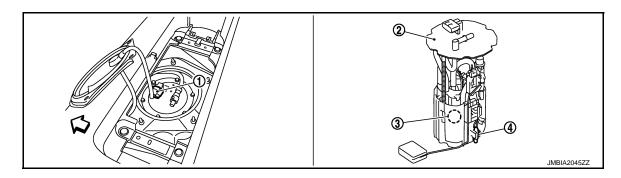


- C: Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



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



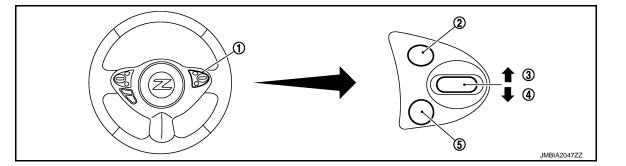
C: Vehicle front

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

# < SYSTEM DESCRIPTION >

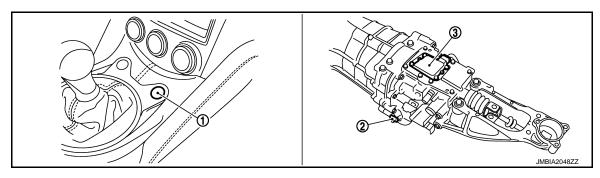
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Accelerator pedal position sensor 2. ECM 1.



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

**RESUME/ACCELERATE** switch 3.



1. S-mode switch

- 2. Input speed sensor
- 3. Gear lever position sensor

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Stop lamp switch 1.

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- Clutch pedal position switch 4.
- **Component Description**
- ASCD brake switch 2.
- Clutch interlock switch
- 3. Brake pedal
- 6. Clutch pedal

INFOID:000000006352257

[VQ37VHR]

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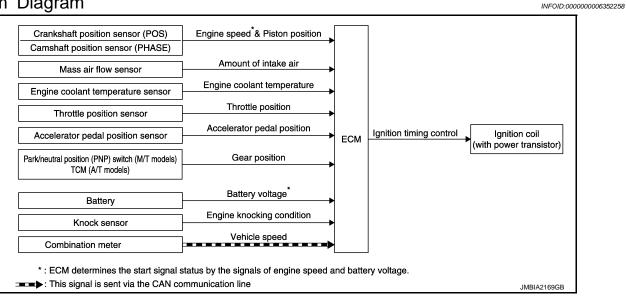
[VQ37VHR]

Component	Reference
A/F sensor 1	EC-242, "Description"
Accelerator pedal position sensor	EC-484, "Description"
Camshaft position sensor (PHASE)	EC-316, "Description"
Crankshaft position sensor (POS)	EC-312, "Description"
Engine coolant temperature sensor	EC-227, "Description"
Fuel injector	EC-517, "Description"
Heated oxygen sensor 2	EC-257, "Description"
Intake air temperature sensor	EC-221, "Description"
Knock sensor	EC-309, "Description"
Mass air flow sensor	EC-194, "Description"
Power steering pressure sensor	EC-385, "Description"
Throttle position sensor	EC-230, "Description"

## < SYSTEM DESCRIPTION >

# ELECTRIC IGNITION SYSTEM

# System Diagram



# System Description

INFOID:000000006352259

# INPUT/OUTPUT SIGNAL CHART

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

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

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

## SYSTEM DESCRIPTION

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

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

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

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

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

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

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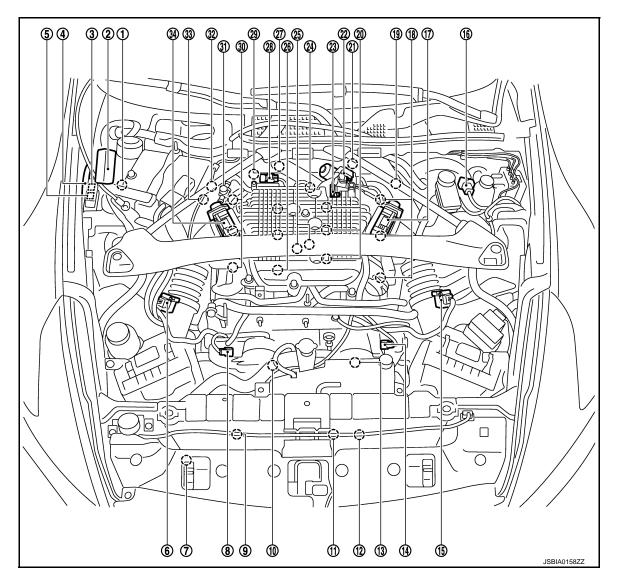
#### < SYSTEM DESCRIPTION >

#### [VQ37VHR]

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

## **Component Parts Location**

INFOID:000000006352260



- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)

- 3. Cooling fan relay
- Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- Ignition coil (with power transistor) and spark plug (bank 1)



## < SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

34. Electric throttle control actuator (bank 1)



[VQ37VHR]

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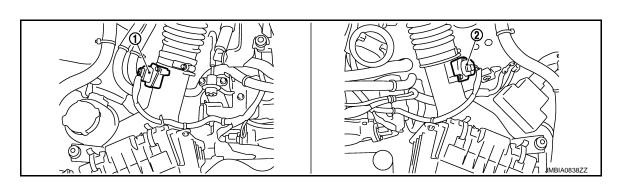
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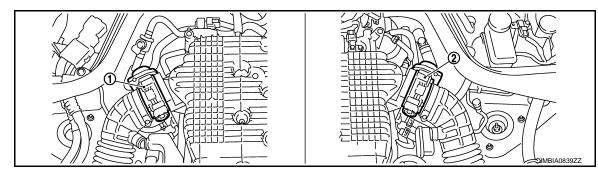
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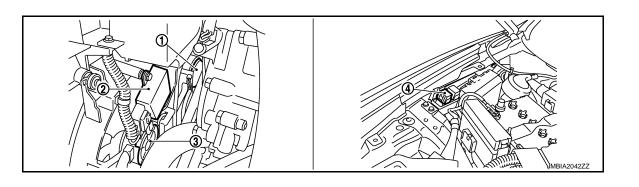
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- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
  - Mass air flow sensor (with intake air temperature sensor) (bank 2)



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



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C: Vehicle front

- Cooling fan motor-2 1.
- 4. Cooling fan relay

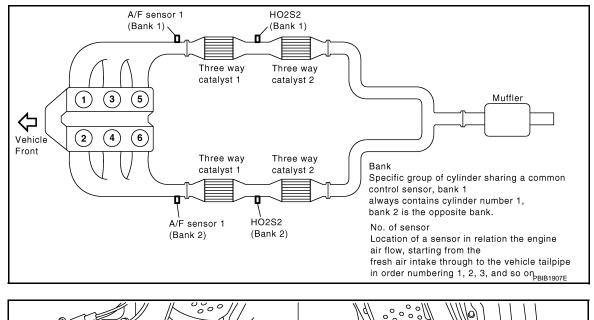
- Cooling fan control module 3.
- Cooling fan motor-1

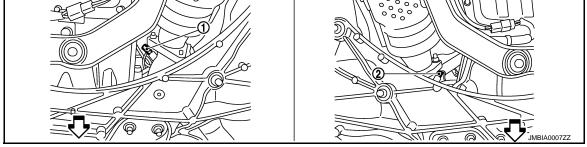
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#### < SYSTEM DESCRIPTION >

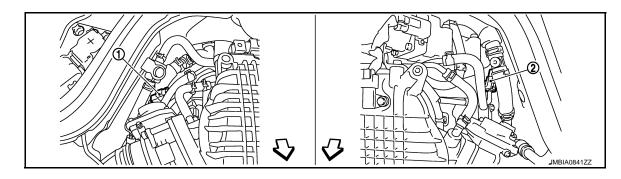






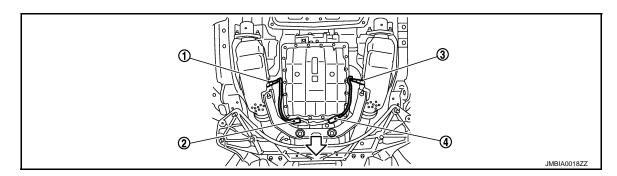
#### C: Vehicle front

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



C: Vehicle front

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



#### < SYSTEM DESCRIPTION >

#### [VQ37VHR]

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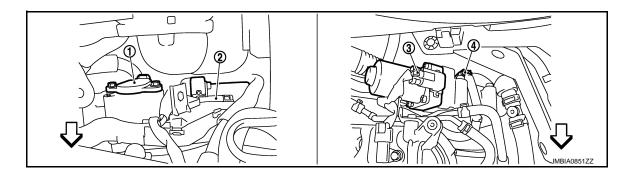
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#### C: Vehicle front

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

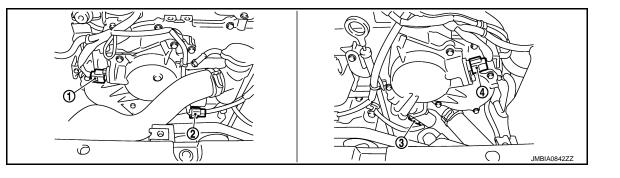
- Heated oxygen sensor 2 (bank 1) 4. harness connector
- 2.
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- VVEL control module 4.



C: Vehicle front

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

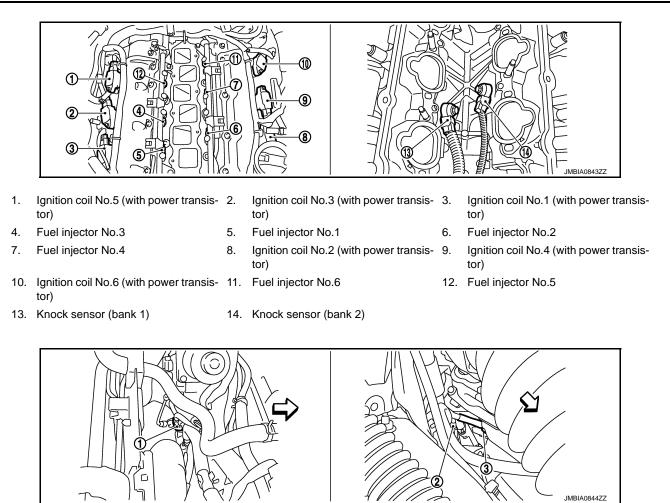
4. VVEL control shaft position sensor (bank 2)



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

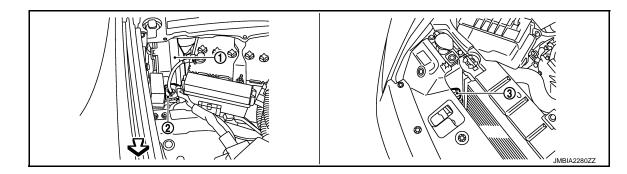
#### < SYSTEM DESCRIPTION >

# [VQ37VHR]



C: Vehicle front

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



C: Vehicle front

1. IPDM E/R

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

#### < SYSTEM DESCRIPTION >

## [VQ37VHR]

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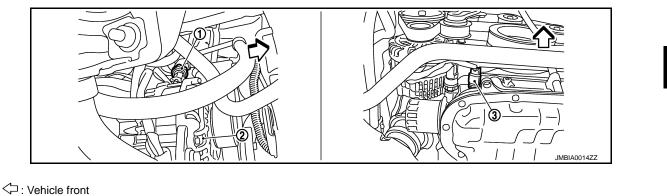
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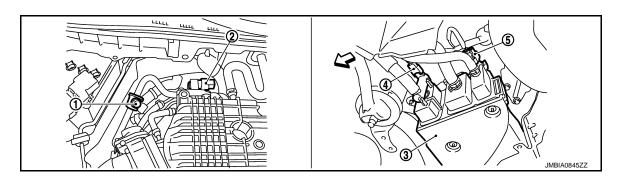
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- 1.
  - Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



- C: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- 2. EVAP canister purge volume control 3. **EVAP** canister solenoid valve 5. EVAP control system pressure sen-
- 2 3 JMBIA2045ZZ

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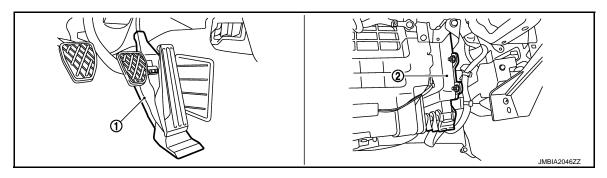
└□: Vehicle front

- 1. 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 4.

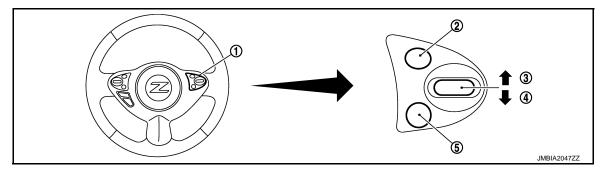
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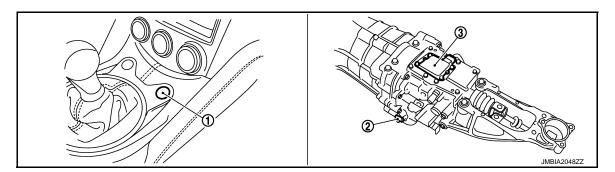


Accelerator pedal position sensor 2. ECM 1.



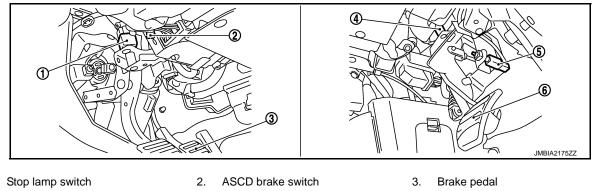
- ASCD steering switch 1.
- CANCEL switch 2.
- 4. SET/COAST switch
- 5. MAIN switch

**RESUME/ACCELERATE** switch 3.



S-mode switch 1.

- 2. Input speed sensor
- 3. Gear lever position sensor



Clutch pedal position switch 4.

# **Component Description**

- 5. Clutch interlock switch
- 6. Clutch pedal

INFOID:000000006352261

1.

#### < SYSTEM DESCRIPTION >

[VQ37VHR]

Component	Reference	
Accelerator pedal position sensor	EC-484, "Description"	A
Camshaft position sensor (PHASE)	EC-316, "Description"	
Crankshaft position sensor (POS)	EC-312, "Description"	EC
Engine coolant temperature sensor	EC-227, "Description"	
Ignition signal	EC-523, "Description"	
Knock sensor	EC-309, "Description"	С
Mass air flow sensor	EC-194, "Description"	
Throttle position sensor	EC-230, "Description"	D

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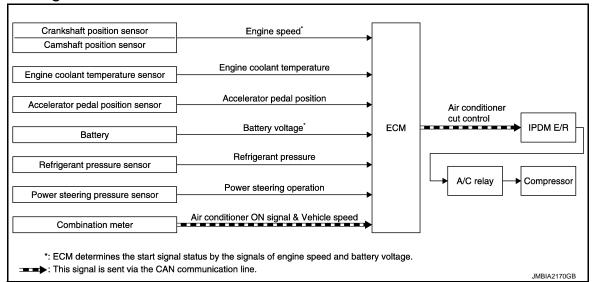
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#### < SYSTEM DESCRIPTION >

# AIR CONDITIONING CUT CONTROL

# System Diagram



# System Description

INFOID:000000006352263

# 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			IPDM E/R	
Battery	Battery voltage*2	Air conditioner			
Refrigerant pressure sensor	Refrigerant pressure	cut control			
Power steering pressure sensor	Power steering operation				
Combination meter	Air conditioner ON signal* <sup>1</sup>				
	Vehicle speed*1				

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

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

## SYSTEM DESCRIPTION

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

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

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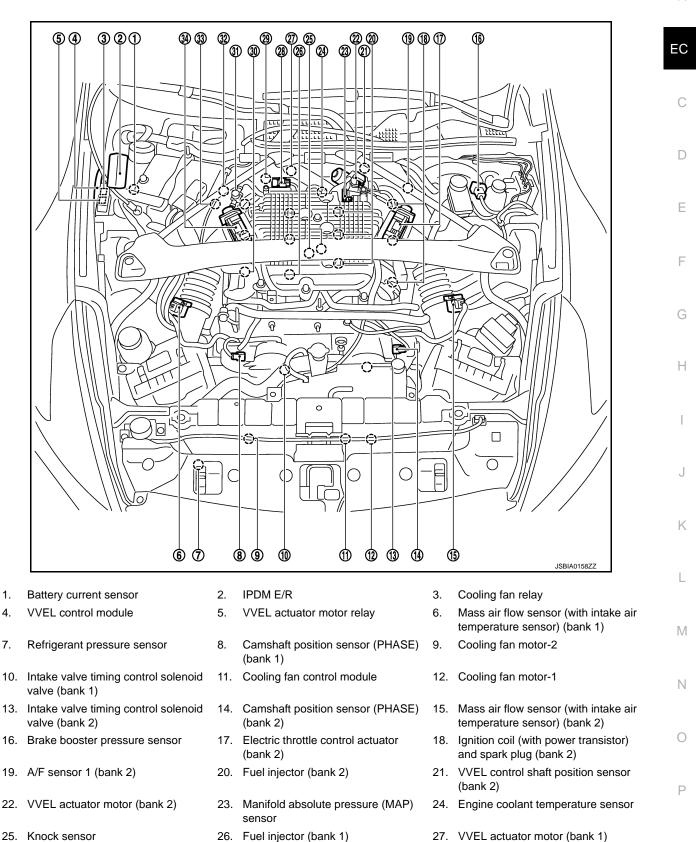
#### < SYSTEM DESCRIPTION >

# **Component Parts Location**

[VQ37VHR]

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- 28. EVAP canister purge volume control 29. VVEL control shaft position sensor solenoid valve
- (bank 1)
- 30. Ignition coil (with power transistor)
  - and spark plug (bank 1)

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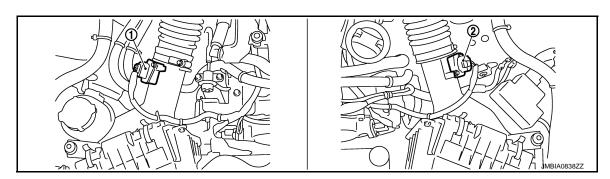
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#### < SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

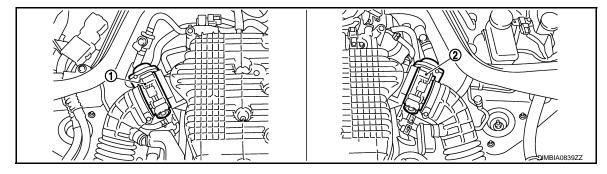
[VQ37VHR]

34. Electric throttle control actuator (bank 1)

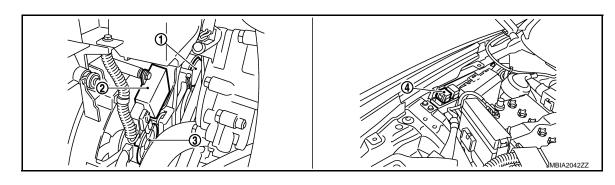


1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)

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



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

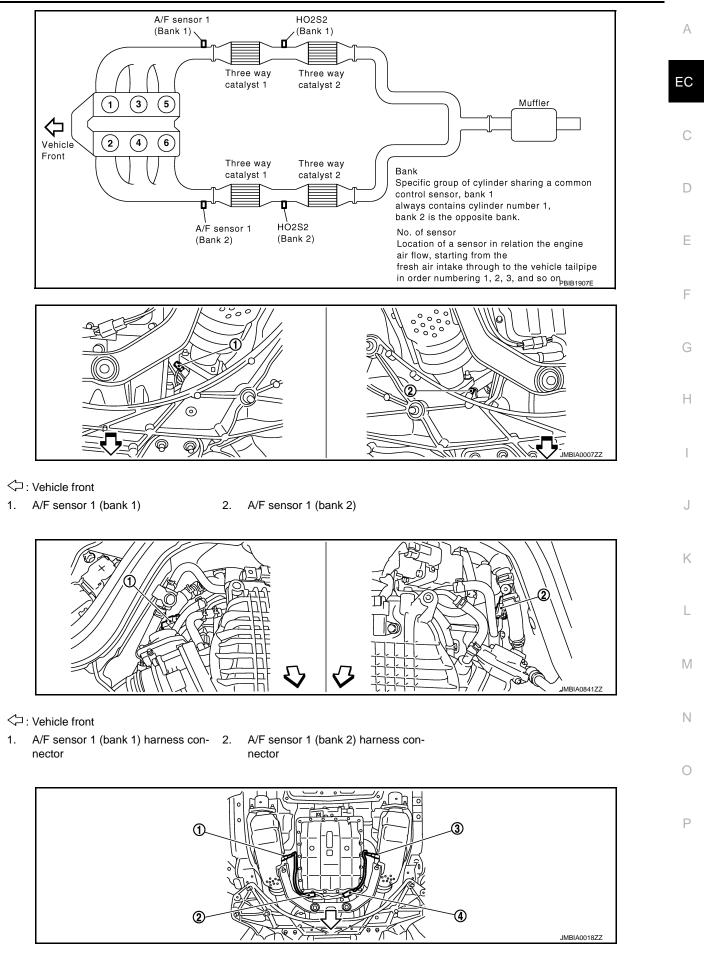


C: Vehicle front

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

#### < SYSTEM DESCRIPTION >





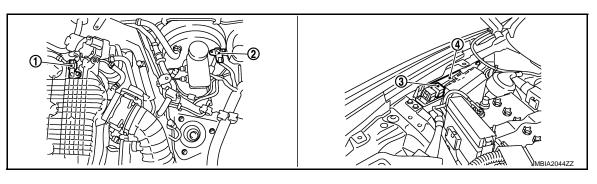
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## < SYSTEM DESCRIPTION >

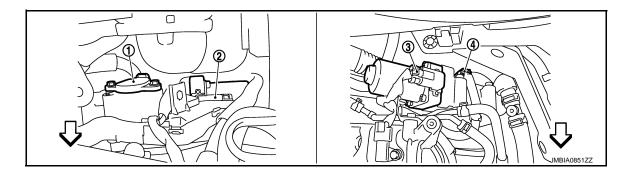
#### C: Vehicle front

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

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



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



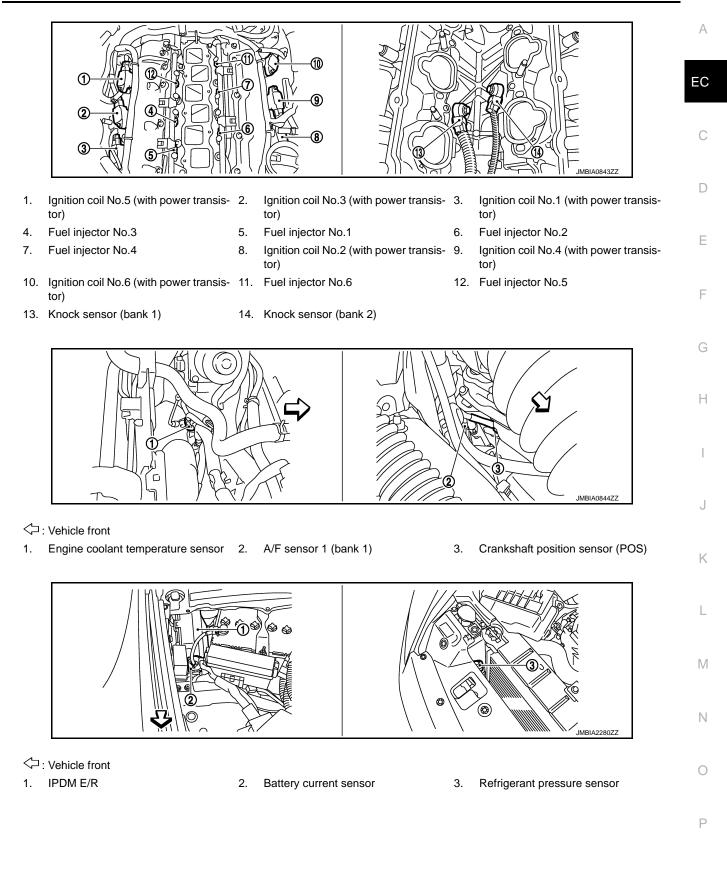
C: Vehicle front

4.

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

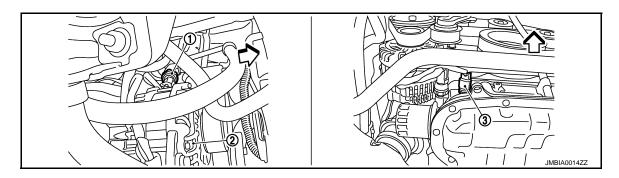
- VVEL control shaft position sensor (bank 2)
- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)
- Intake valve timing control solenoid 3. valve (bank 1) harness connector
- Intake valve timing control solenoid valve (bank 2) harness connector

#### < SYSTEM DESCRIPTION >



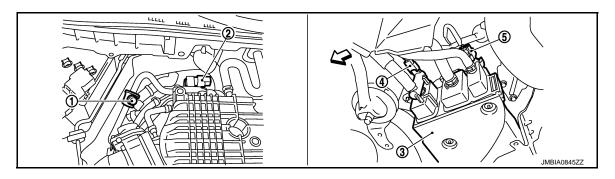
#### < SYSTEM DESCRIPTION >

[VQ37VHR]

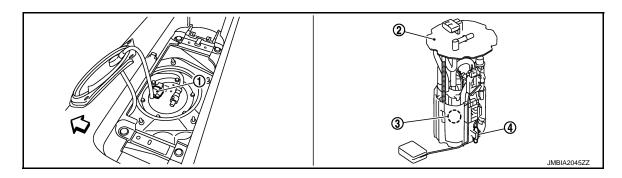


- C : Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



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

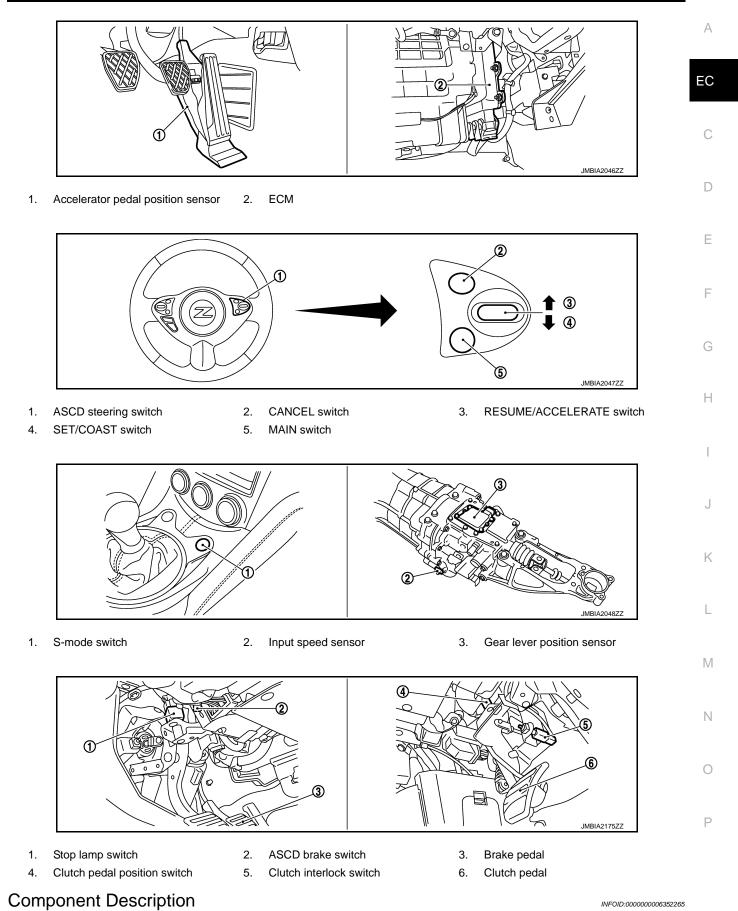


C: Vehicle front

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

### < SYSTEM DESCRIPTION >

### [VQ37VHR]



Revision: 2011 October

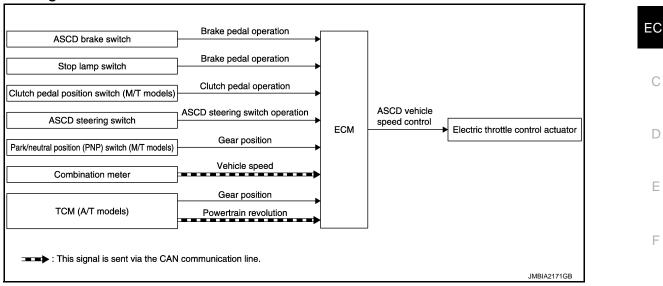
#### < SYSTEM DESCRIPTION >

Component	Reference
Accelerator pedal position sensor	EC-484, "Description"
Camshaft position sensor (PHASE)	EC-316, "Description"
Crankshaft position sensor (POS)	EC-312, "Description"
Engine coolant temperature sensor	EC-227, "Description"
Power steering pressure sensor	EC-385, "Description"
Refrigerant pressure sensor	EC-536, "Description"

### < SYSTEM DESCRIPTION >

# AUTOMATIC SPEED CONTROL DEVICE (ASCD)

### System Diagram



# System Description

### **INPUT/OUTPUT SIGNAL CHART**

Sensor	Input signal to ECM	ECM function	Actuator	
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control		
Stop lamp switch	Brake pedal operation			
Clutch pedal position switch (M/T models)	Clutch pedal operation			
ASCD steering switch	ASCD steering switch operation			Electric throttle control
Park/neutral position (PNP) switch (M/T models)	Gear position		actuator	
Combination meter	Vehicle speed*			
TCM (A/T models)	Gear position			
	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 Ν 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 lamp and SET lamp 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 lamp in combination meter illuminates.)

#### ACCELERATE OPERATION

### **EC-77**

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#### < SYSTEM DESCRIPTION >

[VQ37VHR]

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 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 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 lamp 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 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)

#### < SYSTEM DESCRIPTION >

### **Component Parts Location**

# [VQ37VHR]

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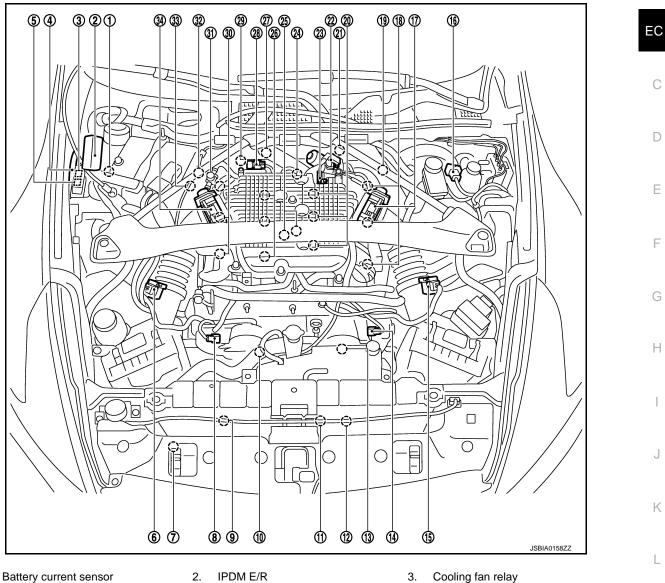
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4. VVEL control module

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- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- 13. Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control 29. VVEL control shaft position sensor solenoid valve

5.

8. Camshaft position sensor (PHASE) (bank 1)

VVEL actuator motor relay

- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- Fuel injector (bank 2) 20.
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- (bank 1)

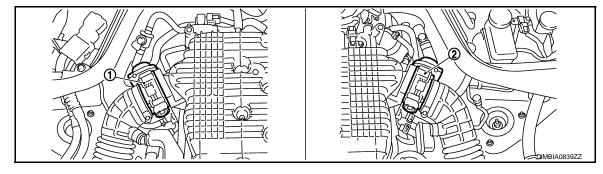
- Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 18. Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

#### < SYSTEM DESCRIPTION >

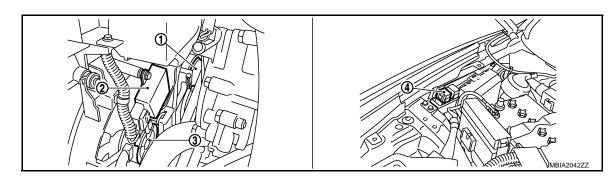
- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)

[VQ37VHR]

- 34. Electric throttle control actuator (bank 1)
- 33. Crankshaft position sensor (POS)
- 2 MBIA0838ZZ
- 1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)
- Mass air flow sensor (with intake air temperature sensor) (bank 2)



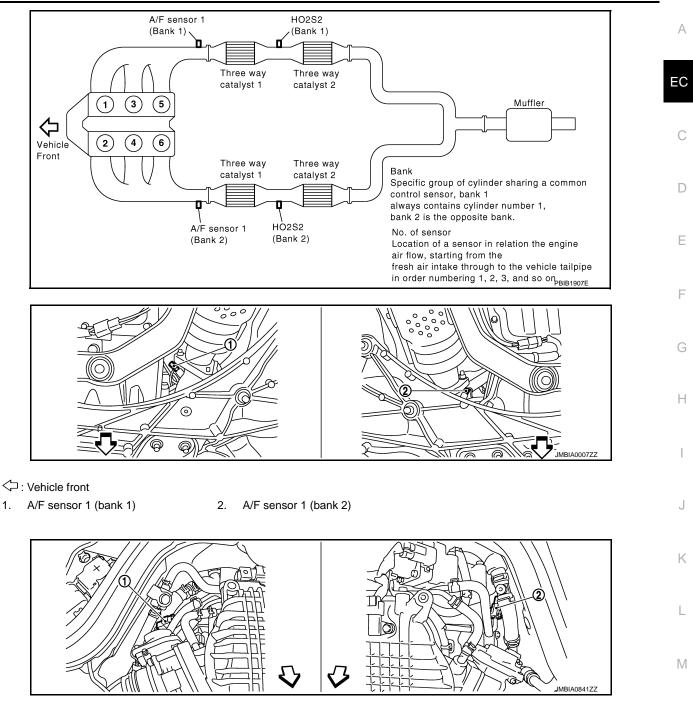
- Electric throttle control actuator 1. (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

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

#### < SYSTEM DESCRIPTION >



C: Vehicle front

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

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#### Revision: 2011 October

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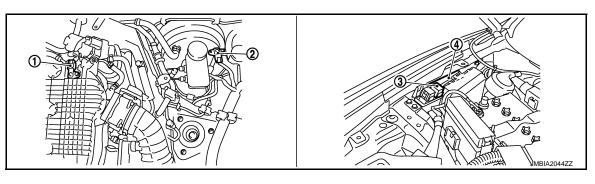
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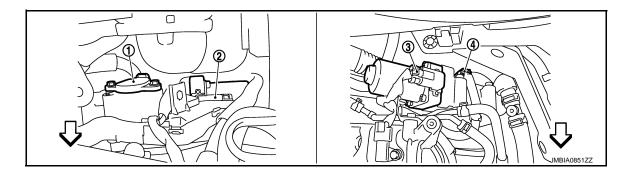
#### C: Vehicle front

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

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



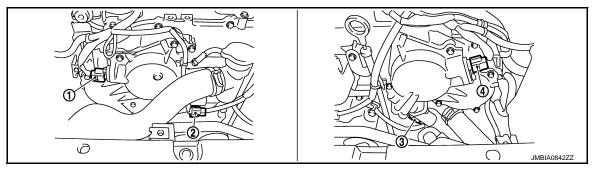
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

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

4. VVEL control shaft position sensor (bank 2)

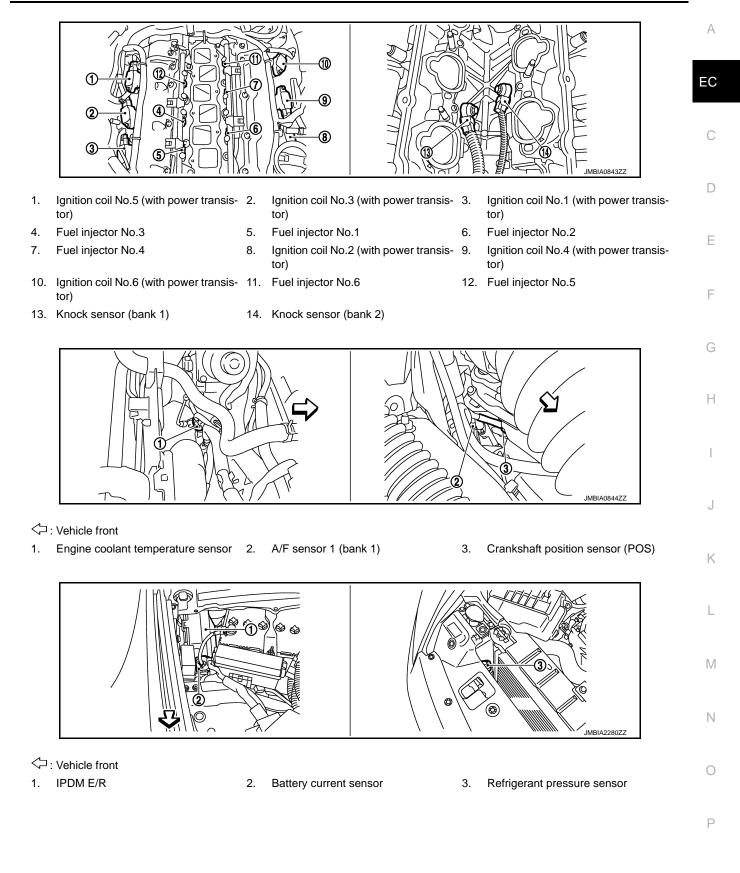


- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)

Intake valve timing control solenoid 3. valve (bank 1) harness connector

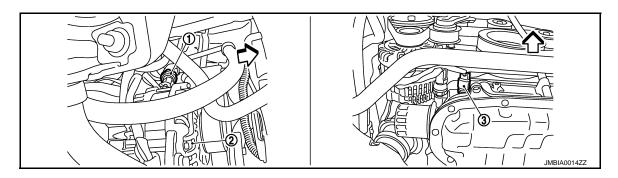
Intake valve timing control solenoid valve (bank 2) harness connector

#### < SYSTEM DESCRIPTION >



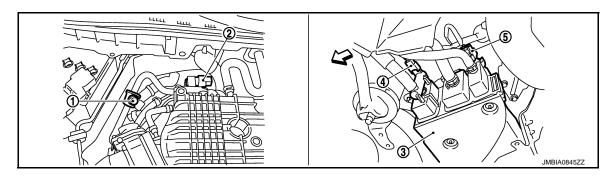
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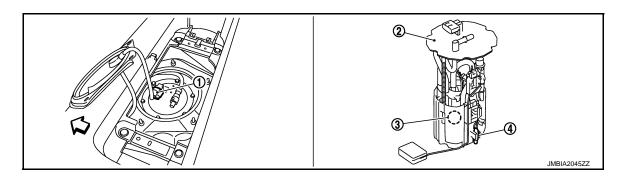


- C: Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



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



C: Vehicle front

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

### < SYSTEM DESCRIPTION >

### [VQ37VHR]

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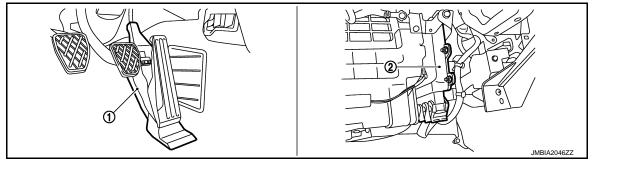
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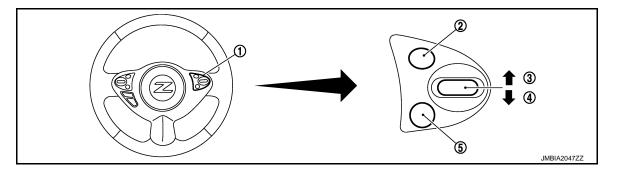
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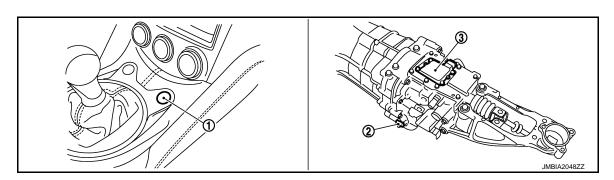


1. Accelerator pedal position sensor 2. ECM



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

3. RESUME/ACCELERATE switch



1. S-mode switch

- 2. Input speed sensor
- 3. Gear lever position sensor

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- 1. Stop lamp switch
- 4. Clutch pedal position switch
- 2. ASCD brake switch
- 5. Clutch interlock switch
- 3. Brake pedal
- 6. Clutch pedal

### < SYSTEM DESCRIPTION >

# Component Description

INFOID:000000006352269

Component	Reference
ASCD brake switch	EC-464. "Description"
ASCD indicator	EC-510, "Description"
ASCD steering switch	EC-461, "Description"
Clutch pedal position switch	EC-411, "Description"
Electric throttle control actuator	EC-459, "Description"
Stop lamp switch	EC-464, "Description"

# CAN COMMUNICATION

### System Description

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. Refer to LAN-25, "CAN Communication Signal Chart", about CAN communication for detail.

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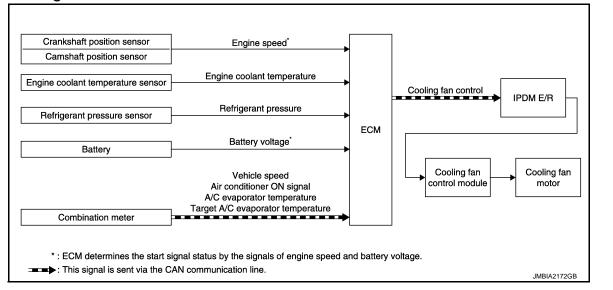
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#### < SYSTEM DESCRIPTION >

# COOLING FAN CONTROL

### System Diagram



### System Description

INFOID:000000006352272

### INPUT/OUTPUT SIGNAL CHART

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

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

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

#### SYSTEM DESCRIPTION

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

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#### < SYSTEM DESCRIPTION >

### **Component Parts Location**

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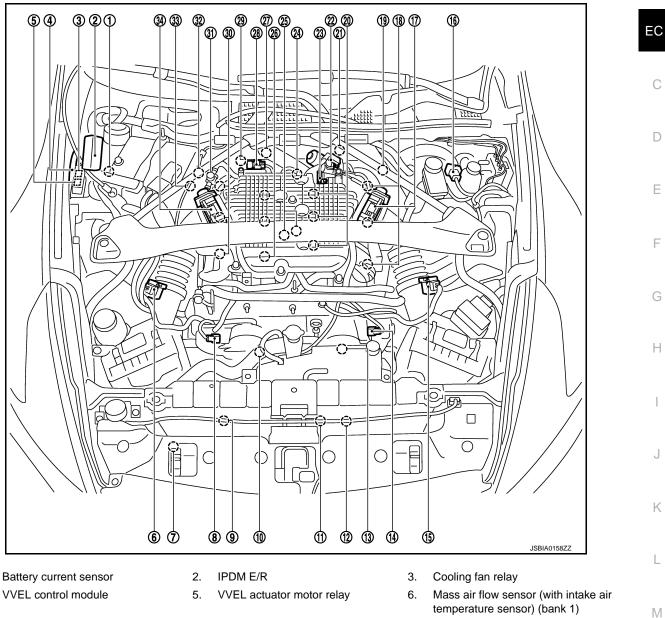
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7. Refrigerant pressure sensor

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- 10. Intake valve timing control solenoid valve (bank 1)
- 13. Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control 29. VVEL control shaft position sensor solenoid valve

- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- (bank 1)

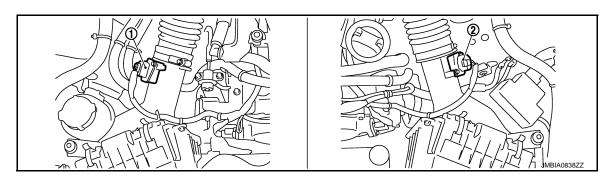
- temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 18. Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

#### < SYSTEM DESCRIPTION >

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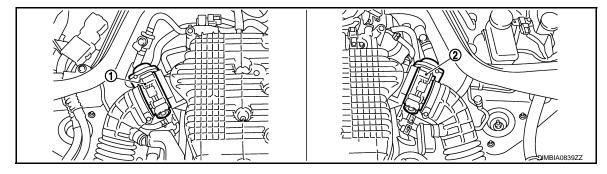
- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

34. Electric throttle control actuator (bank 1)

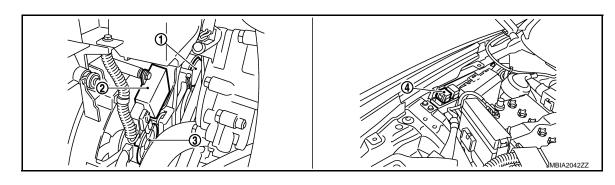


1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)

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



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

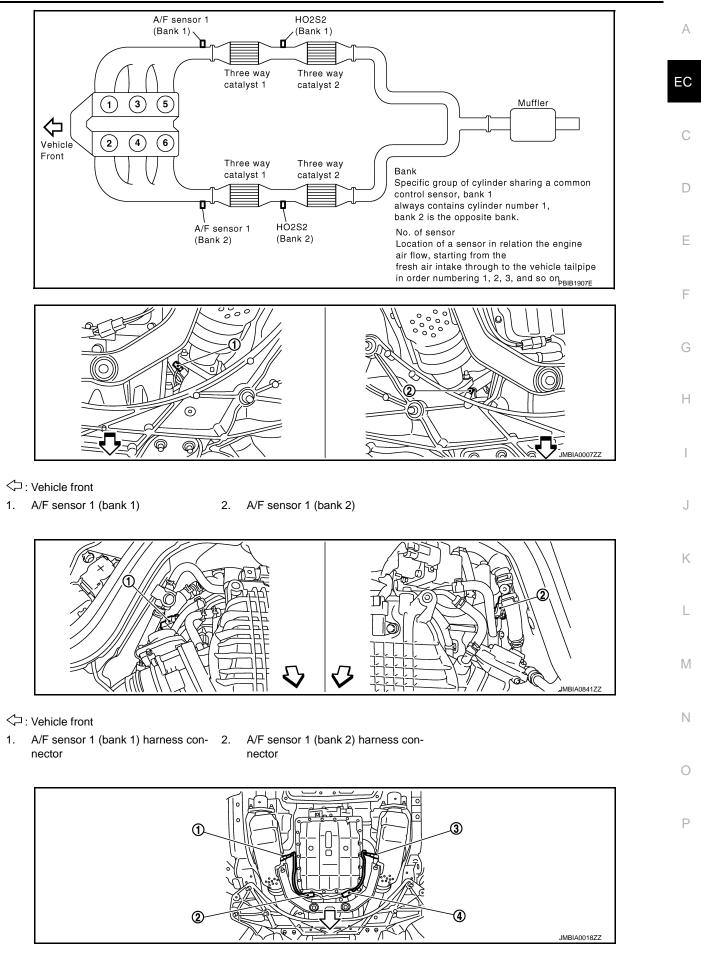


C: Vehicle front

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

#### < SYSTEM DESCRIPTION >





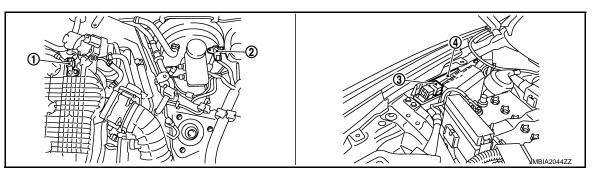
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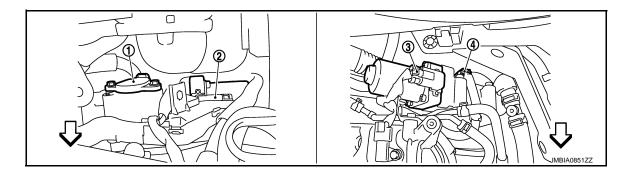
#### C: Vehicle front

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

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



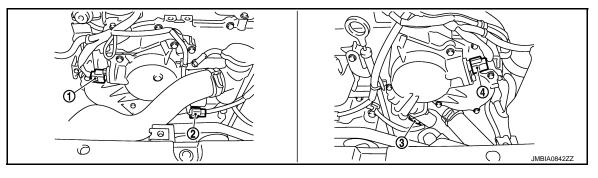
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

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

4. VVEL control shaft position sensor (bank 2)

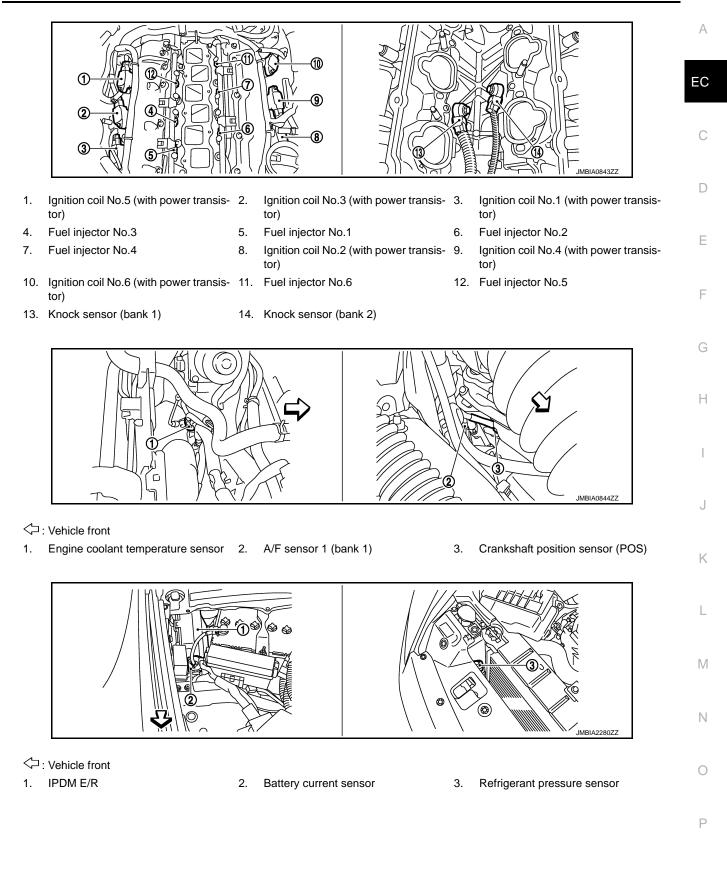


- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)

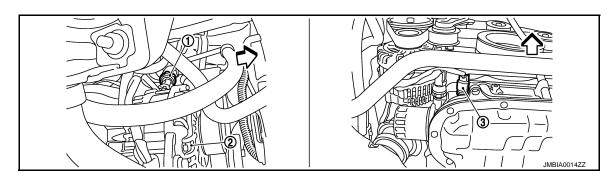
Intake valve timing control solenoid 3. valve (bank 1) harness connector

Intake valve timing control solenoid valve (bank 2) harness connector

#### < SYSTEM DESCRIPTION >

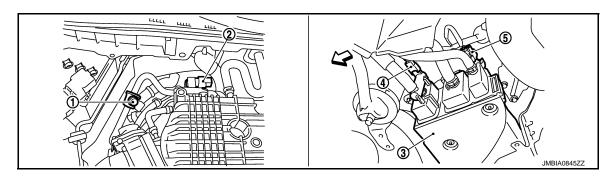


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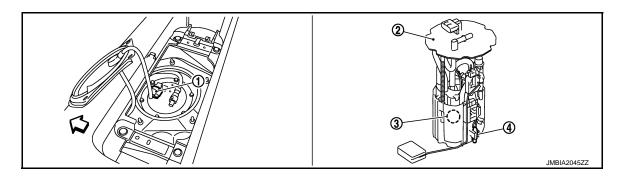


- C: Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



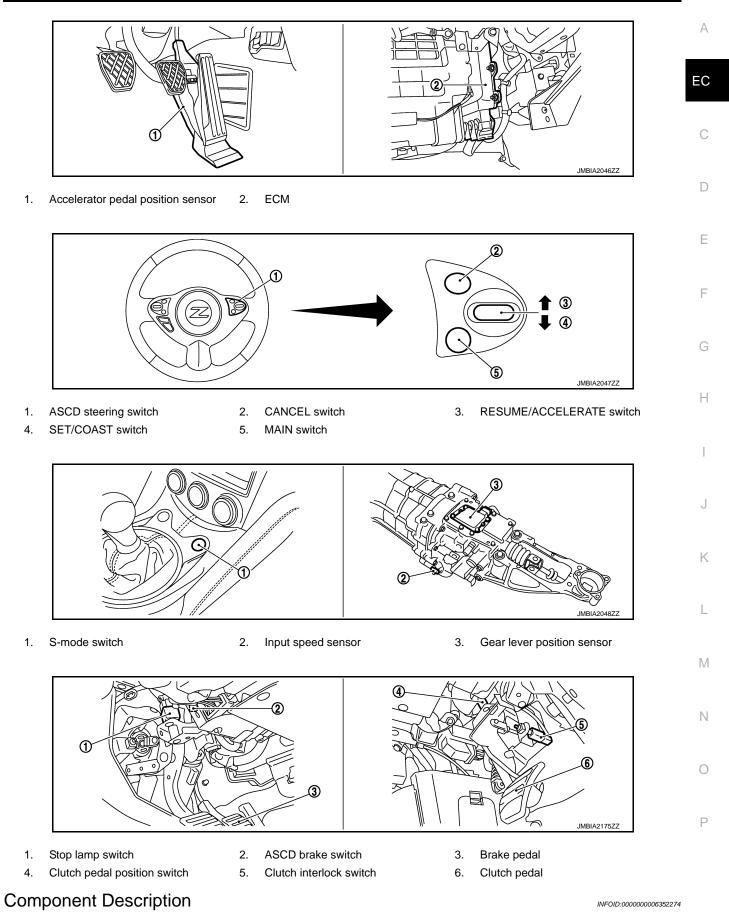
- C: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 5. EVAP control system pressure sensor



C: Vehicle front

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

### < SYSTEM DESCRIPTION >



#### < SYSTEM DESCRIPTION >

Component	Reference
Camshaft position sensor (PHASE)	EC-316, "Description"
Cooling fan control module	EC-511, "Description"
Cooling fan motor	EC-511, "Description"
Crankshaft position sensor (POS)	EC-312, "Description"
Engine coolant temperature sensor	EC-227, "Description"
Refrigerant pressure sensor	EC-536, "Description"

#### < SYSTEM DESCRIPTION >

# **EVAPORATIVE EMISSION SYSTEM**

# System Diagram

Engine speed & Piston position			
	-		
Amount of intake air	<b>→</b>		
Engine coolant temperature	<b>→</b>		
Density of oxygen in exhaust gas	_		
Throttle position		EVAP canister	
Accelerator pedal position	ECM	control solenoid	
· ·	→	valve	
Battery voltage	<b>→</b>		
Fuel temperature in fuel tank	<b>→</b>		
Pressure in purge line	<b>→</b>		
Vehicle speed	⇒		
w the signals of engine speed and battery vo			
	Amount of intake air Engine coolant temperature Density of oxygen in exhaust gas Throttle position Accelerator pedal position Battery voltage <sup>*</sup> Fuel temperature in fuel tank Pressure in purge line Vehicle speed	Amount of intake air Engine coolant temperature Density of oxygen in exhaust gas Throttle position Accelerator pedal position Battery voltage* Fuel temperature in fuel tank Pressure in purge line Vehicle speed	Amount of intake air Engine coolant temperature Density of oxygen in exhaust gas Throttle position Accelerator pedal position Battery voltage <sup>*</sup> Fuel temperature in fuel tank Pressure in purge line Vehicle speed

### System Description

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# **INPUT/OUTPUT SIGNAL CHART**

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

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

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

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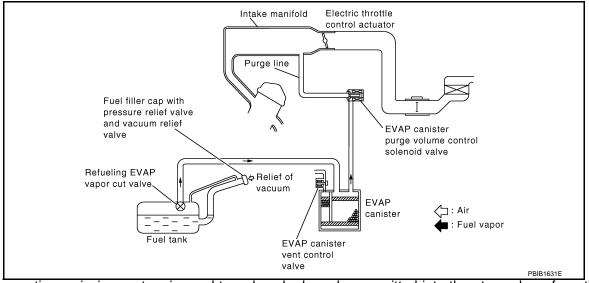
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### < SYSTEM DESCRIPTION >

#### SYSTEM DESCRIPTION



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

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

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

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

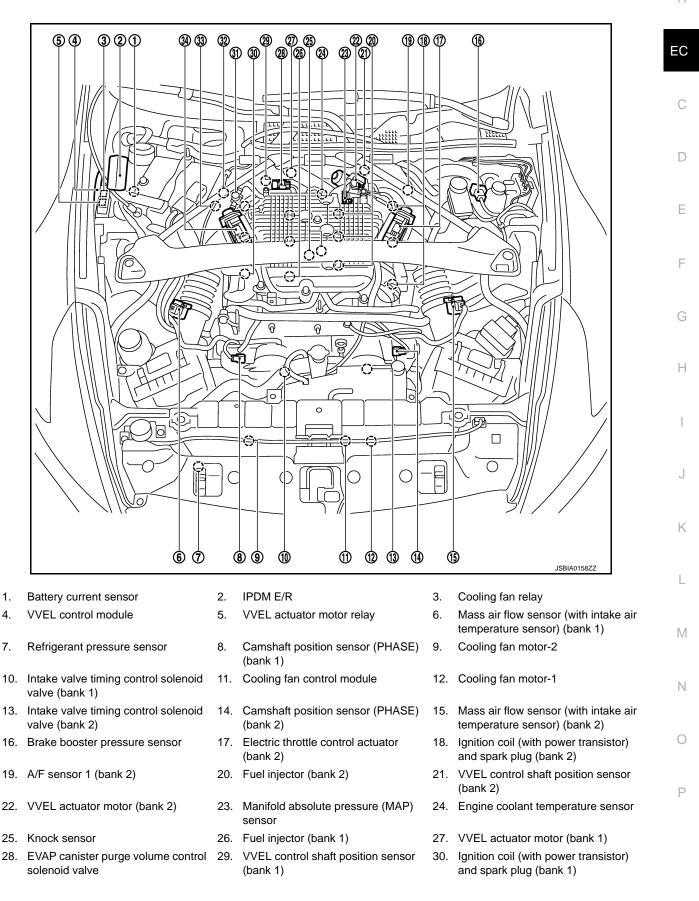
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# **Component Parts Location**

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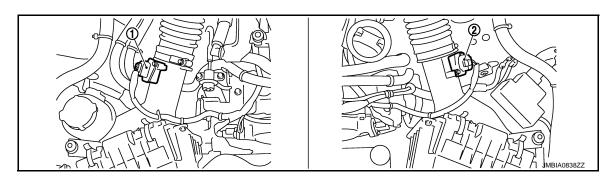
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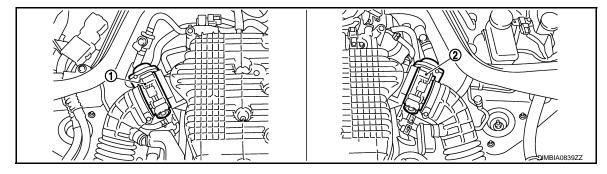
- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

34. Electric throttle control actuator (bank 1)

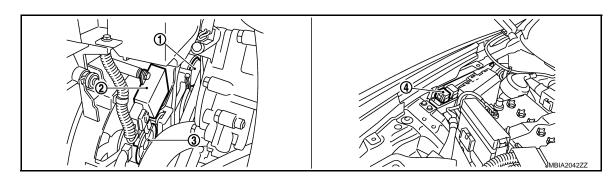


1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)

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



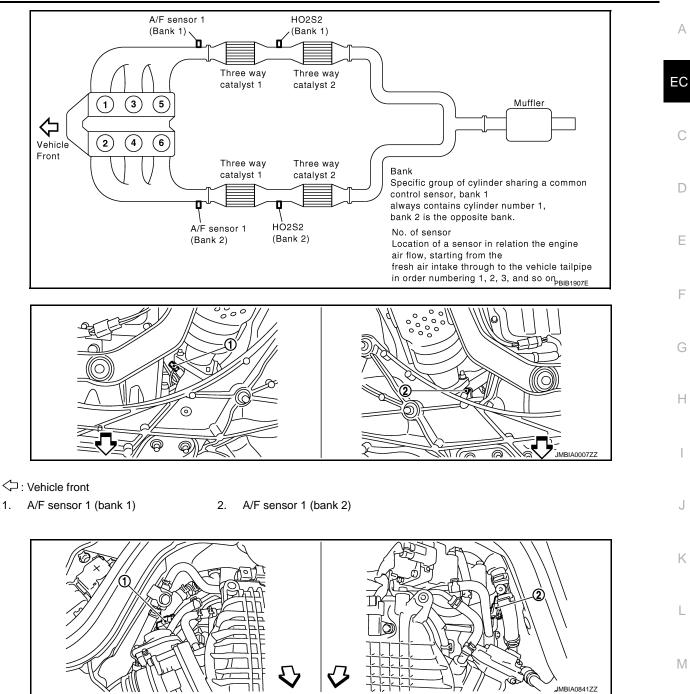
- 1. Electric throttle control actuator (bank 1)
- 2. Electric throttle control actuator (bank 2)



C: Vehicle front

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

#### < SYSTEM DESCRIPTION >



C: Vehicle front

1.

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

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#### Revision: 2011 October

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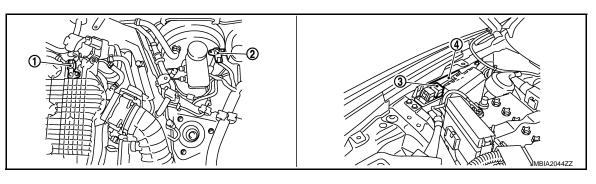
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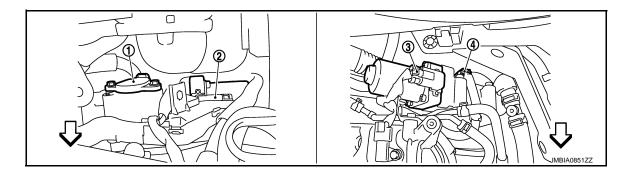
#### C: Vehicle front

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

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



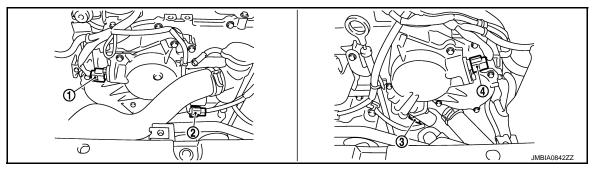
- Manifold absolute pressure (MAP) 1. 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

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

4. VVEL control shaft position sensor (bank 2)

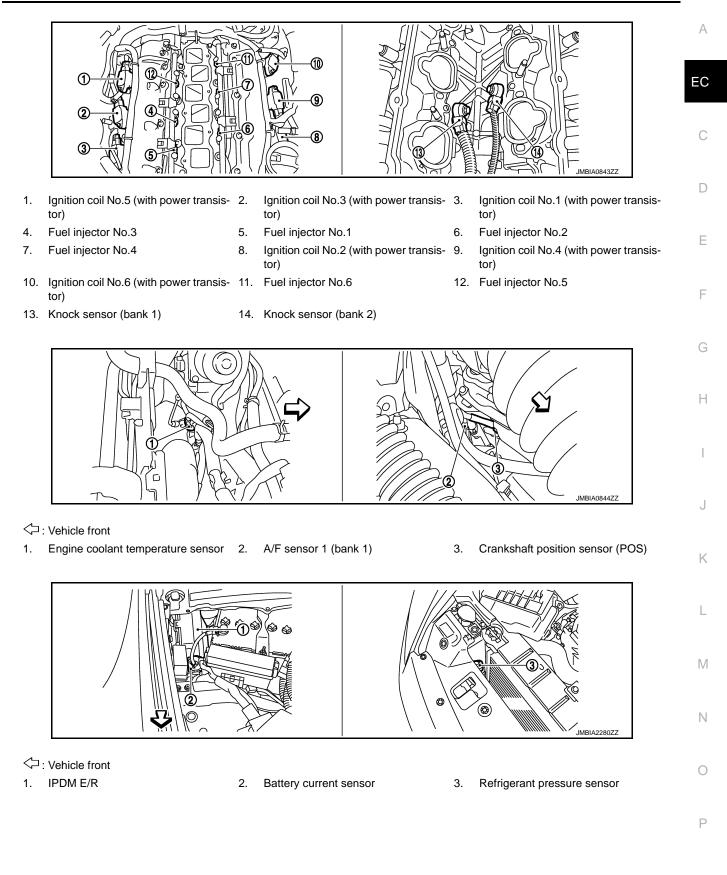


- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)

Intake valve timing control solenoid 3. valve (bank 1) harness connector

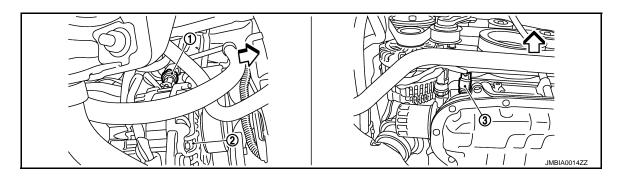
Intake valve timing control solenoid valve (bank 2) harness connector

#### < SYSTEM DESCRIPTION >



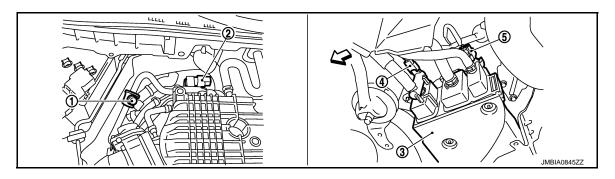
#### < SYSTEM DESCRIPTION >

[VQ37VHR]

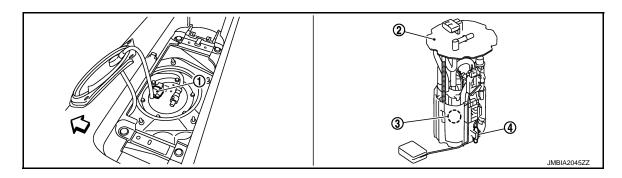


- C: Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



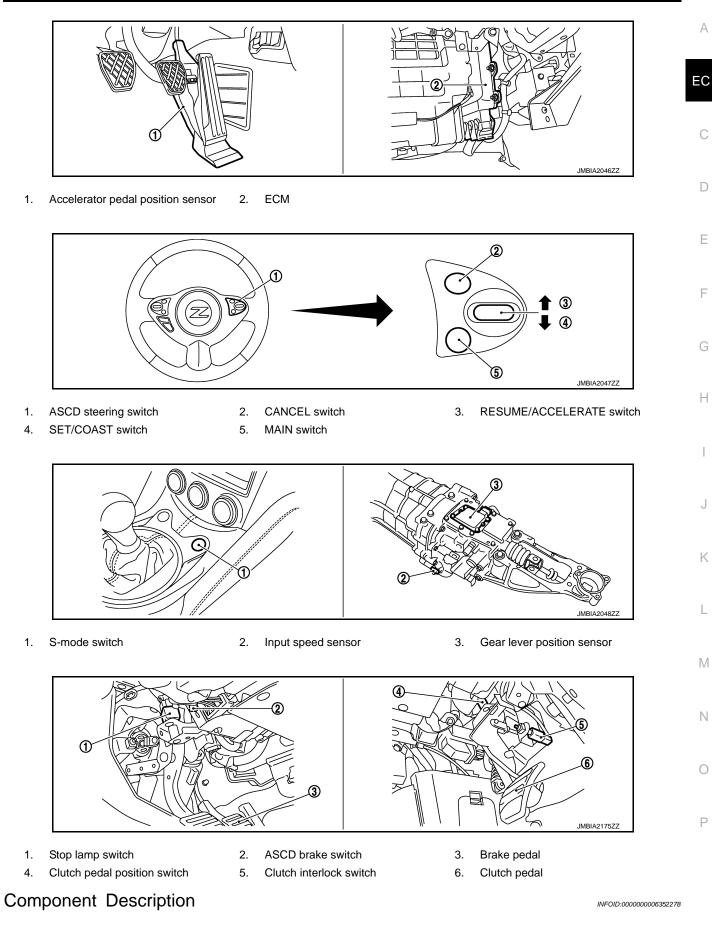
- └□: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- 5. EVAP control system pressure sensor



C: Vehicle front

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

### < SYSTEM DESCRIPTION >



#### < SYSTEM DESCRIPTION >

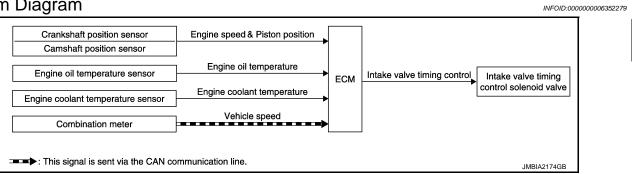
Component	Reference
A/F sensor 1	EC-242, "Description"
Accelerator pedal position sensor	EC-484, "Description"
Camshaft position sensor (PHASE)	EC-316, "Description"
Crankshaft position sensor (POS)	EC-312, "Description"
Engine coolant temperature sensor	EC-227, "Description"
EVAP canister purge volume control solenoid valve	EC-330, "Description"
EVAP control system pressure sensor	EC-346, "Description"
Fuel tank temperature sensor	EC-286, "Description"
Mass air flow sensor	EC-194, "Description"
Throttle position sensor	EC-230, "Description"

# INTAKE VALVE TIMING CONTROL

### < SYSTEM DESCRIPTION >

# INTAKE VALVE TIMING CONTROL

### System Diagram



# System Description

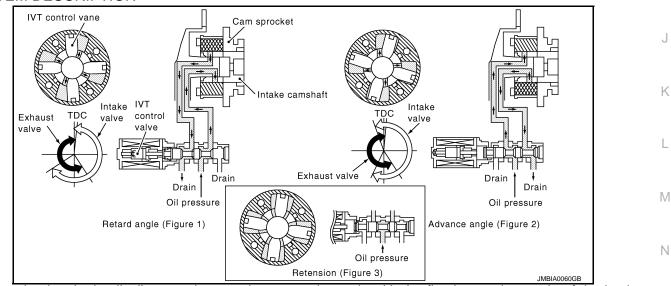
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### INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator	
Crankshaft position sensor (POS)	Engine aread and pieter position	Intake valve timing control	Intake valve timing control solenoid valve	
Camshaft position sensor (PHASE)	Engine speed and piston position			
Engine oil temperature sensor	Engine oil temperature			
Engine coolant temperature sensor	Engine coolant temperature			
Combination meter	Vehicle speed*			

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

### SYSTEM DESCRIPTION



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

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

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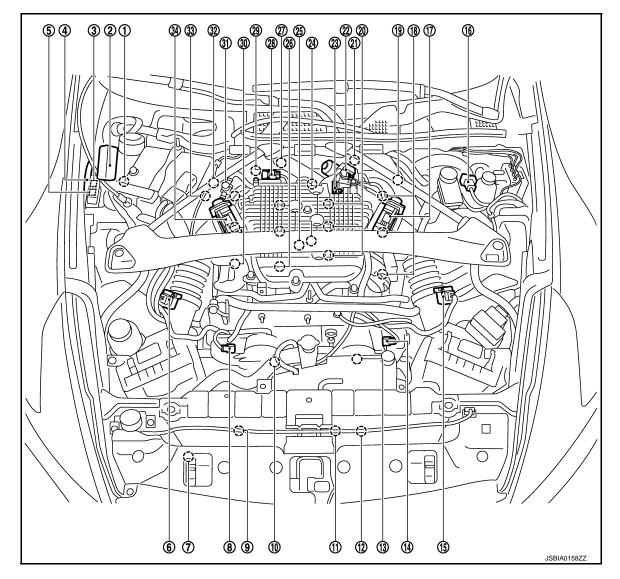
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# INTAKE VALVE TIMING CONTROL

#### < SYSTEM DESCRIPTION >

#### **Component Parts Location**

INFOID:000000006352281



- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)

- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

#### < SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

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[VQ37VHR]

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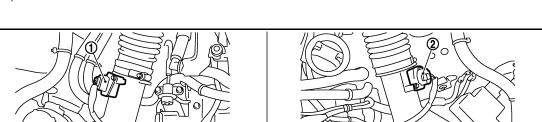
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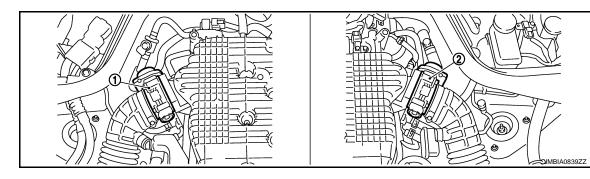
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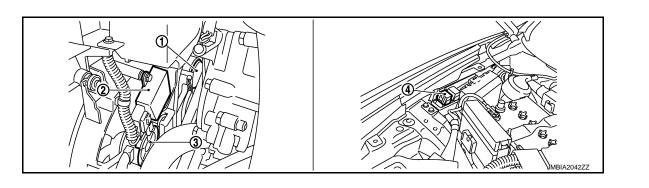
34. Electric throttle control actuator (bank 1)



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



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



2.

C: Vehicle front

- 1. Cooling fan motor-2
- 4. Cooling fan relay

Cooling fan control module 3. Cooling fan motor-1

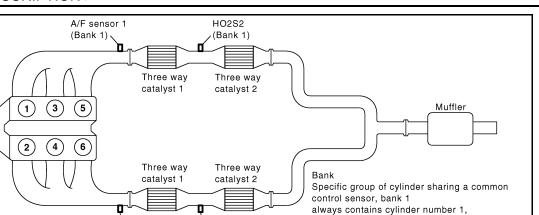
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#### < SYSTEM DESCRIPTION >

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Vehicle Front



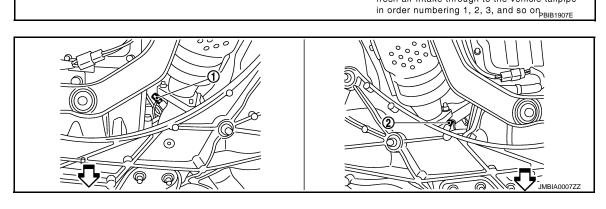
bank 2 is the opposite bank.

air flow, starting from the

Location of a sensor in relation the engine

fresh air intake through to the vehicle tailpipe

No. of sensor



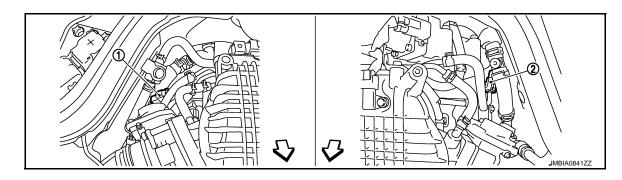
- └□: Vehicle front
- 1. A/F sensor 1 (bank 1)
- 2. A/F sensor 1 (bank 2)

HÖ2S2

(Bank 2)

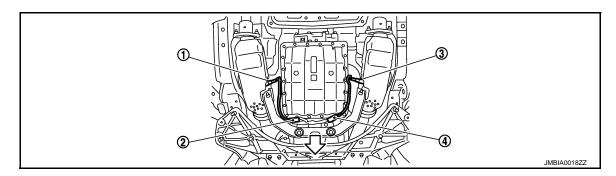
A/F sensor 1

(Bank 2)



C: Vehicle front

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



[VQ37VHR]

#### < SYSTEM DESCRIPTION >

#### [VQ37VHR]

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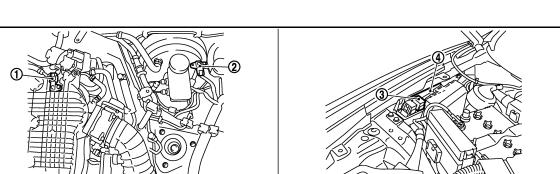
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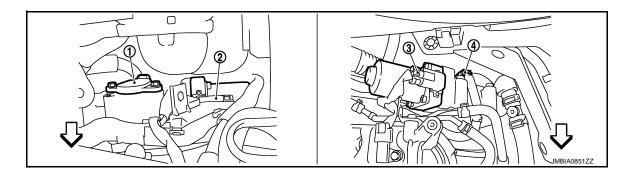
#### C: Vehicle front

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

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



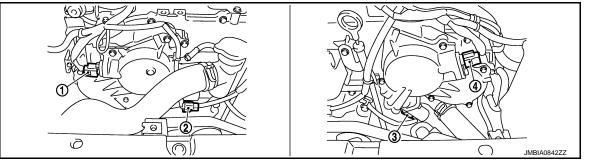
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- VVEL control module 4.



C: Vehicle front

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

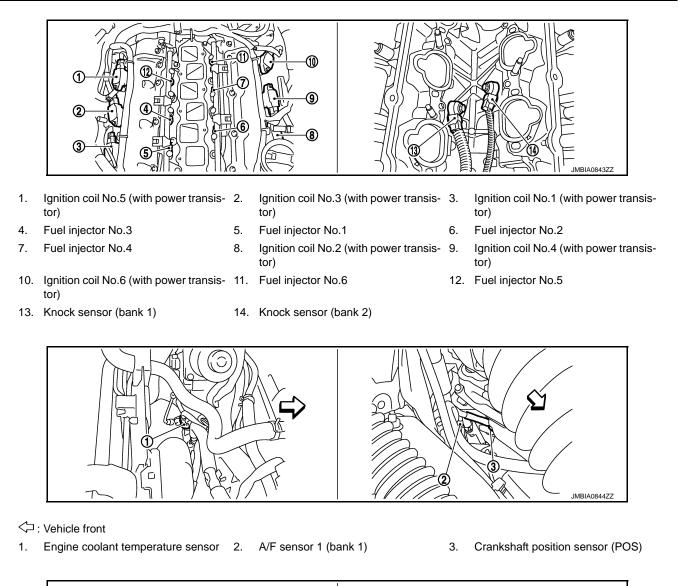
4. VVEL control shaft position sensor (bank 2)



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

#### < SYSTEM DESCRIPTION >

### [VQ37VHR]



C: Vehicle front

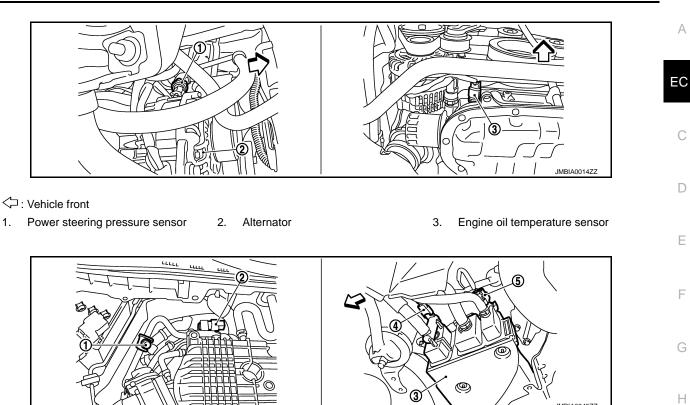
1. IPDM E/R

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

#### < SYSTEM DESCRIPTION >

#### [VQ37VHR]

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- C: Vehicle front
- 1. EVAP service port
- 4. EVAP canister vent control valve
- 2. EVAP canister purge volume control 3. EVAP canister solenoid valve
- JUBIA2045ZZ

EVAP control system pressure sen-

5.

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C: Vehicle front

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

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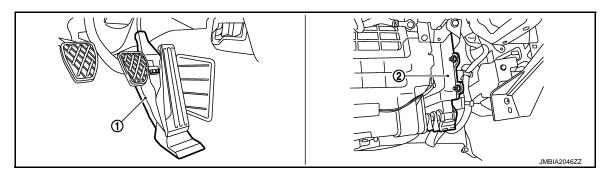
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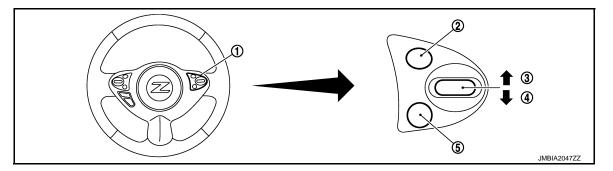
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#### < SYSTEM DESCRIPTION >

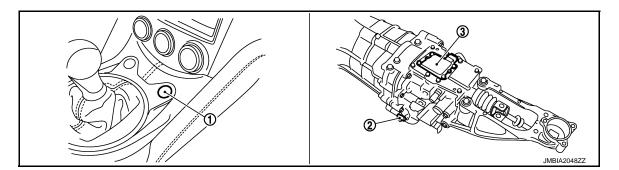
[VQ37VHR]



Accelerator pedal position sensor 2. ECM 1.

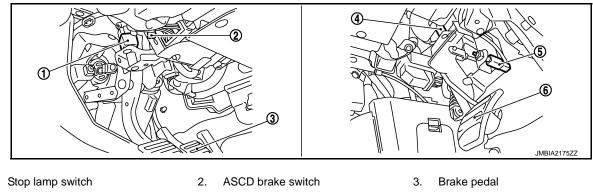


- ASCD steering switch 1.
- CANCEL switch 2.
- 4. SET/COAST switch
- 5.
  - MAIN switch
- RESUME/ACCELERATE switch 3.



S-mode switch 1.

- 2. Input speed sensor
- 3. Gear lever position sensor



Clutch pedal position switch 4.

### **Component Description**

- 5. Clutch interlock switch
- - 6. Clutch pedal

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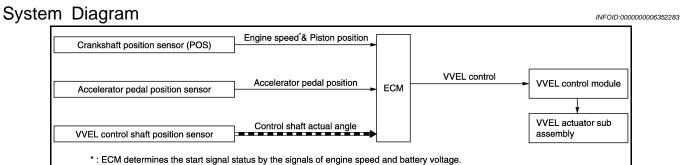
# < SYSTEM DESCRIPTION >

### [VQ37VHR]

Component	Reference	
Camshaft position sensor (PHASE)	EC-316, "Description"	<i>P</i>
Crankshaft position sensor (POS)	EC-312. "Description"	
Engine coolant temperature sensor	EC-227, "Description"	EC
Engine oil temperature sensor	EC-293, "Description"	
ntake valve timing control solenoid valve	EC-201, "Description"	
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# < SYSTEM DESCRIPTION >

# **VVEL SYSTEM**



# System Description

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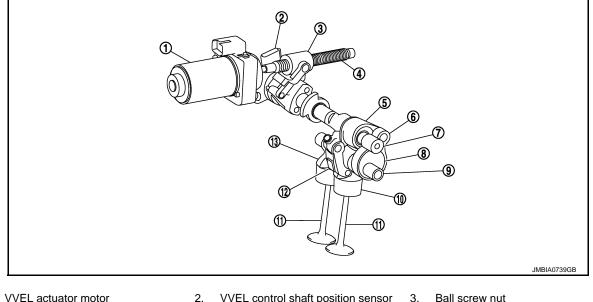
[VQ37VHR]

### **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 actuator sub assembly	
VVEL control shaft position sensor	Control shaft actual angle*			

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

### SYSTEM DESCRIPTION



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

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

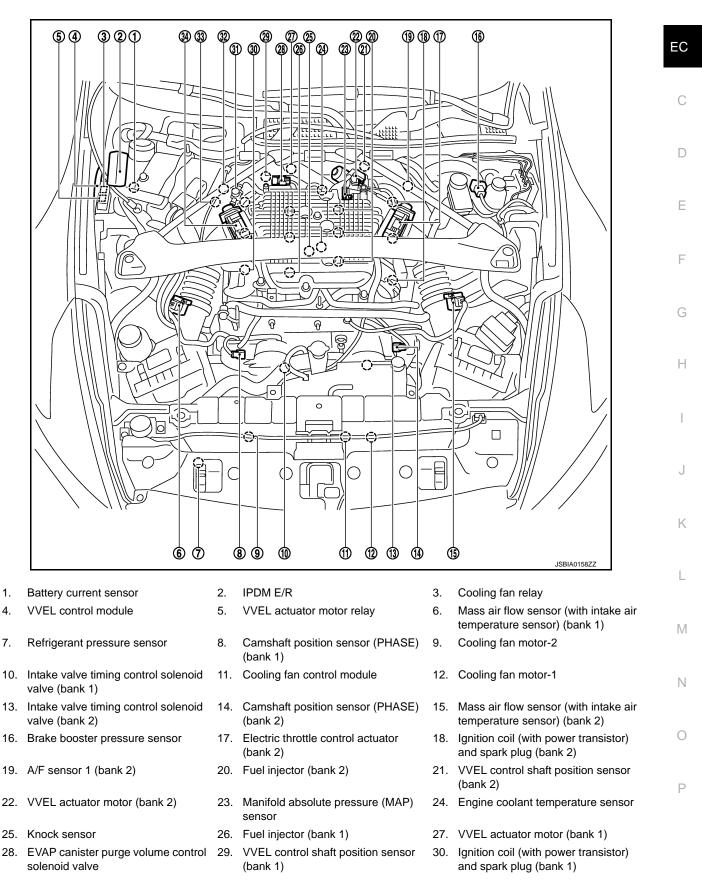
- Ball screw nut
- 6. Link A
- Drive shaft 9.
- 12. Link B

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.

#### < SYSTEM DESCRIPTION >

### **Component Parts Location**

[VQ37VHR]



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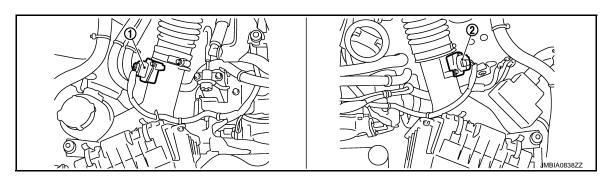
### EC-117

### < SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 33. Crankshaft position sensor (POS)

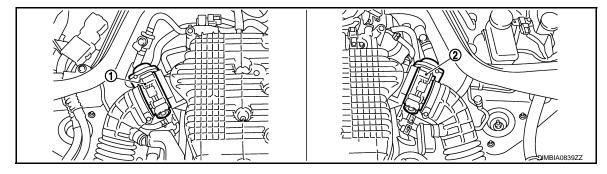
[VQ37VHR]

34. Electric throttle control actuator (bank 1)

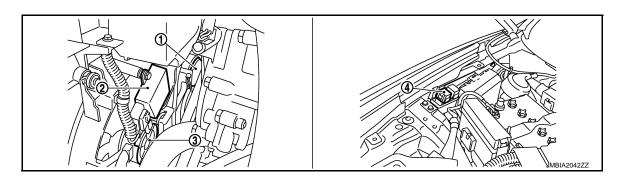


1. Mass air flow sensor (with intake air 2. temperature sensor) (bank 1)

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



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

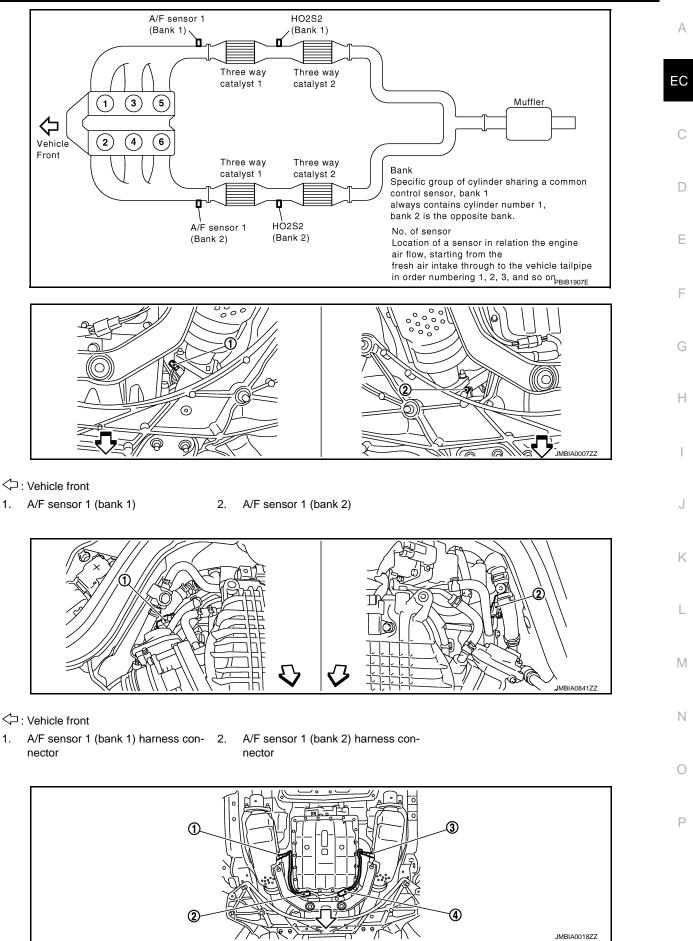


C: Vehicle front

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

#### < SYSTEM DESCRIPTION >



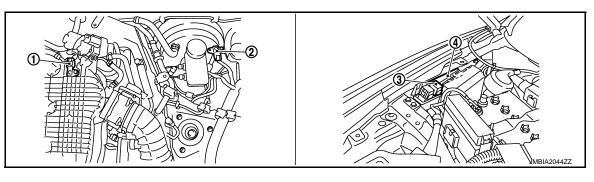


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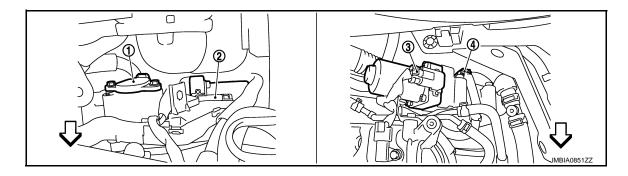
#### └─ : Vehicle front

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

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

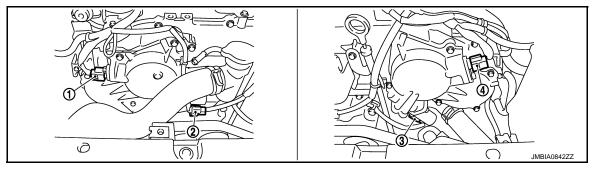


- Manifold absolute pressure (MAP) 1. 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



C: Vehicle front

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



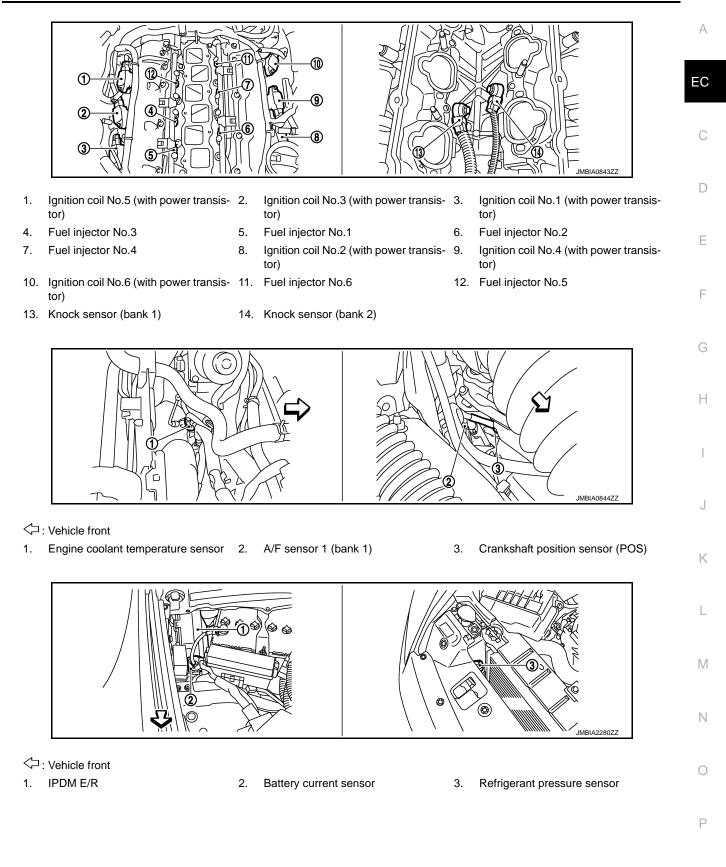
- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- Camshaft position sensor (PHASE) 4. (bank 2)

Intake valve timing control solenoid 3. valve (bank 1) harness connector

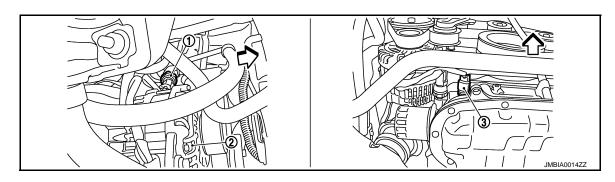
Intake valve timing control solenoid valve (bank 2) harness connector

#### < SYSTEM DESCRIPTION >

### [VQ37VHR]

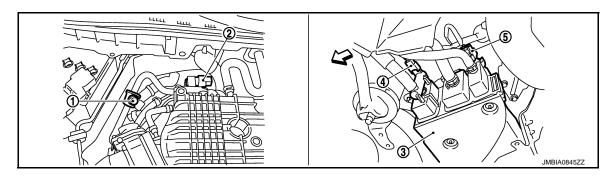


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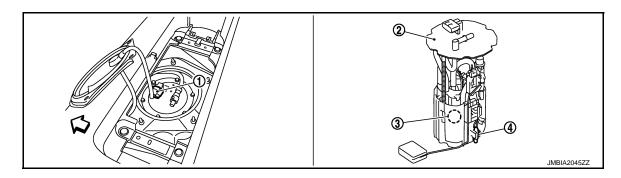


- C : Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



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



C: Vehicle front

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

### < SYSTEM DESCRIPTION >

### [VQ37VHR]

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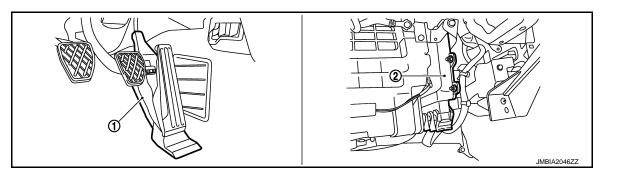
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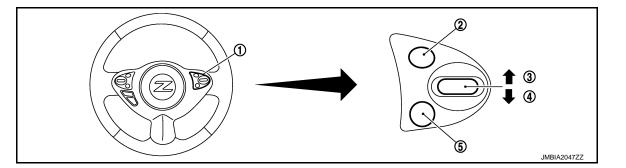
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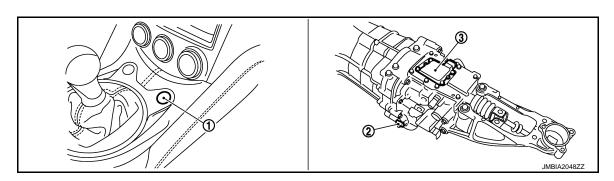


Accelerator pedal position sensor 2. ECM 1.



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

RESUME/ACCELERATE switch 3.



4

1. S-mode switch 2. Input speed sensor

2

3. Gear lever position sensor

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Stop lamp switch 1.

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- Clutch pedal position switch 4.
- **Component Description**
- ASCD brake switch 2.
- 5. Clutch interlock switch
- Clutch pedal

Brake pedal

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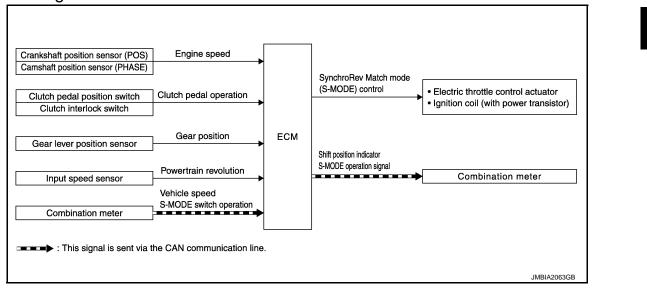
#### < SYSTEM DESCRIPTION >

Component	Reference		
Accelerator pedal position sensor	EC-484, "Description"		
Crankshaft position sensor (POS)	EC-312, "Description"		
VVEL actuator motor	EC-429, "Description"		
VVEL actuator motor relay	EC-433, "Description"		
VVEL control module	EC-474, "Description"		
VVEL control shaft position sensor	EC-425, "Description"		

#### < SYSTEM DESCRIPTION >

# SYNCHROREV MATCH MODE (S-MODE)

### System Diagram



### System Description

#### **INPUT/OUTPUT SIGNAL CHART**

Sensor	Input Signal to ECM	ECM function	Actuator	•
Crankshaft position sensor (POS)	Engine anod			•
Camshaft position sensor (PHASE)	Engine speed			
Clutch pedal position switch	Clutch nodel energian	SynchroRev Match	Electric throttle control	
Clutch interlock switch	Clutch pedal operation	mode (S-MODE) control	<ul><li>actuator</li><li>Ignition coil (with power transistor)</li></ul>	
Gear lever position sensor	Gear position	<ul><li>Shift position indicator*</li><li>S-MODE operation sig-</li></ul>		
Input speed sensor	Powertrain revolution	nal*	Combination meter	
Combination meter	Vehicle speed*			
	S-MODE switch operation*			

\*: This signal is sent via the CAN communication line.

#### SYSTEM DESCRIPTION

Refer to Owner's Manual for SynchroRev Match mode (S-MODE) operating instructions. SynchroRev Match mode (S-MODE) controls engine speed at a suitable level from the present to the next gear position. This control is switched by S-MODE switch (Refer to <u>EC-540</u>, "<u>Description</u>"). When clutch pedal is depressed and shift lever is shifted while S-MODE is being operated, gear position signal is sent to ECM. ECM calculates target engine speed by gear position signal and vehicle speed signal, and then controls throttle opening angle and ignition timing. When downshift is performed, even if accelerator pedal is not depressed, ECM automatically controls throttle opening angle and increases engine speed. When upshift is performed, ECM controls engine speed so that it does not drop lower than the necessary level that is required after upshifting. Engine speed is controlled according to shifting operation above and driver can perform shifting operation quickly, smoothly, and without shifting shock. When S-MODE malfunction is detected, S-MODE warning on information display illuminates and S-MODE is automatically cancelled. At this time, S-MODE indicator turns OFF.

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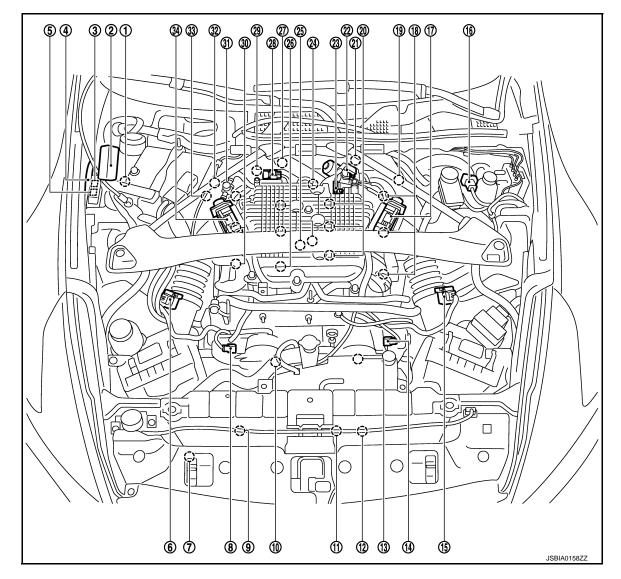
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#### < SYSTEM DESCRIPTION >

#### **Component Parts Location**

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[VQ37VHR]



- 1. Battery current sensor
- 4. VVEL control module
- 7. Refrigerant pressure sensor
- 10. Intake valve timing control solenoid valve (bank 1)
- Intake valve timing control solenoid valve (bank 2)
- 16. Brake booster pressure sensor
- 19. A/F sensor 1 (bank 2)
- 22. VVEL actuator motor (bank 2)
- 25. Knock sensor
- 28. EVAP canister purge volume control solenoid valve

- 2. IPDM E/R
- 5. VVEL actuator motor relay
- 8. Camshaft position sensor (PHASE) (bank 1)
- 11. Cooling fan control module
- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)

- 3. Cooling fan relay
- 6. Mass air flow sensor (with intake air temperature sensor) (bank 1)
- 9. Cooling fan motor-2
- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)
- 24. Engine coolant temperature sensor
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)

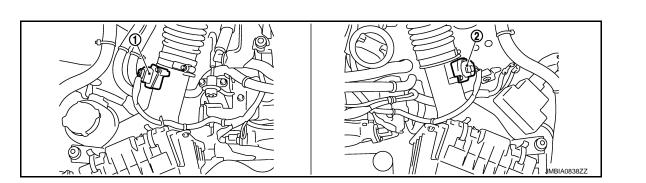
#### < SYSTEM DESCRIPTION >

- 31. EVAP service port
- 32. A/F sensor 1 (bank 1)
- 34. Electric throttle control actuator (bank 1)

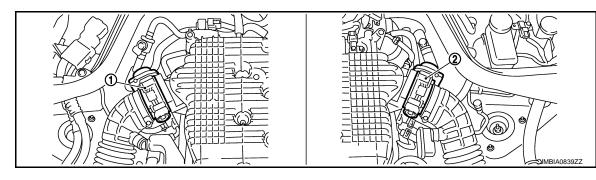


33. Crankshaft position sensor (POS)

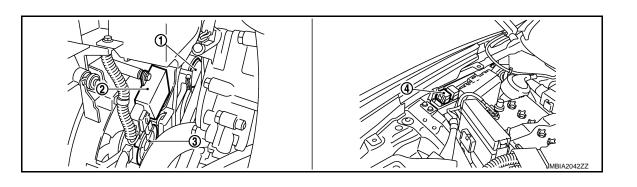
[VQ37VHR]



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



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



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C: Vehicle front

- Cooling fan motor-2 1.
- 4. Cooling fan relay

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

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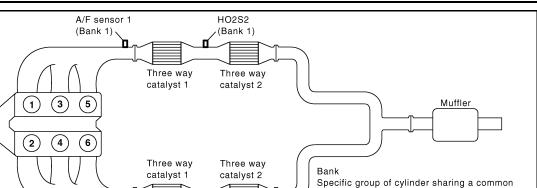
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#### < SYSTEM DESCRIPTION >

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Vehicle Front



control sensor, bank 1

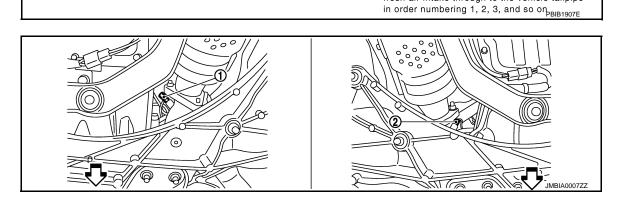
air flow, starting from the

No. of sensor

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

Location of a sensor in relation the engine

fresh air intake through to the vehicle tailpipe

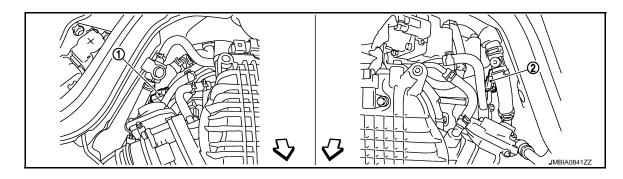


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(Bank 2)

#### └□: Vehicle front

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



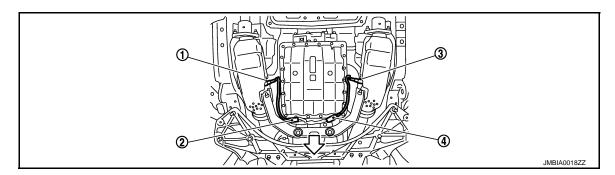
C: Vehicle front

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

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A/F sensor 1

(Bank 2)



#### < SYSTEM DESCRIPTION >

#### [VQ37VHR]

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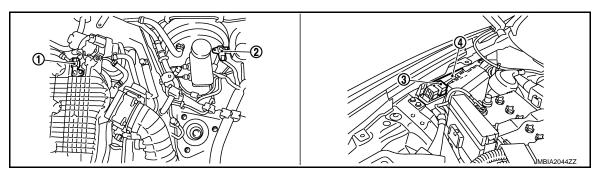
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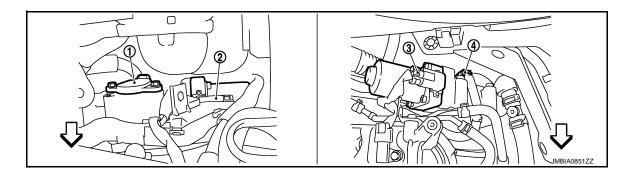
#### C: Vehicle front

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

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



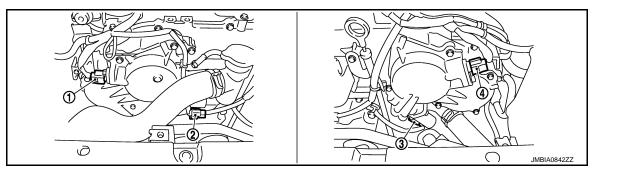
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- VVEL control module 4.



C: Vehicle front

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

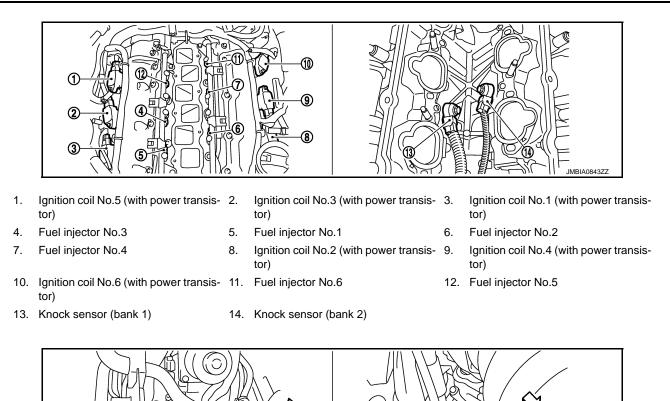
4. VVEL control shaft position sensor (bank 2)



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

#### < SYSTEM DESCRIPTION >

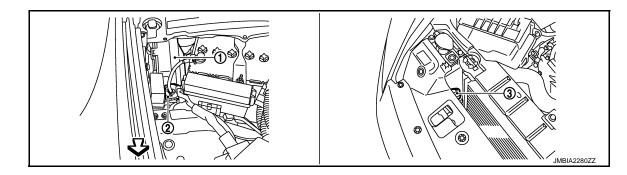
[VQ37VHR]





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

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C: Vehicle front

1. IPDM E/R

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

#### < SYSTEM DESCRIPTION >

#### [VQ37VHR]

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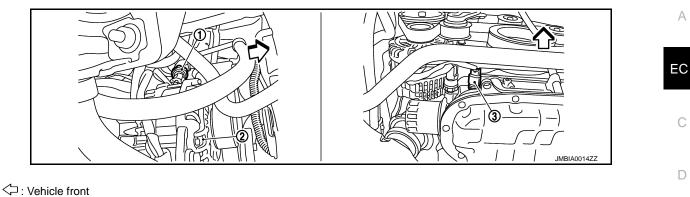
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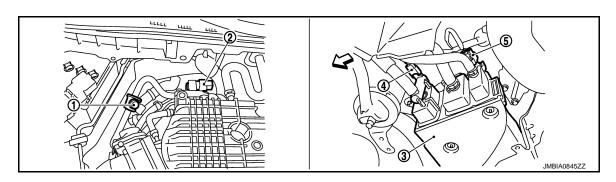
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- 1. Power steering pressure sensor
  - 2. Alternator

Engine oil temperature sensor 3.



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

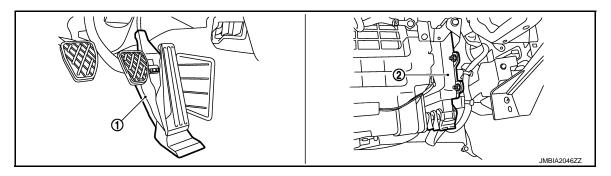
- 1. Fuel level sensor unit and fuel pump 2. Fuel level sensor unit and fuel pump 3. Fuel pressure regulator harness connector
- Fuel tank temperature sensor 4.

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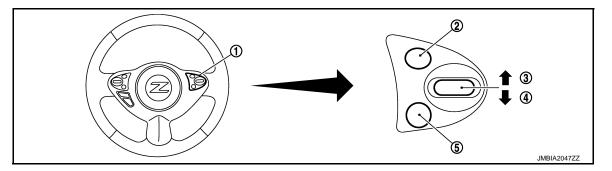
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#### < SYSTEM DESCRIPTION >

[VQ37VHR]

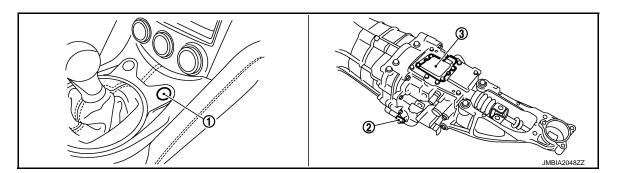


Accelerator pedal position sensor 2. ECM 1.



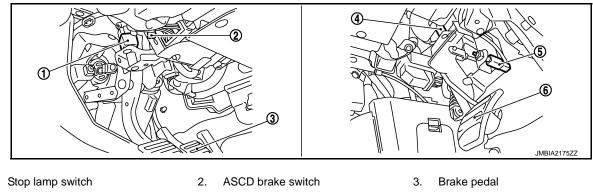
- ASCD steering switch 1.
- CANCEL switch 2.
- 4. SET/COAST switch
- 5. MAIN switch

**RESUME/ACCELERATE** switch 3.



S-mode switch 1.

- 2. Input speed sensor
- 3. Gear lever position sensor



Clutch pedal position switch 4.

### **Component Description**

- 5. Clutch interlock switch
- 6. Clutch pedal

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#### < SYSTEM DESCRIPTION >

[VQ37VHR]

Component	Reference	
Camshaft position sensor (PHASE)	EC-316, "Description"	A
Clutch interlock switch	EC-406, "Description"	
Clutch pedal position switch	EC-411, "Description"	EC
Crankshaft position sensor (POS)	EC-312, "Description"	
Gear lever position sensor	EC-401, "Description"	
Input speed sensor	EC-498, "Description"	С
Shift position indicator	EC-539, "Description"	
S-MODE switch	EC-540, "Description"	D

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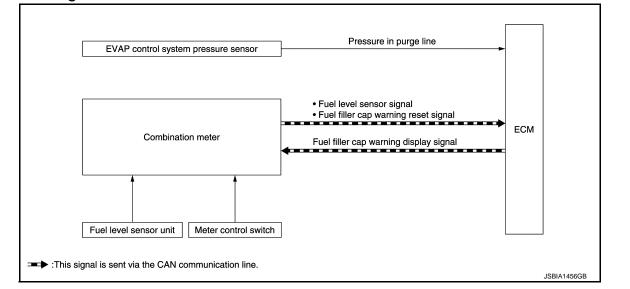
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#### < SYSTEM DESCRIPTION >

# FUEL FILLER CAP WARNING SYSTEM

#### System Diagram



### System Description

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#### INPUT/OUTPUT SIGNAL CHART

Input

Unit/Sensor	Input signal to ECM	ECM function	
EVAP control system pressure sensor	Pressure in purge line		
Combination meter	Fuel level sensor signal*	Fuel filler cap warning control	
	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 sensor signal transmitted from the combination meter via CAN communication.

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. Refer to <u>MWI-</u> <u>27, "INFORMATION DISPLAY : System Description"</u>.
- 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.

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valve (bank 1)

valve (bank 2)

19. A/F sensor 1 (bank 2)

13. Intake valve timing control solenoid

16. Brake booster pressure sensor

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### FUEL FILLER CAP WARNING SYSTEM

#### < SYSTEM DESCRIPTION >

· EVAP leak diagnosis result is normal.

- Fuel refilled.
- DTC erased by using CONSULT-III.

#### 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.

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### **Component Parts Location**

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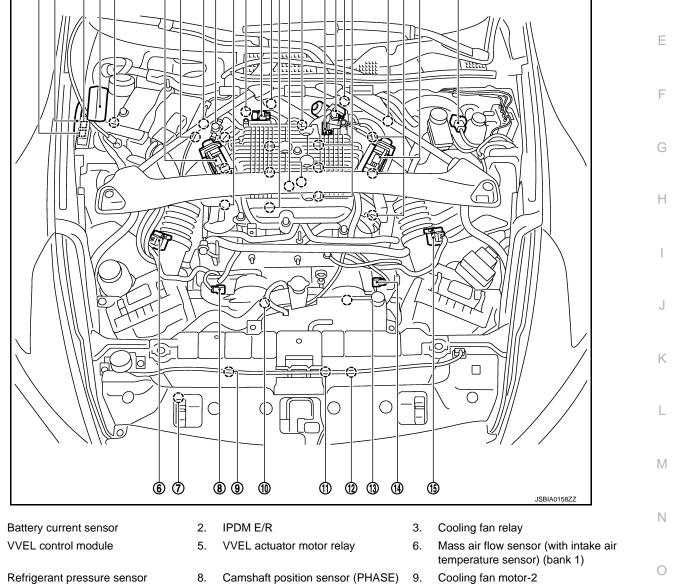
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- 14. Camshaft position sensor (PHASE) (bank 2)
- 17. Electric throttle control actuator (bank 2)
- 20. Fuel injector (bank 2)

- 12. Cooling fan motor-1
- 15. Mass air flow sensor (with intake air temperature sensor) (bank 2)
- 18. Ignition coil (with power transistor) and spark plug (bank 2)
- 21. VVEL control shaft position sensor (bank 2)

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0  $\cap$ E С 6 7 89 12 13 1 1 1 ❻ 2. IPDM E/R 3. VVEL actuator motor relay 5. 6. 8. Camshaft position sensor (PHASE) 9. (bank 1) 10. Intake valve timing control solenoid 11. Cooling fan control module



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#### < SYSTEM DESCRIPTION >

22. VVEL actuator motor (bank 2)

34. Electric throttle control actuator

25. Knock sensor

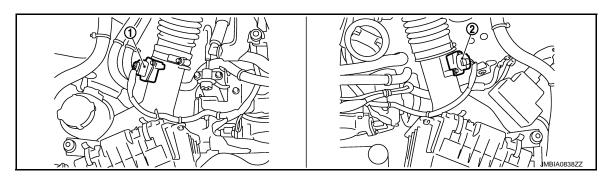
(bank 1)

- 28. EVAP canister purge volume control solenoid valve
- 31. EVAP service port

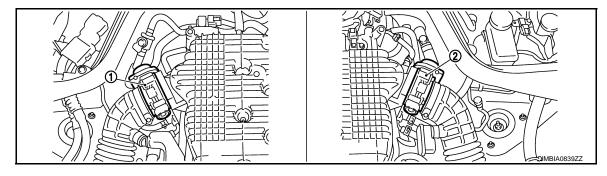
- 23. Manifold absolute pressure (MAP) sensor
- 26. Fuel injector (bank 1)
- 29. VVEL control shaft position sensor (bank 1)
- 32. A/F sensor 1 (bank 1)
- 24. Engine coolant temperature sensor

[VQ37VHR]

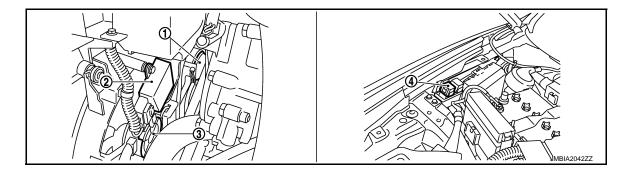
- 27. VVEL actuator motor (bank 1)
- 30. Ignition coil (with power transistor) and spark plug (bank 1)
- 33. Crankshaft position sensor (POS)



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



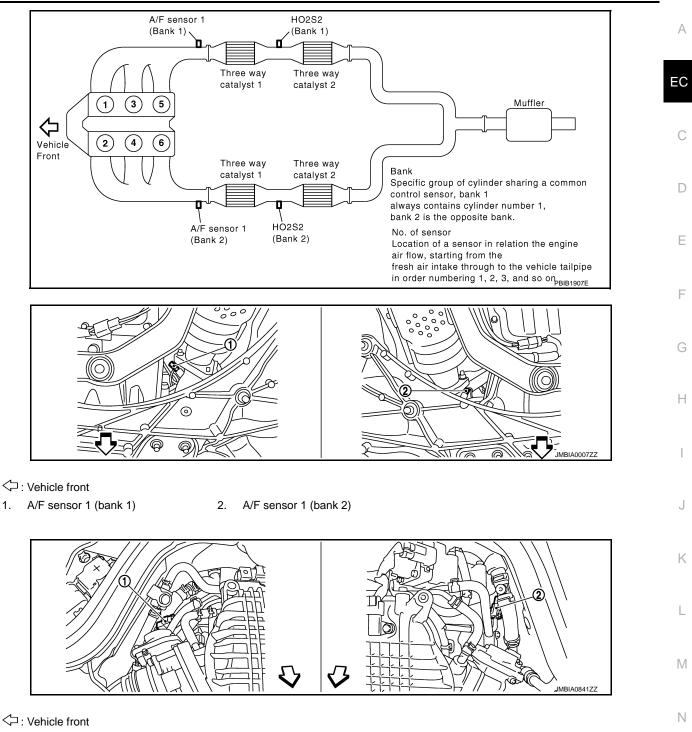
C: Vehicle front

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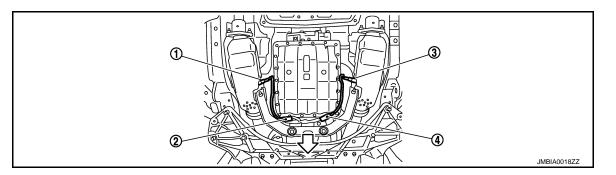
- 1. Cooling fan motor-2 Cooling fan relay
- 2. Cooling fan control module
- 3. Cooling fan motor-1

Revision: 2011 October

#### < SYSTEM DESCRIPTION >



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



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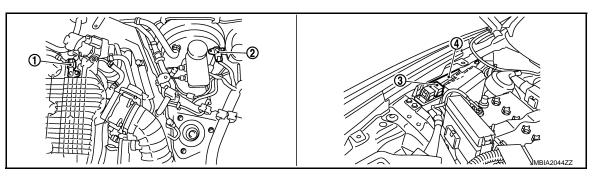
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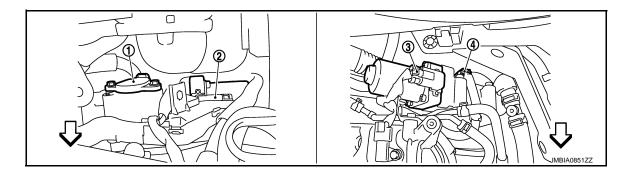
#### C: Vehicle front

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

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



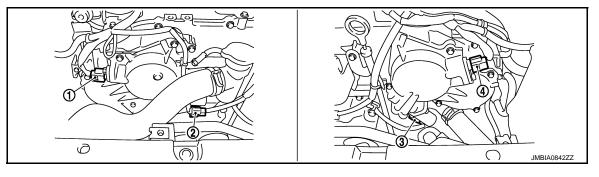
- 1. Manifold absolute pressure (MAP) 2. Brake booster pressure sensor 3. VVEL actuator motor relay sensor
- 4. VVEL control module



✓ : Vehicle front

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

4. VVEL control shaft position sensor (bank 2)



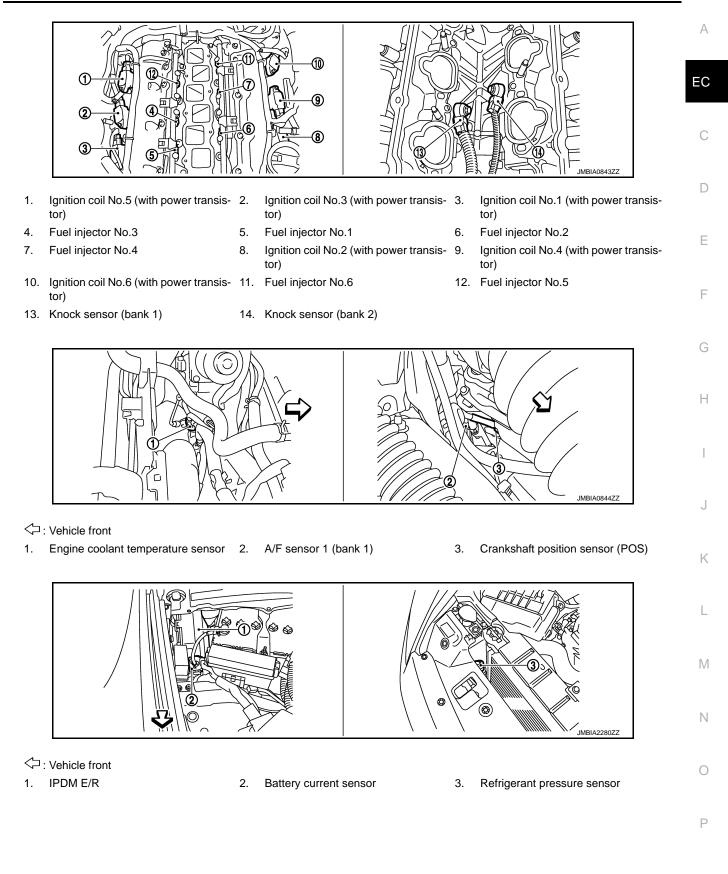
- 1. Camshaft position sensor (PHASE) 2. (bank 1)
- 4. Camshaft position sensor (PHASE) (bank 2)

Intake valve timing control solenoid 3. valve (bank 1) harness connector

Intake valve timing control solenoid valve (bank 2) harness connector

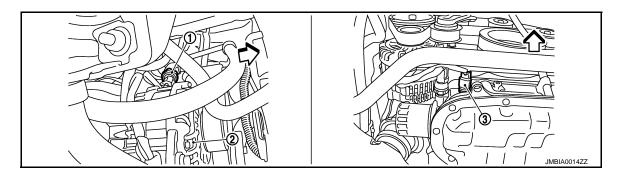
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### [VQ37VHR]



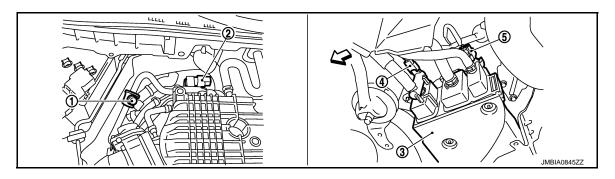
#### < SYSTEM DESCRIPTION >

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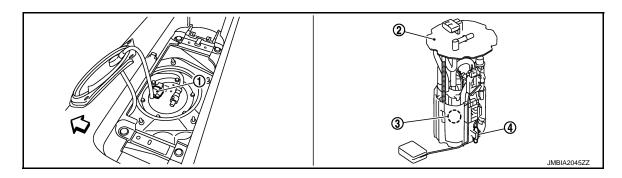


- C : Vehicle front
- 1. Power steering pressure sensor 2. Alternator

3. Engine oil temperature sensor



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

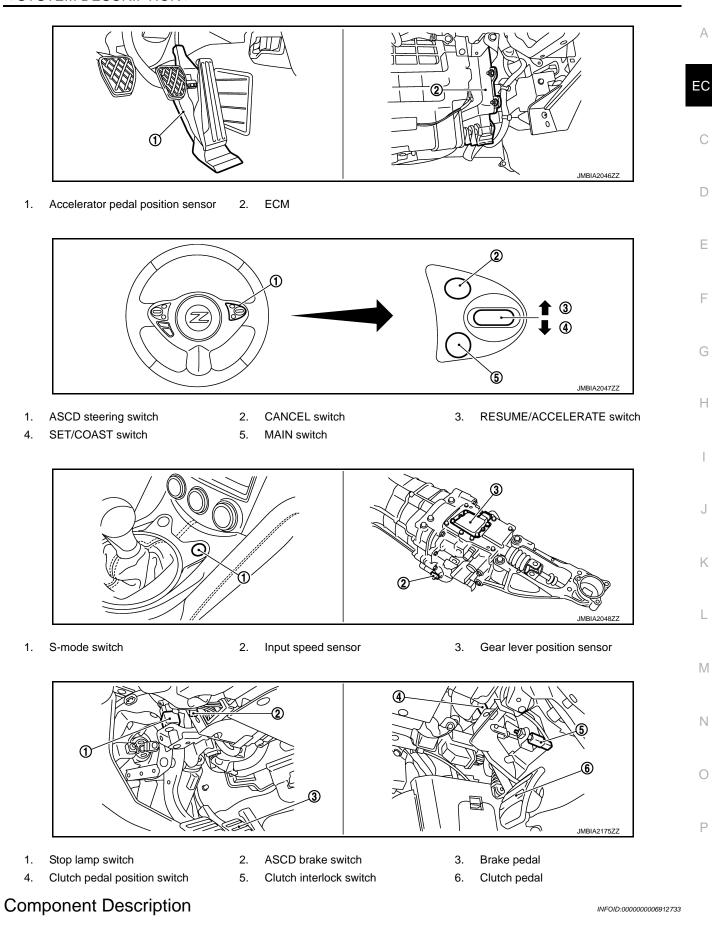


C: Vehicle front

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

### < SYSTEM DESCRIPTION >

### [VQ37VHR]



#### < SYSTEM DESCRIPTION >

Component	Reference		
EVAP control system pressure sensor	EC-346, "Description"		
Fuel level sensor	EC-366, "Description"		

### ON BOARD DIAGNOSTIC (OBD) SYSTEM

#### < SYSTEM DESCRIPTION >

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

#### **Diagnosis Description**

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)

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 <u>EC-143</u>, "Diagnosis Description".

#### 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

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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

		N	111		D.	тс	1 et tri	
		MIL			DTC		1st trip DTC	
Items	1:	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 <u>EC-584, "DTC Index"</u> .)		×		_	×	_	_	_
Except above	_	_	_	×	_	×	×	_

### DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

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### 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-584, "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-III.

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-9</u>, "<u>Work Flow</u>". Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

#### FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

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

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen.

#### < 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 – P0308 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 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 CON-SULT-III will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

#### COUNTER SYSTEM CHART

				IVI
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)	Ν
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)	0

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 "MIS-FIRE <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"

### EC-145

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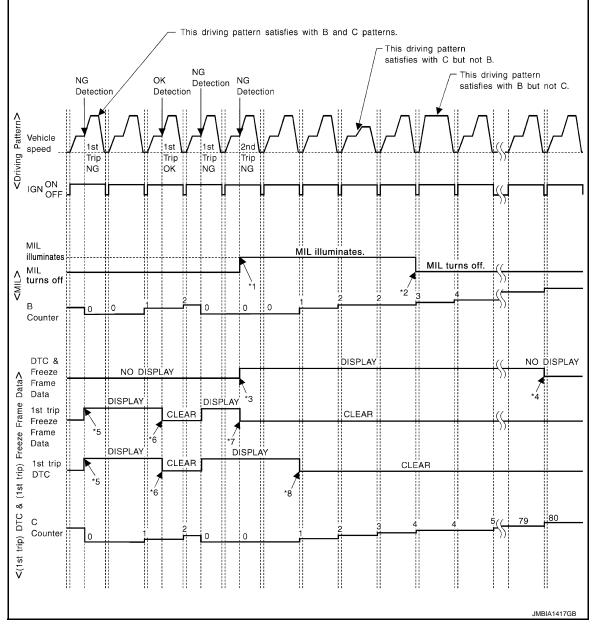
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#### < SYSTEM DESCRIPTION >



- \*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-148, "DIAGNOSIS DESCRIPTION : Driving Pattern".

### EC-146

< SYSTEM DESCRIPTION >

А

EC

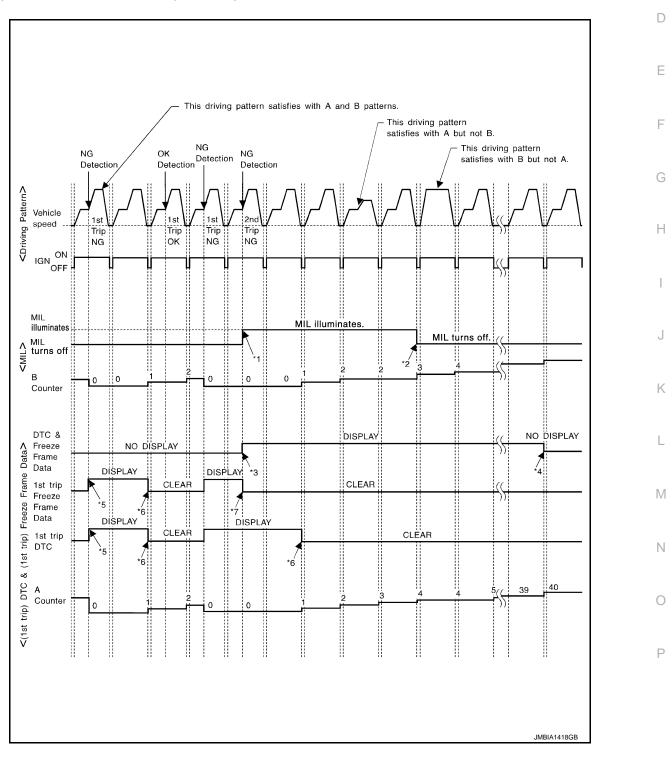
С

#### Driving Pattern C Refer to <u>EC-148</u>, "<u>DIAGNOSIS DESCRIPTION</u>: <u>Driving Pattern</u>". 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 >

- \*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.

**DIAGNOSIS SYSTEM (ECM)** 

- \*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-148, "DIAGNOSIS DESCRIPTION : Driving Pattern".

**Driving Pattern B** Refer to EC-148, "DIAGNOSIS DESCRIPTION : Driving Pattern".

**DIAGNOSIS DESCRIPTION : Driving Pattern** 

#### 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 Α.
- 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 Β.
- 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

### **EC-148**

INFOID:000000006912753

#### < SYSTEM DESCRIPTION >

	-
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]	
<ul> <li>Engine coolant temperature condition:</li> <li>When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).</li> </ul>	A
<ul> <li>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).</li> </ul>	EC
<ul> <li>NOTE:</li> <li>When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.</li> </ul>	С
<ul> <li>When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.</li> </ul>	-
<ul> <li>The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.</li> </ul>	D
DRIVING PATTERN D	
<ul> <li>Driving pattern D means a trip satisfying the following conditions.</li> <li>The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.</li> <li>Idle speed lasts 30 seconds or more.</li> </ul>	E
<ul> <li>A lapse of 600 seconds or more after engine start.</li> <li>NOTE:</li> </ul>	F
<ul> <li>When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.</li> </ul>	l
<ul> <li>When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.</li> </ul>	G
DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code	4 ⊣
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.	K
<b>NOTE:</b> 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.	L
If, during the state emissions inspection, the SRT indicates "CMPLT" for all test items, the inspector will con- tinue 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.	
<b>NOTE:</b> If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates "CMPLT" for all test items. Therefore, it is important to check SRT ("CMPLT") and DTC (No DTCs) before the inspection.	
SRT 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.	
	Ρ

#### < SYSTEM DESCRIPTION >

				Example		
Self-diagn	osis result	Diagnosis	$\leftarrow ON \rightarrow$		on cycle 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	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)

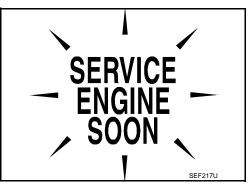
INFOID:000000006912755

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-528</u>, "Component Function Check".

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



#### < SYSTEM DESCRIPTION >

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.
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-19</u> , "ACCELER- ATOR PEDAL RELEASED POSITION LEARNING : Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to <u>EC-20, "THROTTLE VALVE</u> <u>CLOSED POSITION LEARNING : Description"</u> .
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-20, "IDLE AIR VOLUME LEARNING : Description".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to <u>EC-24. "MIXTURE RATIO</u> <u>SELF-LEARNING VALUE CLEAR : Description"</u> .

#### 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. 2. If it remains OFF, check MIL circuit. Refer to EC-528, "Diagnosis Procedure". SRT STATUS MODE Κ 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-149, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code". L **Operation Procedure** 1. Turn ignition switch ON and wait 20 seconds. Μ 2. SRT status is indicated as shown blow. ECM continues to illuminate MIL if all SRT codes are set.

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INFOID:000000006912756

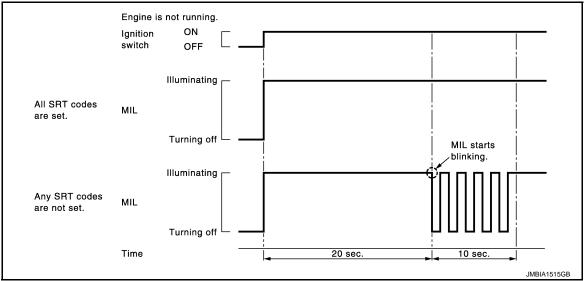
А

EC

#### < SYSTEM DESCRIPTION >

[VQ37VHR]

• 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-528, "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.
- 3. 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.

 Fully release the accelerator pedal. ECM has entered to "Self-diagnostic results" mode.

# EC-152

Diagnostic test mode II

(Self-diagnostic results)

starts

Approx. 10 sec.

More than

Erasing ECM

Mode I

PBIB0092E

memory

10 sec.

Mode II

#### < SYSTEM DESCRIPTION >

ON

OFF

NOTE:

Ignition switch

Accelerator

pedal

[VQ37VHR]







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F

How to Read Self-diagnostic Results

Diagnostic test mode

Fully depressed

Fully

released

The DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below.

Mode I

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

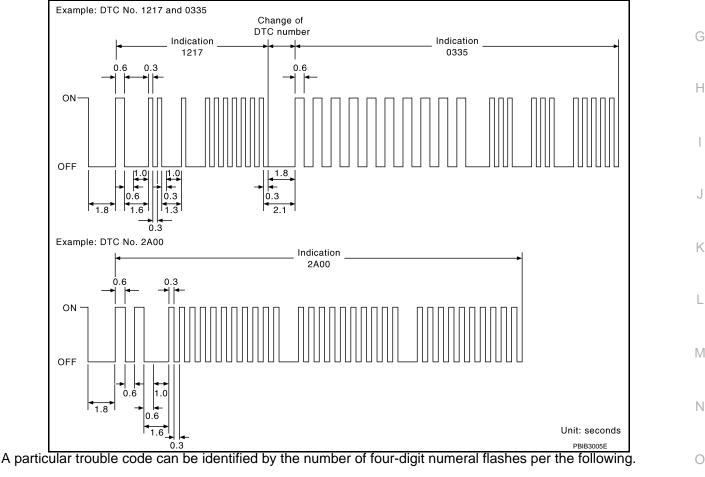
7 sec

Within

5 sec

3 sec.

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-III or GST. A DTC will be used as an example for how to read a code.



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.

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#### < 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-584</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-III** Function

INFOID:000000006912757

[VQ37VHR]

#### FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
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-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.
Function test	This mode is used to inform customers when their vehicle requires periodic maintenance.
ECU identification	ECM part number can be read.

\*: 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

WORK SUPPORT MODE

Work Item

#### < SYSTEM DESCRIPTION >

### [VQ37VHR]

WORK ITEM	CONDITION	USAGE	A
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	<ul> <li>Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions.</li> <li>Ignition switch ON</li> <li>Engine not running</li> <li>Ambient temperature is above 0°C (32°F).</li> <li>No vacuum and no high pressure in EVAP system</li> <li>Fuel tank temp. is more than 0°C (32°F).</li> <li>Within 10 minutes after starting "EVAP SYSTEM CLOSE"</li> <li>When trying to execute "EVAP SYSTEM CLOSE" under the condition except above, CONSULT-III will discontinue it and display appropriate instruction.</li> <li>NOTE:</li> <li>When starting engine, CONSULT-III may display "Battery voltage is low. Charge battery", even when using a charged battery.</li> </ul>	When detecting EVAP vapor leak in the EVAP system	
FUEL PRESSURE RELEASE	<ul> <li>Fuel pump will stop by touching "START" during idling. Crank a few times after engine stalls.</li> </ul>	When releasing fuel pressure from fuel line	ŀ
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*	Idle condition	When setting target idle speed	
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition timing	ŀ
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM	
VVEL POS SEN ADJ PREP	<ul><li>Use this item only when replacing VVEL actuator sub assembly.</li><li>Ignition on and engine stopped.</li></ul>	When adjusting VVEL control shaft position sensor	
M/T NEUTRAL POS LEARN	<ul><li> Ignition on and engine stopped.</li><li>Shift position: neutral</li></ul>	When ECM is replaced When gear lever position sensor is replaced When shift position indicator "N" is blinking	
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position	k

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

#### SELF-DIAG RESULT MODE

Self Diagnostic Item Regarding items of DTC and 1st trip DTC, refer to <u>EC-584, "DTC Index"</u>.

#### 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 <u>EC-584, "DTC Index"</u>), skip step 1.
- 1. Erase DTC in TCM. Refer to <u>TM-204, "Diagnosis Description"</u>.
- 2. Select "ENGINE" with CONSULT-III.
- 3. Select "SELF-DIAG RESULTS".
- 4. Touch "ERASE". (DTC in ECM will be erased.)

Freeze Frame Data and 1st Trip Freeze Frame Data

### EC-155

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#### < SYSTEM DESCRIPTION >

Freeze frame data item*	Description		
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code that is displayed as PXXXX. (Refer to <u>EC-584</u> , " <u>DTC Index</u> ".)		
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.		
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.		
L-FUEL TRM-B1 [%]	"Long-term fuel trim" at the moment a malfunction is detected is displayed.		
L-FUEL TRM-B2 [%]	<ul> <li>The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.</li> </ul>		
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	<ul> <li>One of the following mode is displayed.</li> <li>Mode2: Open loop due to detected system malfunction</li> <li>Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment)</li> <li>Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control</li> <li>Mode5: Open loop - has not yet satisfied condition to go to closed loop</li> </ul>		
INT MANI PRES [kPa]	These 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

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	<ul> <li>Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and cam- shaft position sensor (PHASE).</li> </ul>	<ul> <li>Accuracy becomes poor if engine speed drops below the idle rpm.</li> <li>If the signal is interrupted while the engine is running, an abnormal value may be indicated.</li> </ul>
MAS A/F SE-B1			When the engine is stopped, a
MAS A/F SE-B2	V	The signal voltage of the mass air flow sensor is dis- played.	<ul> <li>certain value is indicated.</li> <li>When engine is running, specification range is indicated in "SPEC".</li> </ul>
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, speci- fication range is indicated in "SPEC".
A/F ALPHA-B1			• When the engine is stopped, a
A/F ALPHA-B2	%	The mean value of the air-fuel ratio feedback correc- tion factor per cycle is indicated.	<ul> <li>certain value is indicated.</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> <li>When engine is running, specification range is indicated in "SPEC".</li> </ul>

#### < SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks	
COOLAN TEMP/S	°C or °F	<ul> <li>The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sen- sor) is displayed.</li> </ul>	• When the engine coolant tem- perature sensor is open or short-circuited, ECM enters fail- safe mode. The engine coolant temperature determined by the ECM is displayed.	A EC
A/F SEN1 (B1)	V	• The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.		С
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.		
HO2S2 (B2)				D
HO2S2 MNTR (B1) HO2S2 MNTR (B2)	RICH/LEAN	<ul> <li>Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small.</li> <li>LEAN: means the amount of oxygen after three way catalyst is relatively large.</li> </ul>	• When the engine is stopped, a certain value is indicated.	E
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.		F
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.		-
ACCEL SEN 1 ACCEL SEN 2	V	• The accelerator pedal position sensor signal voltage is displayed.	<ul> <li>ACCEL SEN 2 signal is con- verted by ECM internally. Thus, they differs from ECM terminal voltage signal.</li> </ul>	G
TP SEN 1-B1			TP SEN 2-B1 signal is convert-	Н
TP SEN 2-B1	V	<ul> <li>The throttle position sensor signal voltage is dis- played.</li> </ul>	ed by ECM internally. Thus, they differs from ECM terminal voltage signal.	
FUEL T/TMP SE	°C or °F	• The fuel temperature (determined by the signal volt- age of the fuel tank temperature sensor) is displayed.		
EVAP SYS PRES	V	The signal voltage of EVAP control system pressure sensor is displayed.		J
FUEL LEVEL SE	V	The signal voltage of the fuel level sensor is dis- played.		
START SIGNAL	ON/OFF	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	<ul> <li>After starting the engine, [OFF] is displayed regardless of the starter signal.</li> </ul>	K
CLSD THL POS	ON/OFF	<ul> <li>Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.</li> </ul>		L
AIR COND SIG	ON/OFF	<ul> <li>Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.</li> </ul>		Μ
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.		Ν
LOAD SIGNAL	ON/OFF	<ul> <li>Indicates [ON/OFF] condition from the electrical load signal.</li> <li>ON: Rear window defogger switch is ON and/or light- ing switch is in 2nd position.</li> <li>OFF: Both rear window defogger switch and lighting switch are OFF.</li> </ul>		O
IGNITION SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch sig- nal.		Г
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 >

Monitored item	Unit	Description	Remarks
INJ PULSE-B1	msec	Indicates the actual fuel injection pulse width com- ponented by ECM according to the input signals	• When the engine is stopped, a certain computed value is indi-
INJ PULSE-B2		pensated by ECM according to the input signals.	cated.
IGN TIMING	BTDC	<ul> <li>Indicates the ignition timing computed by ECM according to the input signals.</li> </ul>	• 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 ac- cording to the signal voltage of the mass air flow sen- sor.	
PURG VOL C/V	%	<ul> <li>Indicates the EVAP canister purge volume control so- lenoid valve control value computed by the ECM ac- cording to the input signals.</li> <li>The opening becomes larger as the value increases.</li> </ul>	
INT/V SOL (B1)		• The control value of the intake valve timing control	
INT/V SOL (B2)	%	<ul><li>solenoid valve (determined by ECM according to the input signals) is indicated.</li><li>The advance angle becomes larger as the value increases.</li></ul>	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (deter- mined by ECM according to the input signals) is indi- cated.	
FUEL PUMP RLY	ON/OFF	• Indicates the fuel pump relay control condition deter- mined by ECM according to the input signals.	
VENT CONT/V	ON/OFF	The control condition of the EVAP canister vent con- trol 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 con- dition determined by the ECM according to the input signals.	
A/F S1 HTR (B2)	%	<ul> <li>Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals.</li> <li>The current flow to the heater becomes larger as the value increases.</li> </ul>	
HO2S2 HTR (B1)	01/055	Indicates [ON/OFF] condition of heated oxygen sen-	
HO2S2 HTR (B2)	ON/OFF	sor 2 heater determined by ECM according to the in- put 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	<ul> <li>Displays the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet.</li> <li>CMPLT: Idle air volume learning has already been performed successfully.</li> </ul>	
TRVL AFTER MIL	km or mile	Distance traveled while MIL is activated.	
ENG OIL TEMP	°C or °F	• The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.	
A/F S1 HTR (B1)	%	<ul> <li>Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals.</li> <li>The current flow to the heater becomes larger as the value increases.</li> </ul>	

#### < SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from MAIN switch sig- nal.	
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	<ul> <li>Indicates [ON/OFF] condition from SET/COAST switch signal.</li> </ul>	
BRAKE SW1	ON/OFF	<ul> <li>Indicates [ON/OFF] condition from ASCD brake switch signal.</li> </ul>	
BRAKE SW2	ON/OFF	Indicates [ON/OFF] condition of stop lamp switch sig- nal.	
VHCL SPD CUT	NON/CUT	<ul> <li>Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed.</li> <li>CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD op- eration is cut off.</li> </ul>	
LO SPEED CUT	NON/CUT	<ul> <li>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.</li> </ul>	
AT OD MONITOR	ON/OFF	<ul><li>Always OFF is displayed.</li><li>This item is not efficient for Z34 models.</li></ul>	
AT OD CANCEL	ON/OFF	<ul><li>Always OFF is displayed.</li><li>This item is not efficient for Z34 models.</li></ul>	
CRUISE LAMP	ON/OFF	Indicates [ON/OFF] condition of CRUISE lamp deter- mined by the ECM according to the input signals.	
SET LAMP	ON/OFF	<ul> <li>Indicates [ON/OFF] condition of SET lamp deter- mined by the ECM according to the input signals.</li> </ul>	
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 combination meter.	
AC EVA TARGET	°C or °F	Indicates target A/C evaporator temperature sent from "unified meter and A/C amp.".	
A/F ADJ-B1		<ul> <li>Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the</li> </ul>	
A/F ADJ-B2	—	target air-fuel ratio stored in ECM and the air-fuel ra- tio calculated from A/F sensor 1 signal.	
TP SEN 1-B2			• TP SEN 2-B2 signal is convert-
TP SEN 2-B2	V	<ul> <li>The throttle position sensor signal voltage is dis- played.</li> </ul>	ed by ECM internally. Thus, they differs from ECM terminal voltage signal.
P/N POSI SW	ON/OFF	<ul> <li>Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.</li> </ul>	
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sen-	

#### < SYSTEM DESCRIPTION >

Monitored item	Unit	Description	Remarks
A/F SEN1 (B2)	V	• The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
ATOM PRES SEN	mV	<ul><li>Always a certain value is displayed.</li><li>This item is not efficient for Z34 models.</li></ul>	
BRAKE BST PRES SE	mV	<ul><li>Always a certain value is displayed.</li><li>This item is not efficient for Z34 models.</li></ul>	
INT/V TIM (B1) INT/V TIM (B2)	°CA	Indicates [°CA] of intake camshaft advance angle.	
MAP SENSOR	V	<ul> <li>Always a certain value is displayed.</li> <li>This item is not efficient for Z34 models.</li> </ul>	
EVAP LEAK DIAG	YET/CMPLT	<ul> <li>Indicates the condition of EVAP leak diagnosis. YET: EVAP leak diagnosis has not been performed yet. CMPLT: EVAP leak diagnosis has been performed successfully.</li> </ul>	
EVAP DIAG READY	ON/OFF	<ul> <li>Indicates the ready condition of EVAP leak diagnosis.</li> <li>ON: Diagnosis has been ready condition.</li> <li>OFF: Diagnosis has not been ready condition.</li> </ul>	
VVEL LEARN	YET/DONE	<ul> <li>Display the condition of VVEL learning YET: VVEL learning has not been performed yet. DONE: VVEL learning has already been performed successfully.</li> </ul>	
VVEL SEN LEARN- B1 VVEL SEN LEARN-	V	Indicates the VVEL learning value.	
B2 VVEL POSITION SEN-B1 VVEL POSITION SEN-B2	V	<ul> <li>The VVEL control shaft position sensor signal volt- age is displayed.</li> </ul>	
VVEL TIM-B1 VVEL TIM-B2	deg	Indicates [deg] of VVEL control shaft angle.	
ALTDUTY	%	<ul> <li>Indicates the duty ratio of the power generation com- mand value.</li> </ul>	
ALT DUTY SIG	ON/OFF	<ul> <li>The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated.</li> <li>ON: Power generation voltage variable control is ac- tive.</li> <li>OFF: Power generation voltage variable control is in- active.</li> </ul>	
GEAR POSITION	1/2/3/4/5/6/N/R/ ##	<ul> <li>Indicates the shift position determined by the ECM according to the input signals.</li> </ul>	"##" is displayed when shift posi- tion cannot be judged.
M/T SYN REV STAT	INACT/ACTIVE	<ul> <li>Displays SynchroRev Match mode (S-MODE) is condition.</li> <li>INACT: S-MODE is not operated ACTIVE: S-MODE is operated</li> </ul>	
M/T SYNCHRO SW	ON/OFF	<ul> <li>Indicates [ON/OFF] condition from S-MODE switch signal.</li> </ul>	
CPP SW	ON/OFF	<ul> <li>Indicates [ON/OFF] condition from clutch pedal position switch signal.</li> </ul>	
CLUTCH INTLCK SW	ON/OFF	<ul> <li>Indicates [ON/OFF] condition from clutch interlock switch signal.</li> </ul>	

#### < SYSTEM DESCRIPTION >

### [VQ37VHR]

Monitored item	Unit	Description	Remarks	0
M/T N POS LEARN YET/DONE		<ul> <li>Displays the M/T Neutral Position Learning condition. YET: M/T neutral position learning is not complete yet.</li> <li>DONE: M/T neutral position learning is successfully complete.</li> </ul>		EC
THRTL STK CNT B1 <sup>*</sup>	_	_		С
HO2 S2 DIAG1 (B1)	INCMP/CMPLT	<ul> <li>Indicates DTC P0139 self-diagnosis (delayed re- sponse) condition.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>		D
HO2 S2 DIAG1 (B2)	INCMP/CMPLT	<ul> <li>Indicates DTC P0159 self-diagnosis (delayed re- sponse) condition.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>		E
HO2 S2 DIAG2 (B1)	INCMP/CMPLT	<ul> <li>Indicates DTC P0139 self-diagnosis (slow response) condition.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>		F
HO2 S2 DIAG2 (B2)	INCMP/CMPLT	<ul> <li>Indicates DTC P0159 self-diagnosis (slow response) condition.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>		G
A/F SEN1 DIAG2 (B1) <sup>*</sup>	INCMP/CMPLT	<ul> <li>Indicates DTC P014C or P014D self-diagnosis con- dition.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>		Η
A/F SEN1 DIAG2 (B2) <sup>*</sup>	INCMP/CMPLT	<ul> <li>Indicates DTC P014E or P014F self-diagnosis condi- tion.</li> <li>INCMP: Self-diagnosis is incomplete.</li> <li>CMPLT: Self-diagnosis is complete.</li> </ul>		J

\*: 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. K

#### ACTIVE TEST MODE

#### Test Item

TEST ITEM CONDITION JUDGEMENT CHECK ITEM (REMEDY) · Ignition switch: ON (Engine stopped) Μ Solenoid valve makes an Harness and connectors VENT CONTROL/V Turn solenoid valve ON and OFF with the Solenoid valve operating sound. CONSULT-III and listen to operating sound. · Engine: Return to the original trouble condi-· Harness and connectors Ν tion If trouble symptom disap-• Engine coolant temperature ENG COOLANT TEMP pears, see CHECK ITEM. • Change the engine coolant temperature sensor using CONSULT-III. · Fuel injector · Engine: Return to the original trouble condi-· Harness and connectors tion If trouble symptom disap-FUEL INJECTION · Fuel injector · Change the amount of fuel injection using pears, see CHECK ITEM. Air fuel ratio (A/F) sensor 1 CONSULT-III. FUEL/T TEMP SEN · Change the fuel tank temperature using CONSULT-III. · Engine: After warming up, run engine at 1,500 rpm. Engine speed changes ac-· Harness and connectors PURG VOL CONT/V · Change the EVAP canister purge volume cording to the opening per-· Solenoid valve control solenoid valve opening percent uscent. ing CONSULT-III.

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#### [VQ37VHR]

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL PUMP RELAY	<ul> <li>Ignition switch: ON (Engine stopped)</li> <li>Turn the fuel pump relay ON and OFF using CONSULT-III and listen to operating sound.</li> </ul>	Fuel pump relay makes the operating sound.	<ul><li>Harness and connectors</li><li>Fuel pump relay</li></ul>
IGNITION TIMING	<ul> <li>Engine: Return to the original trouble condition</li> <li>Timing light: Set</li> <li>Retard the ignition timing using CONSULT-III.</li> </ul>	If trouble symptom disap- pears, see CHECK ITEM.	Perform Idle Air Volume Learning.
FAN DUTY CONTROL*	<ul><li>Ignition switch: ON</li><li>Change duty ratio using CONSULT-III.</li></ul>	Cooling fan speed changes.	<ul> <li>Harness and connectors</li> <li>Cooling fan motor</li> <li>Cooling fan relay</li> <li>Cooling fan control module</li> <li>IPDM E/R</li> </ul>
ALTERNATOR DUTY	<ul><li>Engine: Idle</li><li>Change duty ratio using CONSULT-III.</li></ul>	Battery voltage changes.	<ul> <li>Harness and connectors</li> <li>IPDM E/R</li> <li>Alternator</li> </ul>
POWER BALANCE	<ul> <li>Engine: After warming up, idle the engine.</li> <li>A/C switch OFF</li> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Cut off each injector signal one at a time using CONSULT-III.</li> </ul>	Engine runs rough or dies.	<ul> <li>Harness and connectors</li> <li>Compression</li> <li>Fuel injector</li> <li>Power transistor</li> <li>Spark plug</li> <li>Ignition coil</li> </ul>

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

#### DTC & SRT CONFIRMATION MODE

#### SRT STATUS Mode

- For items whose SRT codes are set, "CMPLT" is displayed on the CONSULT-III screen; for items whose SRT codes are not set, "INCMP" is displayed.
- "SRT STATUS" provides the presence or absence of permanent DTCs stored in ECM memory.

#### PERMANENT DTC STATUS Mode

< SYSTEM DESCRIPTION >

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.

#### NOTE:

Permanent DTCs stored in ECM memory are displayed on the CONSULT-III screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP). CAUTION:

#### < SYSTEM DESCRIPTION >

[VQ37VHR]

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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".

CAUTION: Turn ignition switch from O status screen.	N to OFF twice to update the information	ation on the	
PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D	<u></u>
хххх	INCMP	INCMP	
хххх	CMPLT	INCMP	
хххх	INCMP	CMPLT	
хххх	CMPLT	INCMP	
хххх	INCMP	INCMP	
хххх	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 item	Corresponding DTC No.	Reference page	
	EVP SML LEAK P0442*/P1442*	—	_	K
EVAPORATIVE SYSTEM	EVP V/S LEAK P0456/P1456*	P0456	<u>EC-360</u>	
EVAPORATIVE STSTEM	PURG VOL CN/V P1444	P0443	<u>EC-330</u>	
	PURG FLOW P0441	P0441	<u>EC-325</u>	L
	A/F SEN1 (B1) P1278/P1279	P0133	<u>EC-252</u>	
A/F SEN1	A/F SEN1 (B1) P1276	P0130	<u>EC-242</u>	M
A/F SENT	A/F SEN1 (B2) P1288/P1289	P0153	<u>EC-252</u>	
	A/F SEN1 (B2) P1286	P0150	<u>EC-242</u>	
	HO2S2 (B1) P1146	P0138	<u>EC-263</u>	Ν
	HO2S2 (B1) P1147	P0137	<u>EC-257</u>	
10202	HO2S2 (B1) P0139	P0139	<u>EC-271</u>	0
HO2S2	HO2S2 (B2) P1166	P0158	<u>EC-263</u>	0
	HO2S2 (B2) P1167	P0157	<u>EC-257</u>	
	HO2S2 (B2) P0159	P0159	<u>EC-271</u>	Ρ

\*: DTC P0442, P1442 and P1456 does not apply to Z34 models but appears in DTC Work Support Mode screens.

#### < DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS TROUBLE DIAGNOSIS - SPECIFICATION VALUE

### Description

INFOID:000000006352294

[VQ37VHR]

The specification (SP) value indicates the tolerance of the value that is displayed in "SPEC" in "DATA MONI-TOR" mode of CONSULT-III during normal operation of the Engine Control System. When the value in "SPEC" in "DATA MONITOR" mode is within the SP value, the Engine Control System is confirmed OK. When the 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 correction)
- 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:000000006352295

### 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/cm<sup>2</sup>, 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

# With CONSULT-III NOTE:

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

- 1. Perform EC-14, "BASIC INSPECTION : Special Repair Requirement".
- 2. Select "B/FUEL SCHDL", "A/F ALPHA-B1", "A/F ALPHA-B2", "MAS A/F SE-B1" and "MAS A/F SE-B2" in "SPEC" of "DATA MONITOR" mode with CONSULT-III.
- 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 <u>EC-165</u>, "Diagnosis Procedure".

### < DTC/CIRCUIT DIAGNOSIS >

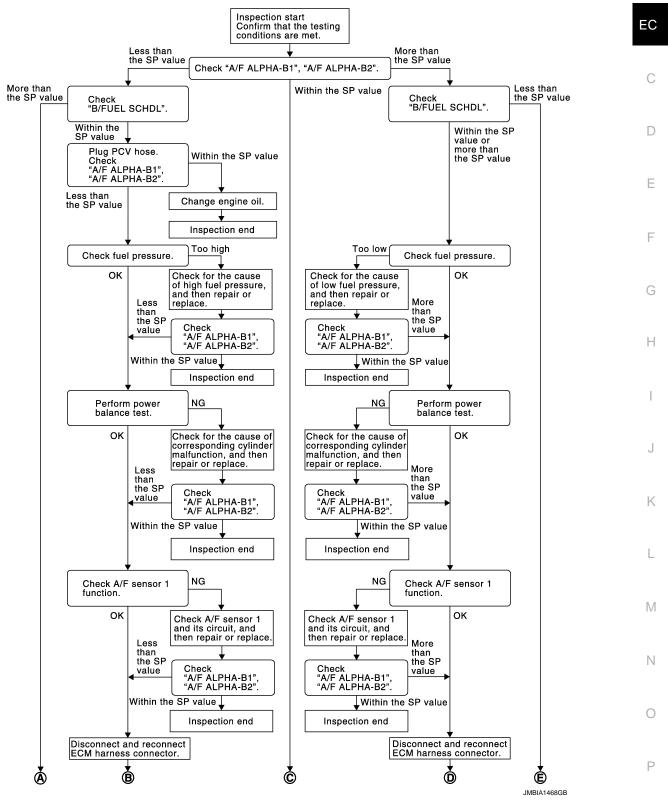
#### **Diagnosis** Procedure



INFOID:000000006352296

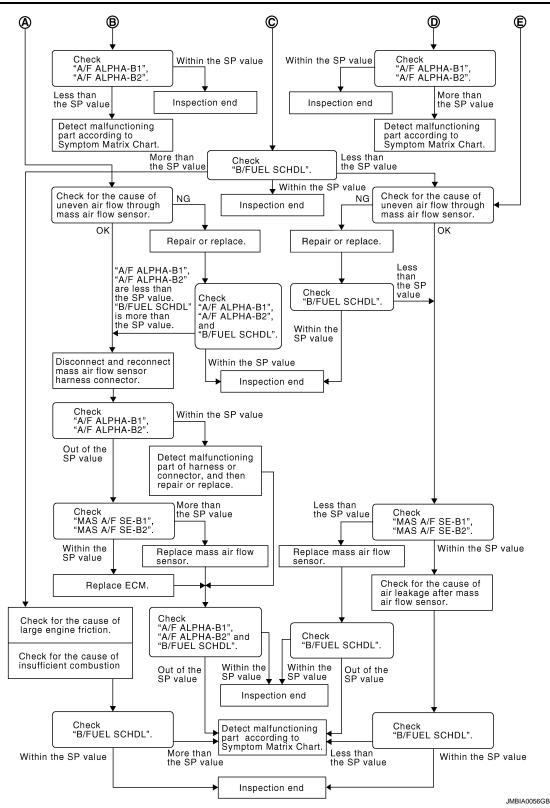
А

#### **OVERALL SEQUENCE**



#### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]



### DETAILED PROCEDURE

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

#### (B) With CONSULT-III

- 1. Start engine.
- 2. Confirm that the testing conditions are met. Refer to EC-164, "Component Function Check".
- 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.

# EC-166

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHI	<b>{</b> ]
<b>NOTE:</b> Check "A/F ALPHA-B1", "A/F ALPHA-B2" for approximately 1 minute because they may fluctuate. It is N if the indication is out of the SP value even a little.	IG A
Is the measurement value within the SP value?	
YES >> GO TO 17.	EC
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"	C
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within t SP value.	
Is the measurement value within the SP value?	D
YES >> GO TO 4.	
NO >> More than the SP value: GO TO 19.	E
3.CHECK "B/FUEL SCHDL"	
Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within t	ne
SP value.	F
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.	G
4.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"	
1. Stop the engine.	- F
<ol> <li>Disconnect PCV hose, and then plug it.</li> <li>Start angling</li> </ol>	
<ol> <li>Start engine.</li> <li>Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure the sure the</li></ol>	at i
each indication is within the SP value.	
Is the measurement value within the SP value?	
YES >> GO TO 5.	J
NO >> GO TO 6.	
5. CHANGE ENGINE OIL	
1. Stop the engine.	K
2. Change engine oil.	
<b>NOTE:</b> This symptom may occur when a large amount of gasoline is mixed with engine oil because of drivi	na L
conditions (such as when engine oil temperature does not rise enough since a journey distance is t	
short during winter). The symptom will not be detected after changing engine oil or changing driving co	n-
ditions.	N
>> INSPECTION END	
6.CHECK FUEL PRESSURE	Ν
Check fuel pressure. (Refer to EC-636, "Inspection".)	—
Is the inspection result normal?	
YES >> GO TO 9.	С
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	F
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"

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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

Is the measurement value within the SP value?

YES >> INSPECTION END

NO >> GO TO 9.

9.PERFORM POWER BALANCE TEST

- 1. Perform "POWER BALANCE" in "ACTIVE TEST" mode.
- 2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following bellow.

Ignition coil and its circuit (Refer to <u>EC-523, "Component Function Check"</u>.)

- Fuel injector and its circuit (Refer to EC-517, "Component Function Check".)
- Intake air leakage
- Low compression pressure (Refer to <u>EM-28</u>, "Inspection".)

Is the inspection result normal?

- YES >> Replace fuel injector and then GO TO 11.
- NO >> Repair or replace malfunctioning part and then GO TO 11.

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

1. Start engine.

Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that 2. 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

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.

- For DTC P0130, P0150, refer to <u>EC-242, "DTC Logic"</u>.
   For DTC P0131, P0151, refer to <u>EC-246, "DTC Logic"</u>.
- For DTC P0132, P0152, refer to <u>EC-249, "DTC Logic"</u>.
- For DTC P0133, P0153, refer to EC-252, "DTC Logic".
- For DTC P2A00, P2A03, refer to <u>EC-501, "DTC Logic"</u>.

Are any DTCs detected?

YES >> GO TO 13.

>> GO TO 15. NO

13.CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnosis Procedure according to corresponding DTC.

>> GO TO 14.

**14.**CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

- 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

1. Stop the engine.

#### [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > 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" EC 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? YES >> INSPECTION END NO >> Detect malfunctioning part according to EC-620. "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 Check for the cause of large engine friction. Refer to the following. Engine oil level is too high Engine oil viscosity Belt tension of power steering, alternator, A/C compressor, etc. is excessive Noise from engine Noise from transmission, etc. 2. Check for the cause of insufficient combustion. Refer to the following. Valve clearance malfunction Intake valve timing control function malfunction Camshaft sprocket installation malfunction, etc. >> Repair or replace malfunctioning part, and then GO TO 30. **19**.CHECK INTAKE SYSTEM Check for the cause of uneven air flow through mass air flow sensor. Refer to the following. Crushed air ducts Malfunctioning seal of air cleaner element Uneven dirt of air cleaner element Improper specification of intake air system Is the inspection result normal? YES >> GO TO 21. NO >> Repair or replace malfunctioning part, and then GO TO 20. 20.CHECK "A/F ALPHA-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL" Select "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that each indication is within the SP value. Is the measurement value within the SP value? YES >> INSPECTION END

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

# 21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

2.

1.

2.

1.

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

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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

- 1. Start engine.
- 2. Select "Ă/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 >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to <u>EC-205, "Diagno-</u> <u>sis Procedure"</u>. 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
- 1. Replace ECM.
- Go to <u>EC-17</u>, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair <u>Requirement"</u>.

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

TROUBLE DIAGNOSIS - SPECIFICATION VALUE					
< DTC/CIRCUIT DIAGN	IOSIS >	[VQ37VHR]			
<ul> <li>Malfunctioning seal in i</li> </ul>	ntake air system, etc.	A			
>> GO TO 30.					
29. CHECK "A/F ALPH	A-B1", "A/F ALPHA-B2", AND "B/FUEL SCHDL"	EC			
	"A/F ALPHA-B2", and "B/FUEL SCHDL" in "SPEC" of cation is within the SP value.				
Is the measurement valu	e within the SP value?	С			
YES >> INSPECTIO NO >> Detect malfu	N END nctioning part according to <u>EC-620, "Symptom Table"</u> .				

 $30. {\sf CHECK "B/FUEL SCHDL"}$ 

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-620. "Symptom Table".

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# POWER SUPPLY AND GROUND CIRCUIT

### < DTC/CIRCUIT DIAGNOSIS >

POWER SUPPLY AND GROUND CIRCUIT

**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 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	Terminal	Ground	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.

3. Check the voltage between ECM harness connector and ground.

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

# EC-172

[VQ37VHR]

INFOID:000000006352297

# POWER SUPPLY AND GROUND CIRCUIT

#### < DTC/CIRCUIT DIAGNOSIS >

•			short to gro	und or short to power in harness I	or connectors. A
				10 seconds. connector terminals as follows.	EC
	ECM				С
	+	_		Voltage	0
Connector	Terminal	Terminal			
M107	125	128		nition switch OFF, battery volt- or a few seconds, then drop to 0V.	D
Is the inspe	ection result	t normal?			E
	- GO TO 7.				
-	> GO TO 9.				_
1.CHECK	ECM POW	/ER SUPPL	Y CIRCUIT-	II	F
	nition switc				
2. Check	the voltage	e between IF	PDM E/R ha	ness connector and ground.	G
	PDM E/R	Grou	und V	Itage	
Connector	-		und Datta		Н
E7	53	Grou	ind Batte	y voltage	
Is the inspe					1
	> GO TO 8. > Replace II		Refer to PCS	35, "Removal and Installation".	
•	•			<u> </u>	
Refer to <u>GI-43, "Intermittent Incident"</u> .			J		
	<u>-43, intern</u>		<u>ənı</u> .		
	> INSPECT				К
•			Y CIRCUIT-	N/	
1					
				10 seconds. connector terminals as follows.	L
	E	СМ			Μ
	+		-	Voltage	IVI
Connector	Terminal	Connector	Terminal		
F101	24	M107	128	Battery voltage	Ν
Is the inspe	ection result	t normal?	1		
•	- GO TO 13				
	- GO TO 10				0
<b>10.</b> CHEC	CK ECM PC	WER SUPI	PLY CIRCU	F-V	
		harness cor			Р
			s connector		
3. Check	the continu	iity between	I ECIVI narne	ss connector and IPDM E/R harn	ess connector.

	E	СМ	IPDN	/I E/R	Continuity
_	Connector	Terminal	Connector	Terminal	Continuity
	F101	24	E7	69	Existed

# POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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 or connectors E3, F1
- 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.

12.CHECK 15 A FUSE

1. Disconnect 15 A fuse (No. 50) from IPDM E/R.

2. Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace 15A fuse.

**13.**CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	Continuity
M107	125	E7	49	Existed

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

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

Harness or connectors E106, M6

• 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.

15. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace IPDM E/R. Refer to PCS-35, "Removal and Installation".
- NO >> Repair open circuit or short to ground or short to power in harness or connectors.

# POWER SUPPLY AND GROUND CIRCUIT (VVEL CONTROL MODULE) < DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]

# POWER SUPPLY AND GROUND CIRCUIT (VVEL CONTROL MODULE)

Diagnosi	s Proced	ure				INFOID:000000006352298	
1.снеск	GROUND	CONNEC	TION			EC	
2. Check Is the inspective YES >> NO >> 2.CHECK 1. Discon	GO TO 2. Repair or 1 VVEL CON nect VVEL	nection M normal? replace gr ITROL MC control mo	ound connect	ion. JND CIRCUIT connector.	tion in <u>GI-46, "Circuit Inspection"</u> . FOR OPEN AND SHORT ness connector and ground.	C	
VVFI	. control modu	le			-		
Connecto		minal	Ground	Continuity		F	
E15		14	Ground	Existed	_		
	eck harnes		t to power.		_	G	
Is the inspe		normal?				0	
NO >>			•	r in harness co ER SUPPLY C		Н	
<ol> <li>Turn ig</li> <li>Check</li> </ol>	nition switcl	h ON. between	odule harness		ss connector and ground.		
	+	_		Voltage		J	
Connector	Terminal	Terminal		i i i gi			
E15	8	14		ition switch OFF, t for a few second mately 0 V.		K	
Is the inspe	ction result	normal?				L	
NO >>	GO TO 5. GO TO 4.					М	
				ER SUPPLY C	IRCUIT-II		
<ol> <li>Discon</li> <li>Discon</li> </ol>	nect VVEL nect IPDM	control mo E/R harne	d wait at least odule harness ess connector. en VVEL contr	connector.	ness connector and IPDM E/R harr		
VVEL co	ntrol module		IPDM E/R	Continuity	-	0	
Connector	Terminal	Conne	ctor Termina	Continuity	_		
E15	8	E7	49	Existed	_	Р	
<u>ls the inspe</u> YES >>	ction result	<u>normal?</u> Diagnosis	Procedure"	d short to pow nd or short to p	er. ower in harness or connectors.		

 $5. {\sf check intermittent incident}$ 

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-35, "Removal and Installation".
- NO >> Repair open circuit, short to ground or short to power in harness or connectors.

#### < DTC/CIRCUIT DIAGNOSIS >

# **U0101 CAN COMM CIRCUIT**

# Description

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

# DTC Logic

INFOID:000000006352300 D

### 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.	<ul> <li>CAN communication line between TCM and ECM (CAN communication line is open or shorted)</li> </ul>	
DTC CON	IFIRMATION PROCI	EDURE		(
1.PERFO	RM DTC CONFIRMAT	TION PROCEDURE		
<ol> <li>Turn ignition switch ON and wait at least 3 seconds.</li> <li>Check DTC.</li> </ol>				ŀ
<u>Is DTC detected?</u> YES >> <u>EC-177, "Diagnosis Procedure"</u> . NO >> INSPECTION END				
Diagnosis Procedure				
Go to LAN-15, "Trouble Diagnosis Flow Chart".				

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[VQ37VHR]

INFOID:000000006352299

# U1003 CAN COMM CIRCUIT

### Description

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

# DTC Logic

INFOID:000000006352303

# DTC DETECTION LOGIC

#### NOTE:

If DTC U1003 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-397, "DTC Logic"</u>.

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.	<ul> <li>Harness or connectors (VVEL CAN communication line is open or shorted)</li> <li>ECM</li> <li>VVEL control module</li> </ul>

# 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-178, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000006352304

# 1. CHECK VVEL CAN COMMUNICATION CIRCUIT

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

ECM		VVEL control module		Continuity
Connector	Terminal	Connector	Terminal	Continuity
F102	54	E15	24	Existed
FIUZ	55		11	LVISIGO

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

Is the inspection result normal?

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

) DETECTION

2. DETECT MALFUNCTIONING PART

Check the following.

INFOID:000000006352302

# **U1003 CAN COMM CIRCUIT**

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]	
<ul> <li>Harness connector E3, F1</li> <li>Harness for open or short between ECM and VVEL control module</li> </ul>	А
>> Repair open circuit, short to ground or short to power in harness or connectors.	
3. CHECK INTERMITTENT INCIDENT	EC
Refer to GI-43, "Intermittent Incident".	
Is the inspection result normal?	С
YES >> GO TO 4. NO >> Repair or replace.	
4. REPLACE VVEL CONTROL MODULE	D
1. Replace VVEL control module.	D
<ol> <li>Go to <u>EC-18. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement"</u>.</li> </ol>	Е
>> GO TO 5.	
5. PERFORM DTC CONFIRMATION PROCEDURE	F
1. Reconnect all harness connectors disconnected	
2. Turn ignition switch ON.	G
<ol> <li>Erase DTC.</li> <li>Perform DTC Confirmation Procedure.</li> </ol>	
See <u>EC-178, "DTC Logic"</u> .	Н
5. Check DTC. Is the DTC U1003 displayed again?	
YES $>>$ GO TO 6.	
NO >> INSPECTION END	
6.REPLACE ECM	
1. Replace ECM.	J
2. Go to <u>EC-17</u> , "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".	
>> INSPECTION END	Κ
>> INSPECTION END	
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# **U0164 CAN COMM CIRCUIT**

# Description

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

# DTC Logic

INFOID:000000006352306

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0164	Lost communication with combination meter	When ECM is not transmitting or receiving CAN com- munication signal of OBD (emission related diagno- sis) with combination mete for 2 seconds or more.	<ul> <li>CAN communication line between combination meter and ECM (CAN communication line is open or shorted)</li> </ul>

### 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-180, "Diagnosis Procedure".
- NO >> INSPECTION END

#### Diagnosis Procedure

Go to LAN-15, "Trouble Diagnosis Flow Chart".

INFOID:000000006352305

INFOID:000000006352307

### < DTC/CIRCUIT DIAGNOSIS >

# **U1001 CAN COMM CIRCUIT**

# Description

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

# DTC Logic

INFOID:000000006352309

# DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
U1001	CAN communication line	When ECM is not transmitting or receiving CAN com- munication signal other than OBD (emission related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)		
DTC CON	FIRMATION PRO	CEDURE			
1.PERFO	RM DTC CONFIRM	ATION PROCEDURE			
<ol> <li>Turn ignition switch ON and wait at least 3 seconds.</li> <li>Check DTC.</li> </ol>					
<u>Is DTC detected?</u> YES >> <u>EC-181. "Diagnosis Procedure"</u> . NO >> INSPECTION END					
Diagnosis Procedure					
Go to LAN-15, "Trouble Diagnosis Flow Chart".					

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# U1024 CAN COMM CIRCUIT

# Description

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

INFOID:000000006352312

# DTC DETECTION LOGIC **NOTE**:

If DTC U1024 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-397, "DTC Logic"</u>.

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

### 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-182, "Diagnosis Procedure".
- NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000006352313

# 1. CHECK VVEL CAN COMMUNICATION CIRCUIT

### 1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Disconnect VVEL control module harness connector.
- 4. Check the continuity between ECM harness connector and VVEL control module harness connector.

E	СМ	VVEL con	trol module	Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
F102	54	E15	24	Existed	
1102	55		11	LAISIGU	

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

Is the inspection result normal?

YES >> GO TO 2.

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

2. CHECK INTERMITTENT INCIDENT

# EC-182

INFOID:000000006352311

# **U1024 CAN COMM CIRCUIT**

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
Refer to GI-43, "Intermittent Incident".		
Is the inspection result normal?	A	
YES >> GO TO 3. NO >> Repair or replace.	_	
<b>3.</b> REPLACE VVEL CONTROL MODULE	EC	
1. Replace VVEL control module.		
<ol> <li>Go to <u>EC-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL ULE) : Special Repair Requirement"</u>.</li> </ol>	CONTROL MOD- C	
>> GO TO 4.	D	
4. PERFORM DTC CONFIRMATION PROCEDURE	D	
1. Recnnect all harness connectors disconnected.		
2. Turn ignition switch ON.	E	
<ol> <li>Erase DTC.</li> <li>Perform DTC Confirmation Procedure.</li> </ol>		
See <u>EC-182, "DTC Logic"</u> .	F	
<u>Is the DTC U1024 displayed again?</u> YES >> GO TO 5.		
NO >> INSPECTION END	G	
5. REPLACE ECM		
1. Replace ECM.	Н	
2. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM)	: Special Repair	
Requirement".		
>> INSPECTION END	1	
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### < DTC/CIRCUIT DIAGNOSIS >

# P0011, P0021 IVT CONTROL

# DTC Logic

[VQ37VHR]

INFOID:000000006352314

### 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-201, "DTC Logic"</u>.
- If DTC P0011 or P0021 is displayed with DTC P0524, first perform the trouble diagnosis for DTC P0524. Refer to <u>EC-382, "DTC Logic"</u>.

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

### 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

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

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

### CAUTION:

### Always drive at a safe speed.

- 4. Stop vehicle with engine running and let engine idle for 10 seconds.
- 5. Check 1st trip DTC.

### Is 1st trip DTC detected?

YES >> Go to EC-185. "Diagnosis Procedure"

NO >> GO TO 3.

**3.** PERFORM DTC CONFIRMATION PROCEDURE-II

### < DTC/CIRCUIT DIAGNOSIS >

ENG SPEED

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

1,700 - 3,175 rpm (A constant rotation is maintained.)

COOLAN TEMP/S	More than 70°C (158°F)		EC
Selector lever	1st or 2nd position	I	
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)		С
CAUTION: Always drive at a 3. Check 1st trip DT			D
Is 1st trip DTC detected	ed?		_
YES >> Go to <u>EC-</u> NO >> INSPECT	<u>-185, "Diagnosis Procedure"</u> ION END		E
Diagnosis Proced	dure	INFOID:00000006352315	F
1.CHECK OIL PRES	SURE WARNING LAMP		
<ol> <li>Start engine.</li> <li>Check oil pressu nated.</li> </ol>	re warning lamp and confirm it is not illumi-		G
<u>Is oil pressure warning</u> YES >> Go to <u>LU-</u>	6, "Inspection".		Н
NO >> GO TO 2.			
		РВІА8559Ј	J
2. CHECK INTAKE V	ALVE TIMING CONTROL SOLENOID VALVE	: Dir (0000	
Refer to EC-186, "Cor	mponent Inspection".		Κ
Is the inspection result			
YES >> GO TO 3. NO >> Replace r View".	malfunctioning intake valve timing control soler	noid valve. Refer to <u>EM-55, "Exploded</u>	L
<u> </u>	HAFT POSITION SENSOR (POS)		M
Refer to EC-315, "Cor			IVI
Is the inspection resul	t normal?		
YES >> GO TO 4.			Ν
· ·	crankshaft position sensor (POS). Refer to <u>EM-1</u> FT POSITION SENSOR (PHASE)	IT, Exploded view.	
	· · ·		0
Refer to <u>EC-319, "Cor</u> Is the inspection result	· · · ·		
YES >> GO TO 5.			Ρ
NO >> Replace r	malfunctioning camshaft position sensor (PHASE	). Refer to EM-55, "Exploded View".	Г
5. CHECK CAMSHAP	FT (INTAKE)		
Check the following.			

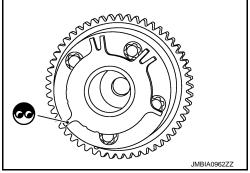
А

### < DTC/CIRCUIT DIAGNOSIS >

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

### Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Remove debris and clean the signal plate of camshaft front end or replace camshaft. Refer to <u>EM-90</u>, <u>"Exploded View"</u>.



# **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 <u>EM-56, "Removal and Installation"</u>.

NO >> GO TO 7.

**7.**CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to <u>EM-100, "Inspection"</u>. <u>Is the inspection result normal?</u>

- YES >> GO TO 8.
- NO >> Clean lubrication line.

**8.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

### >> INSPECTION END

### **Component Inspection**

INFOID:000000006352316

[VQ37VHR]

# 1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance ( $\Omega$ )
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 <u>EM-55</u>, "<u>Exploded</u> <u>View</u>".

# 2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to <u>EM-55, "Exploded View"</u>.

### < DTC/CIRCUIT DIAGNOSIS >

# [VQ37VHR]

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

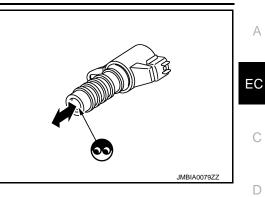
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to <u>EM-55</u>, "Exploded <u>View</u>".



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

### < DTC/CIRCUIT DIAGNOSIS >

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

# Description

INFOID:000000006352317

[VQ37VHR]

### SYSTEM DESCRIPTION

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

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

# DTC Logic

INFOID:000000006352318

# 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.)	<ul> <li>Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.)</li> <li>A/F sensor 1 heater</li> </ul>
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.)	<ul> <li>Harness or connectors (The A/F sensor 1 heater circuit is shorted.)</li> <li>A/F sensor 1 heater</li> </ul>
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.)	<ul> <li>Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.)</li> <li>A/F sensor 1 heater</li> </ul>
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.)	<ul> <li>Harness or connectors (The A/F sensor 1 heater circuit is shorted.)</li> <li>A/F sensor 1 heater</li> </ul>

### 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-189, "Diagnosis Procedure".
- NG >> INSPECTION END

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

# **[VQ37VHR]**

< DTC/CIRCU		•	•				[VQ37VHR]
Diagnosis	Proce	dure					INFOID:00000006352319
1.CHECK GROUND CONNECTION							
<ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection M95. Refer to Ground Inspection in <u>GI-46, "Circuit Inspection"</u>.</li> </ol>							
· · · ·	Is the inspection result normal?						
	O TO 2 epair oi	replace gr	ound con	nection.			С
<b>2.</b> CHECK AI	•				ER SUPP	LY CIRCUIT	
1. Disconne	ct air fu	el ratio (A/F		1 harness o			D
<ol> <li>Turn ignit</li> <li>Check the</li> </ol>			A/F senso	or 1 harnes	s connecto	or and ground.	
	, vonag	e between				si ana groana.	Е
DTC		A/F sensor	1	Ground	Voltag	10	
	Bank	Connector	Terminal		Vona		_
P0031, P0032	1	F3	4	Ground	Battery ve	bltage	F
P0051, P0052	2	F20	4				
<u>Is the inspecti</u> YES >> G	on resu O TO 4						G
	O TO 3						
3. DETECT N	/IALFUN	OCTIONING	9 PART				Н
Check the foll							
<ul> <li>Harness cor</li> <li>IPDM E/R h</li> </ul>			=7				I
<ul> <li>15 A fuse (N</li> </ul>	lo. 46)						1
<ul> <li>Harness for</li> </ul>	open o	r short betv	veen A/F	sensor 1 ar	nd fuse		
>> R	epair o	replace ha	arness or (	connectors	_		J
4.CHECK A/		•				ЛТ	
1. Turn ignit	ion swit	ch OFF.					K
2. Disconne	ct ECM	harness co					
3. Check the	e conun	uity betwee	en A/F Ser	ISOF I NAME	ess conne	ctor and ECM harness co	
		A/F sensor	1	EC	M		
DTC	Bank	Connector	Terminal	Connector	Terminal	Continuity	M
P0031, P0032	1	F3	3	F101	1	Existed	IVI
P0051, P0052	2	F20	3		5		
4. Also chec			t to groun	d and short	t to power.		N
<u>Is the inspecti</u> YES >> G	O TO 5						
			short to g	round or sh	nort to pow	er in harness or connecto	ors. O
5.CHECK A/F SENSOR 1 HEATER							
Refer to EC-190, "Component Inspection".							
Is the inspection result normal?							
YES >> GO TO 7. NO >> GO TO 6.							
6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1							
					Refer to FI	M-39, "Exploded View".	
CAUTION		5	( )				

CAUTION:

# EC-189

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

### < DTC/CIRCUIT DIAGNOSIS >

- 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.

Component Inspection

INFOID:000000006352320

# 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 <u>EM-39, "Exploded View"</u>. 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 >

# P0037, P0038, P0057, P0058 HO2S2 HEATER

# Description

# SYSTEM DESCRIPTION

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

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	
<ul> <li>Below 3,600 rpm after the following conditions are met.</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	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 sen- sor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul> <li>Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)</li> <li>Heated oxygen sensor 2 heater</li> </ul>
P0038	Heated oxygen sensor 2 heater (bank 1) control circuit high	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul> <li>Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.)</li> <li>Heated oxygen sensor 2 heater</li> </ul>
P0057	Heated oxygen sensor 2 heater (bank 2) control circuit low	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul> <li>Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)</li> <li>Heated oxygen sensor 2 heater</li> </ul>
P0058	Heated oxygen sensor 2 heater (bank 2) control circuit high	The current amperage in the heated oxygen sen- sor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	<ul> <li>Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.)</li> <li>Heated oxygen sensor 2 heater</li> </ul>

### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

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

### **TESTING CONDITION:**

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

>> GO TO 2.

INFOID:000000006352322

INFOID:00000006352321

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# P0037, P0038, P0057, P0058 HO2S2 HEATER

### < DTC/CIRCUIT DIAGNOSIS >

# 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 8. Check 1st trip DTC.

### Is 1st tip DTC detected?

YES >> Go to EC-192, "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 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	
ыс	Bank	Connector Terminal		Ground	voltage	
P0037, P0038	1	F54	2	Ground	Battery voltage	
P0057, P0058	2	F53	2	Ground	Dattery voltage	

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

### Check the following.

- Harness connectors E3, F1
- IPDM E/R harness connector E7
- 15 A fuse (No. 46)

• Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit, 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.
- 2. Disconnect ECM harness connector.

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

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

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

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# 

	JU37, PUU38, PUU57, PUU58 HU	
< DTC/CIRCUIT DIAGNO		[VQ37VHR]
Is the inspection result nor	mal?	A
YES >> GO TO 5. NO >> Repair open c	ircuit, short to ground or short to power ir	A harness or connectors.
5.CHECK HEATED OXYC	<b>.</b> .	
Refer to EC-193, "Compor		E0
Is the inspection result nor		
YES >> GO TO 7.		C
NO >> GO TO 6.		
<b>6.</b> REPLACE HEATED O	YGEN SENSOR 2	
	ated oxygen sensor 2. Refer to EM-39, "	Exploded View".
<ul><li>in) onto a hard surface</li><li>Before installing new I</li></ul>	such as a concrete floor; use a new o neated oxygen sensor, clean exhaust ercial service tool (J-43897-18 or J-43	from a height of more than 0.5 m (19.7 ne. system threads using Oxygen Sensor 897-12)] and approved Anti-seize Lubri-
		1
>> INSPECTION		
7.CHECK INTERMITTEN		0
Refer to <u>GI-43, "Intermitter</u>	<u>it Incident"</u> .	
>> INSPECTION	END	F
Component Inspection	лт Л	INFOID:00000006352324
<b>1.</b> CHECK HEATED OXY	GEN SENSOR 2 HEATER	
	F. /gen sensor 2 harness connector. /een HO2S2 terminals as follows.	
Terminal	Resistance (Ω)	ĸ
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)	L
Is the inspection result nor YES >> INSPECTION NO >> GO TO 2.		Ν
2.REPLACE HEATED OX	YGEN SENSOR 2	
Replace malfunctioning he	ated oxygen sensor 2. Refer to EM-39, "	Exploded View".
<ul> <li>CAUTION:</li> <li>Discard any heated ox in) onto a hard surface</li> <li>Before installing new of</li> </ul>	ygen sensor which has been dropped such as a concrete floor; use a new o oxygen sensor, clean exhaust system service tool (J-43897-18 or J-43897-1	from a height of more than 0.5 m (19.7

>> INSPECTION END

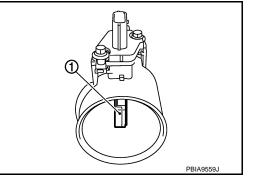
### < DTC/CIRCUIT DIAGNOSIS >

# 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 pres- sure - mass air flow cor- relation	A difference exceeding the specified value develops between a value transmitted from the manifold absolute pressure (MAP) sensor to ECM and an estimated in- take pressure of intake manifold calculated by ECM, based on a mass sir flow sensor signal.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Mass air flow sensor</li> <li>Manifold absolute pressure (MAP) sensor</li> <li>EVAP control system pressure sensor</li> <li>Intake air leaks</li> <li>Intake air temperature sensor</li> </ul>
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.
- 3. 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

### (I) With CONSULT-III

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

# EC-194

INFOID:000000006352325

INFOID:00000006352326

# P006A, P0101, P010B MAF SENSOR

< DTC/CIRCUI		•	01, P010B MA		[VQ37VHR]
For A/T models Accelerate t		0 to 88 km/h	(0 to 55 MPH) und	er the following conditior	IS:
NOTE: • Accelerate	e with the accele	erator pedal k		lows easy diagnoses.	
ACCEL SEN 1	1.4 - 2.0	V			
Selector lever	D position	1			
CAUTION:			n (13 to 55 MPH) u	nder the following condit	ions:
NOTÉ: • Accelerate	at a safe speed with the accele	erator pedal k		lows easy diagnoses.	
	eration at engine	- speeu 2,000	and 3,000 ipin al	una casy ulayi 10585.	
ACCEL SEN 1	1.4 – 2.0	V			
Selector lever	3rd				
Check 1st t					
Without COI Start engine	NSULT-III		erating temperatur ditions.	Э.	
Without COI Start engine Drive the ve or A/T models With selector ing condition CAUTION:	NSULT-III e and warm it up whicle under the pr lever in D pos ns:	following cond	ditions.	e. n 0 to 88 km/h (0 to 55 M	PH) under the follow-
<ul> <li>Without COI</li> <li>Start engine</li> <li>Drive the ve</li> <li>or A/T models</li> <li>With selector</li> <li>ing condition</li> <li>CAUTION:</li> <li>Always drive</li> <li>NOTE:</li> <li>Accelerate</li> </ul>	NSULT-III e and warm it up whicle under the or lever in D posi- ns: at a safe speed e with the accele	following cond ition, accelera I. erator pedal ke	ditions. Ite the vehicle fron	n 0 to 88 km/h (0 to 55 M	PH) under the follow-
<ul> <li>Without COI</li> <li>Start engine</li> <li>Drive the ve</li> <li>or A/T models</li> <li>With selector</li> <li>ing condition</li> <li>CAUTION:</li> <li>Always drive</li> <li>NOTE:</li> <li>Accelerate</li> </ul>	NSULT-III e and warm it up whicle under the or lever in D posi- ns: at a safe speed e with the accele	following cond ition, accelera I. erator pedal ke	ditions. Ite the vehicle fron		PH) under the follow-
<ul> <li>Without COI</li> <li>Start engine</li> <li>Drive the very</li> <li>Drive the very</li> <li>A/T models</li> <li>With selector</li> <li>ing condition</li> <li>CAUTION:</li> <li>Always drive</li> <li>NOTE:</li> <li>Accelerator</li> <li>Accelerator peda</li> </ul>	NSULT-III e and warm it up thicle under the or lever in D positions: at a safe speed e with the accele eration at engine	following cond ition, accelera I. erator pedal ke	ditions. Ite the vehicle fron	n 0 to 88 km/h (0 to 55 M	PH) under the follow-
<ul> <li>Without COI Start engine Drive the ver With selector ing condition</li> <li>CAUTION: Always drive NOTE:</li> <li>Accelerate</li> <li>The accel</li> </ul>	NSULT-III e and warm it up whicle under the or lever in D pos ns: at a safe speed e with the accele eration at engine	following cond ition, accelera I. erator pedal ko e speed 2,000	ditions. Ite the vehicle fron ept constant. and 3,000 rpm al	n 0 to 88 km/h (0 to 55 M	PH) under the follow-
<ul> <li>Without COI</li> <li>Start engine</li> <li>Drive the version</li> <li>Drive the version</li> <li>A/T models</li> <li>With selector</li> <li>ing condition</li> <li>CAUTION:</li> <li>Always drive</li> <li>NOTE:</li> <li>Accelerator</li> <li>The accel</li> <li>Accelerator pedal</li> <li>Connector</li> <li>E112</li> <li>Dr M/T models</li> <li>With selector</li> <li>Iowing condition</li> </ul>	NSULT-III e and warm it up shicle under the or lever in D positions: at a safe speed e with the acceler eration at engine position sensor 1 Terminal 3 or lever in 3rd po	following cond ition, accelera I. erator pedal ke e speed 2,000 Ground Ground	ditions. ate the vehicle from ept constant. and 3,000 rpm al Voltage (V) 1.4 - 2.0	n 0 to 88 km/h (0 to 55 M	
<ul> <li>Without COI Start engine Drive the ver or A/T models With selector ing condition CAUTION: Always drive NOTE:</li> <li>Accelerator Accelerator pedal Connector E112</li> <li>M/T models With selector lowing cond CAUTION: Always drive NOTE:</li> <li>Accelerator</li> </ul>	NSULT-III e and warm it up chicle under the pr lever in D positions at a safe speed e with the acceler eration at engine 1 position sensor 1 1 Terminal 3 or lever in 3rd po- litions: at a safe speed e with the acceler e with the acceler	following cond ition, accelera I. erator pedal ke e speed 2,000 Ground Ground sition, accele	ditions. the the vehicle from ept constant. ) and 3,000 rpm al Voltage (V) 1.4 – 2.0 rate the vehicle from ept constant.	n 0 to 88 km/h (0 to 55 M lows easy diagnoses. m 20 to 88 km/h (13 to 54	
<ul> <li>Without COI Start engine Drive the very or A/T models With selector ing condition CAUTION: Always drive NOTE:</li> <li>Accelerator Englector Accelerator pedal Connector E112</li> <li>M/T models With selector lowing cond CAUTION: Always drive NOTE:</li> <li>Accelerator</li> </ul>	NSULT-III e and warm it up chicle under the pr lever in D positions at a safe speed e with the acceler eration at engine 1 position sensor 1 1 Terminal 3 or lever in 3rd po- litions: at a safe speed e with the acceler e with the acceler	following cond ition, accelera I. erator pedal ke e speed 2,000 Ground Ground sition, accele	ditions. the the vehicle from ept constant. ) and 3,000 rpm al Voltage (V) 1.4 – 2.0 rate the vehicle from ept constant.	n 0 to 88 km/h (0 to 55 M lows easy diagnoses.	
<ul> <li>Without COI</li> <li>Start engine</li> <li>Drive the version of A/T models</li> <li>With selectoring condition</li> <li>CAUTION:</li> <li>Always drive</li> <li>NOTE:</li> <li>Accelerator pedal</li> <li>Connector</li> <li>E112</li> <li>M/T models</li> <li>With selectoring condition</li> <li>CAUTION:</li> <li>Accelerator pedal</li> <li>Connector</li> <li>E112</li> <li>M/T models</li> <li>With selectoring condition</li> <li>CAUTION:</li> <li>Always drive</li> <li>NOTE:</li> <li>Accelerator</li> <li>The accelerator</li> </ul>	NSULT-III e and warm it up chicle under the pr lever in D positions at a safe speed e with the acceler eration at engine 1 position sensor 1 1 Terminal 3 or lever in 3rd po- litions: at a safe speed e with the acceler e with the acceler	following cond ition, accelera I. erator pedal ka e speed 2,000 Ground Ground sition, accele I. erator pedal ka e speed 2,000	ditions. The the vehicle from and 3,000 rpm al Voltage (V) 1.4 – 2.0 rate the vehicle from ept constant. and 3,000 rpm al	n 0 to 88 km/h (0 to 55 M lows easy diagnoses. m 20 to 88 km/h (13 to 54	
<ul> <li>Without COI</li> <li>Start engine</li> <li>Drive the version of A/T models</li> <li>With selectoring condition</li> <li>CAUTION:</li> <li>Always drive</li> <li>NOTE:</li> <li>Accelerator pedat</li> <li>Connector</li> <li>E112</li> <li>M/T models</li> <li>With selectoring condition</li> <li>CAUTION:</li> <li>Accelerator pedat</li> <li>Connector</li> <li>E112</li> <li>M/T models</li> <li>With selectoring condition</li> <li>CAUTION:</li> <li>Always drive</li> <li>NOTE:</li> <li>Accelerator</li> <li>The accelerator</li> </ul>	NSULT-III e and warm it up shicle under the or lever in D posi- ns: at a safe speed e with the accele eration at engine position sensor 1 Terminal 3 or lever in 3rd po- litions: at a safe speed e with the accele eration at engine	following cond ition, accelera I. erator pedal ke e speed 2,000 Ground Ground sition, accele	ditions. the the vehicle from ept constant. ) and 3,000 rpm al Voltage (V) 1.4 – 2.0 rate the vehicle from ept constant.	n 0 to 88 km/h (0 to 55 M lows easy diagnoses. m 20 to 88 km/h (13 to 54	

NO >> INSPECTION END

### < DTC/CIRCUIT DIAGNOSIS >

### Diagnosis Procedure

[VQ37VHR]

### **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 >> Reconnect the parts.

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.

# ${f 3.}$ CHECK MASS AIR FLOW SENSOR POWER SUPPLY CIRCUIT

1. 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	1	Mass air flow s	sensor	Ground	Voltage	
DIC	Bank	Connector	Terminal	Ciouna	voltage	
P006A, P0101	1	F31	5	Ground	Battery voltage	
P006A, P010B	2	F42	5	Clound	Dattery 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.

# 5.check mass air flow sensor ground circuit for open and short

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

DTC	N	lass air flow s	ensor	EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P006A, P0101	1	F31	4	F102	68	Existed
P006A, P010B	2	F42	4	FIUZ	94	Existed

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, short to ground or short to power in harness or connectors.

# EC-196

# P006A, P0101, P010B MAF SENSOR

### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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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	N	lass air flow s	ensor	EC	CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P006A, P0101	1	F31	3	F102	77	Existed
P006A, P010B	2	F42	3		79	
2. Also check			t to groun	d and sho	rt to powe	r.
s the inspection						
	D TO 7		short to a	round or s	hort to no	wer in harness or connectors.
<b>7.</b> снеск ма	• •		-		•	
Is the inspection		-	re (IVIAP)	Sensor. Re	eler to <u>EC</u>	-222, "Component Inspection".
	D TO 8					
			osolute pr	essure (M/	AP) senso	or. Refer to <u>EM-34, "Exploded View"</u> .
8. CHECK INT	AKE A		RATURE	SENSOR		
					22, "Com	oonent Inspection".
Is the inspection						
	О ТО 9					
	eplace	mass air fl	ow senso	or (with int	ake air te	mperature sensor). Refer to EM-32, "Exploded
9.CHECK EV					SENSO	5
					SENSOR	<b>X</b>
Refer to EC-34			spection'			
<u>Is the inspection</u> YES-1 (Only			toctod)>>	CO TO 10		
YES-2 (DTC						
YES-3 (DTC	P006A	and P010E	3 are dete	ected)>>G	D TO 12.	
	•	EVAP cont	•		sensor.	
<b>10.</b> CHECK N	ASS /	AIR FLOW	SENSOR			
Refer to EC-19		-	spection'			
Is the inspection						
YES >> G( NO >> Re			w sensoi	(hank 1) a	and (hank	2). Refer to EM-32, "Exploded View".
11.снеск м	•			, ,	•	
						concert Increation"
Is the inspection		,	ik i). Rei	er to <u>EC-1</u>	<u>90, Comp</u>	ponent Inspection".
	D TO 1					
			ow sensoi	(bank 1).	Refer to E	M-32, "Exploded View".
12.снеск м	•			. ,		
						ponent Inspection".
Is the inspection		•		0. to <u>Lo h</u>		in the second seco
•	D TO 1					
NO >> Re	place	mass air flo			Refer to E	M-32, "Exploded View".
13.CHECK I	NTER	MITTENT IN	NCIDENT			
Refer to GI-43						

Refer to <u>GI-43, "Intermittent Incident"</u>.

< DTC/CIRCUIT DIAGNOSIS >

### >> INSPECTION END

### Component Inspection

1.CHECK MASS AIR FLOW SENSOR-I

### With CONSULT-III

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

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

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

### Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Start engine and warm it up to normal operating temperature.
- 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] 79	68	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
FIUZ		94	Ignition switch ON (Engine stopped.)	Approx. 0.4
			Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 2) signal]		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

2.check for the cause of uneven air flow through mass air flow sensor

- 1. 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.

# EC-198

# P006A, P0101, P010B MAF SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 3.

3. CHECK MASS AIR FLOW SENSOR-II

### With CONSULT-III

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

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

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

### Without CONSULT-III

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

	ECM				
Connector	+	_	Condition	Voltage (V)	
Connector	Terminal	Terminal			
		77	Ignition switch ON (Engine stopped.)	Approx. 0.4	
	[MAF sensor (bank 1) signal] 79		Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2	
		68	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	
E402			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*	
F102			Ignition switch ON (Engine stopped.)	Approx. 0.4	
			04	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 2) signal]	94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7	
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*	

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

### Is the inspection result normal?

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

A 32 GO 10 4.

### 4.CHECK MASS AIR FLOW SENSOR-III

### With CONSULT-III

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

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# P006A, P0101, P010B MAF SENSOR

### < DTC/CIRCUIT DIAGNOSIS >

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

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

### Without CONSULT-III

- 1. Turn ignition switch OFF.
- 2. 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 operat- ing temperature.)	0.7 - 1.2
		00	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
F102			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*
FIUZ	79		Ignition switch ON (Engine stopped.)	Approx. 0.4
		94	Idle (Engine is warmed-up to normal operat- ing temperature.)	0.7 - 1.2
	[MAF sensor (bank 2) signal]	94	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
			Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace malfunctioning mass air flow sensor. Refer to EM-32, "Exploded View".

# P0075, P0081 IVT CONTROL SOLENOID VALVE

### < DTC/CIRCUIT DIAGNOSIS >

# P0075, P0081 IVT CONTROL SOLENOID VALVE

# Description

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

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

The longer pulse width advances valve angle.

Trouble diagnosis name

The shorter pulse width retards valve angle.

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

# **DTC Logic**

DTC No.

### DTC DETECTION LOGIC

PBIB1842E

Coil

Possible cause

Plungei

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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	<ul> <li>Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.)</li> </ul>	
P0081	Intake valve timing control so- lenoid valve (bank 2) circuit	valve.	<ul> <li>Intake valve timing control solenoid valve</li> </ul>	
	NFIRMATION PROCED	JRE		

DTC detecting condition

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

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

2. Turn ignition switch ON.

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

### >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

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

### 2. Check 1st trip DTC.

### Is 1st trip DTC detected?

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

NO >> INSPECTION END

### Diagnosis Procedure

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

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

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# P0075, P0081 IVT CONTROL SOLENOID VALVE

### < DTC/CIRCUIT DIAGNOSIS >

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

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

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

 $\mathbf{3.}$  CHECK INTAKE 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	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0075	1	F28	1	F101	18	Existed	
P0081	2	F29	1	1 101	29	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, short to ground or short to power in harness or connectors.

**4.**CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-202, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to <u>EM-55</u>, "<u>Exploded</u> <u>View</u>".

**5.**CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

### >> INSPECTION END

### **Component Inspection**

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# 1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.

2. Disconnect intake valve timing control solenoid valve harness connector.

3. Check resistance between intake valve timing control solenoid valve terminals as follows.

# P0075, P0081 IVT CONTROL SOLENOID VALVE

# < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Terminals	Resistance ( $\Omega$ )			А
1 and 2	7.0 - 7.7 [at 20°C (68°F)]			
1 or 2 and ground	$_\infty^\infty$ (Continuity should not exist)			EC
Is the inspection re	esult normal?			
YES >> GO TO NO >> Repla <u>View</u> "	ce malfunctioning intake valv	ve timing control sole	noid valve. Refer to EM-55, "Exploded	С
	E VALVE TIMING CONTROL e valve timing control solenoid		5 "Exploded View"	D
	DC between intake valve tin		5, Exploded view.	
valve terminal	s 1 and 2, and then interrupt i s as shown in the figure.			Е
CAUTION: Do not apply Doing so ma	12 V DC continuously for solution of the so			F
Always repla	ace O-ring when intake va ve is removed.	lve timing control		G
Is the inspection re	esult normal?		JMBIA0079ZZ	
		ve timing control sole	noid valve. Refer to EM-55, "Exploded	Η

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### < DTC/CIRCUIT DIAGNOSIS >

# P0102, P0103, P010C, P010D MAF SENSOR

# Description

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

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

# DIA9559J

### INFOID:000000006352334

# DTC Logic

# 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.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Intake air leaks</li> <li>Mass air flow sensor</li> </ul>
P0103	Mass air flow sensor (bank 1) circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Mass air flow sensor</li> </ul>
P010C	Mass air flow sensor (bank 2) circuit low input	An excessively low voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Intake air leaks</li> <li>Mass air flow sensor</li> </ul>
P010D	Mass air flow sensor (bank 2) circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul><li>Harness or connectors (The sensor circuit is open or shorted.)</li><li>Mass air flow sensor</li></ul>

### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

### Which DTC is detected?

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

2. PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102 AND P010C

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

Is 1st trip DTC detected?

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

NO >> INSPECTION END

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

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

2. Check DTC.

# EC-204

[VQ37VHR]

INFOID:00000006352333

< DTC/CIRCL	JIT DIA		•	, P0100	C, P010D M	AF SENSOR	[VQ37VHR]
Is DTC detect							<u> </u>
YES >> G		<u>-205, "Diac</u>	<u>inosis Proc</u>	<u>edure"</u> .			
4.PERFORM	1 DTC C	ONFIRMA		CEDURE	FOR DTC P01	03 AND P010D-II	
1. Start engi 2. Check DT		wait at leas	t 5 seconds	5.			
Is DTC detect							
		<u>-205, "Diac</u> FION END	<u>inosis Proc</u>	edure".			
Diagnosis I	Proce	dure					INFOID:000000006352335
1.INSPECTIO	ON STA	RT					
Confirm the de							
Which DTC is							
P0102, P010 P0103, P010							
2. CHECK IN							
Check the foll	owing fo	or connection	on.				
Air duct Vacuum hos	ses						
Intake air pa		between air	duct to inta	ake mani	fold		
s the inspecti							
	O TO 3 econne	ct the parts	_				
<b>3.</b> CHECK GR							
I. Turn igniti							
2. Check gro	ound co	nnection M	95. Refer to	o Ground	Inspection in G	I-46, "Circuit Inspection	<u>on"</u> .
s the inspecti							
	O TO 4 epair or	replace gr	ound conne	ection.			
	•				лт		
					connector.		
2. Turn igniti	ion swit	ch ON.					
<ol> <li>Check the</li> </ol>	e voltag	e between	MAF senso	r harnes	s connector and	l ground.	
		MAF sens	or				
DTC	Bank	Connector	Terminal	Ground	Voltage		
P0102, P0103	1	F31	5		<b></b>	-	
P010C, P010D	2	F42	5	Ground	Battery voltage		
s the inspecti	on resu	It normal?				•	
	O TO 6						
_							
D.DETECT M							
Check the follo Harness cor		s E106 M6					
Harness cor			03				

• 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.

# EC-205

### < DTC/CIRCUIT DIAGNOSIS >

# 6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

### 1. Turn ignition switch OFF.

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

DTC		MAF sense	or	EC	CM	Continuity
	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0102, P0103	1	F31	4	F102	68	Existed
P010C, P010D	2	F42	4	1102	94	LAISteu

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

Is the inspection result normal?

YES >> GO TO 7.

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

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

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

DTC P0102, P0103		MAF sense	or	Continuity		
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0102, P0103	1	F31	3	E102	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, short to ground or short to power in harness or connectors.

### 8.CHECK MASS AIR FLOW SENSOR

Refer to EC-206, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning mass air flow sensor. Refer to <u>EM-32</u>, "Exploded View".

### **9.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

### >> INSPECTION END

### Component Inspection

1.CHECK MASS AIR FLOW SENSOR-I

### (B) With CONSULT-III

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

Monitor item	Condition	Indication (V)
	Ignition switch ON (Engine stopped.)	Approx. 0.4
MAS A/F SE-B1 Idle (Engine is warmed-up to normal operating	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*



INFOID:000000006352336

### < DTC/CIRCUIT DIAGNOSIS >

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

### Without CONSULT-III

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

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

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

### Is the inspection result normal?

YES >> INSPECTION END NO >> GO TO 2.	I
2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MASS AIR FLOW SENSOR	
<ol> <li>Turn ignition switch OFF.</li> <li>Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.</li> <li>Crushed air ducts</li> </ol>	J
<ul> <li>Malfunctioning seal of air cleaner element</li> <li>Uneven dirt of air cleaner element</li> <li>Improper specification of intake air system parts</li> </ul>	K
Is the inspection result normal? YES >> GO TO 4. NO >> GO TO 3.	L
3. CHECK MASS AIR FLOW SENSOR-II	M

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

Monitor item	Condition	Indication (V)
	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 - 1.2
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.3 - 1.7
	Idle to about 4,000 rpm	0.7 - 1.2 to Approx. 2.4*

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

### **Without CONSULT-III**

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

### EC-207

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### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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

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

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

### Is the inspection result normal?

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

**4.**CHECK MASS AIR FLOW SENSOR-III

### With CONSULT-III

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

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

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

### **Without CONSULT-III**

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

### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Clean or replace malfunctioning mass air flow sensor. Refer to EM-32, "Exploded View".

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### < DTC/CIRCUIT DIAGNOSIS >

# P0106 MANIFOLD ABSOLUTE PRESSURE SENSOR

### Description

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

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

# JMBIA0877ZZ

DTC Logic

INFOID:000000006352338

# 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 abso- lute pressure (MAP) sensor to ECM and an estimated intake pressure of intake manifold calculated by ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted.)</li> <li>Manifold absolute pressure (MAP) sensor</li> <li>Intake air leaks</li> </ul>

### 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 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

### With CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to normal operating temperature.
- 3. 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.

NOTÉ:

- 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

# EC-210

INFOID:00000006352337

[V037VHR]

Accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:          Aurys 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 law minimum       3rd         • Check 1st trip DTC.         * With selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:         or AT models         With selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:         CACCIENCE         Aurys drive at a safe speed.         NOTE:         • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerate with the accelerator pedal kept constant.         • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerate pedal position sensor 1       Ground         Connector       Terminal         With selector lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:         CAUTION:       Mays drive at a safe speed.         NOTE:       Mays drive at a safe speed.         NOTE:       Mays drive at a safe speed.         NOTE:       Mays drive	< DTC/CIRCUI	T DIAGNOSIS :	>		[VQ37VHR]	
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         • Check 1st trip DTC.         Without CONSULT-III         • State engine and warm it up to normal operating temperature.         Drive the vehicle under the following conditions.         arX models         Within conditions:         CAT models         Within selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:         CATION:         Navas drive at a safe speed.         NOTE:         • Acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerator padal position sensor 1         Connector         Terminal         Ground       Voltage (V)         E112       3         Ground       1.4-2.0         or Mark drive at a safe speed.         NOTE:       Acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerator with the accelerator pedal kept constant.         • Accelerate with the accelerator pedal kept constant.         • Accelerate with the accelerator pedal kept constant.         • Acce	CAUTION:			n (13 to 55 MP	H) under the following conditions:	Д
ACCEL SEN 1       1.4-2.0 V         Selector lever       3rd         Selector lever       3rd         • Check 1st trip DTC.       With selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:         Or VT 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:       Avage 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 pedal position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:         Connector Terminal Ground 14-2.0         or MT 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:         Avage 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.         Accelerate with the accelerator pedal kept constant.         • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerate pedal position at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         • Check 1st trip DTC.     <	NOTÉ:	-		ept constant.		EC
Selector lever       3rd         Check 1st trip DTC.         Without CONSULT-III         Start engine and warm it up to normal operating temperature.         Drive the vehicle under the following conditions.         or AT 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 pedal position sensor 1       Ground       Voltage (V)         Et12       3       Ground       1.4 – 2.0         or MT models       With selector lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:         CAUTON:       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.         Accelerate with the accelerator pedal kept constant.         • Accelerate with the accelerator pedal kept constant.         • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerator pedal position sensor 1       Ground       1.4 – 2.0					n allows easy diagnoses.	
Check 1st trip DTC.     Without CONSULT-III     Start engine and warm it up to normal operating temperature.     Drive the vehicle under the following conditions.     or AT 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 pedal position sensor 1     Ground 1.4 – 2.0     or MT 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.     Cellot Note:     Accelerate 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.         Accelerate with the accelerator pedal kept constant.         The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerate with the accelerator pedal kept constant.         The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerate with the accelerator pedal kept constant.         The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerate methods by the accelerator pedal kept constant.         The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerate with the accelerator pedal kept constant.         The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerate methods by the acceleration at engine speed 2,000	ACCEL SEN 1	1.4 – 2.0	V			С
(i) Without CONSULT-III Start engine and warm it up to normal operating temperature. Drive the vehicle under the following conditions. or AT models With selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the follow- ing conditions: CAUTION: Always drive at a safe speed. NOTE: <ul> <li>Accelerate with the accelerator pedal kept constant.</li> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> </ul> Accelerate with the accelerator pedal kept constant. <ul> <li>Terminal</li> <li>Ground</li> <li>Votage (V)</li> <li>E112</li> <li>Ground</li> <li>I.4 - 2.0</li> </ul> or 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. • Accelerate with the accelerator pedal kept constant. • Accelerate metal position sensor 1 Ground Voltage (V) Connector Terminal Ground Voltage (V) Connector Terminal Ground Voltage (V) Connector Connector Terminal Ground Voltage (V) Connector Terminal Ground Voltage (V) Connector Connector Terminal Ground Voltage (V) Connector So to EC-211. "Diagnosis Procedure". NO >> INSPECTION END Viagnosis Procedure Vacuum hoses Intake air passage between air duct and	Selector lever	3rd				
Start engine and warm it up to normal operating temperature. Drive the vehicle under the following conditions. ar AT models With selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the follow- ing conditions: <b>CAUTION:</b> <b>Always drive at a safe speed.</b> <b>NOTE:</b> • Accelerate with the accelerator pedal kept constant. • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses. Accelerator pedal position sensor 1 Ground 14–2.0 or MT models With selector lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the fol- lowing conditions: <b>Connector</b> Terminal Ground 14–2.0 or MT models With selector lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the fol- lowing conditions: <b>CAUTION:</b> <b>Accelerate</b> with the accelerator pedal kept constant. • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses. <b>Accelerate</b> with the accelerator pedal kept constant. • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses. <b>Accelerate</b> with the accelerator pedal kept constant. • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses. <b>Accelerate</b> pedal position sensor 1 Ground 1.4–2.0 • Check 1st trip DTC. <b>1st trip DTC</b> <b>1st trip DTC</b>		•				C
<ul> <li>Drive the vehicle under the following conditions.</li> <li>or AT models</li> <li>With selector lever in D position, accelerate the vehicle from 0 to 88 km/h (0 to 55 MPH) under the following conditions:</li> <li>CAUTION:</li> <li>Accelerate with the accelerator pedal kept constant.</li> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> <li>Accelerate redal position sensor 1 Ground Voltage (V)</li> <li>Connector Terminal Ground 1.4 - 2.0</li> <li>or MT models</li> <li>With selector lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:</li> <li>CAUTION:</li> <li>Accelerate with the accelerator pedal kept constant.</li> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> <li>Accelerate vehicle lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:</li> <li>CAUTION:</li> <li>Always drive at a safe speed.</li> <li>NOTE:</li> <li>Accelerate with the accelerator pedal kept constant.</li> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> <li>Accelerate with the accelerator pedal kept constant.</li> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> <li>Accelerate redal position sensor 1 Ground Voltage (V)</li> <li>Connector Terminal Ground 1.4 - 2.0</li> <li>Check 1st trip DTC.</li> <li>Attribute DTC detected?</li> <li>YES &gt;&gt; Go to EC-211, "Diagnosis Procedure".</li> <li>NO &gt;&gt; INSPECTION END</li> <li>Proce Autor and intake manifold.</li> <li>the inspection result normal?</li> <li>YES &gt;&gt; GO TO 2.</li> <li>NO &gt;&gt; Repair or replace ground connection.</li> <li>CHECK GROUND CONNECTION</li> </ul>			to normal on	arating tompor	atura	
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 pedal position sensor 1       Ground         Connector       Terminal         Ground       1.4 - 2.0         or MT 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:       Always drive at a safe speed.         Order       Always drive at a safe speed.         NOTE:       Always drive at a safe speed.         OTH:       Always drive at a safe speed.         NOTE:       Always drive at a safe speed.         OTH:       Always drive at a safe speed.         NOTE:       Always drive at a safe speed.         NOTE:       Always drive at a safe speed.         Ochecklerate with the accelerator pedal kept constant.       •         • Accelerate with the accelerator pedal kept constant.       •         • Check 1st trip DTC.       Istim DTC.         Istintip DTC detected? <td< td=""><td></td><td></td><td></td><td></td><th></th><td></td></td<>						
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NOTE:         • Accelerate with the accelerator pedal kept constant.         • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerator pedal position sensor 1       Ground       Voltage (V)         E112       3       Ground       1.4 - 2.0         or MT models       With selector lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions:         CALITION:       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.         Accelerate with the accelerator pedal kept constant.         • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.         Accelerator pedal position sensor 1       Ground         Connector       Terminal         Ground       1.4 - 2.0         • Accelerator pedal position sensor 1       Ground         Ist trip DTC.       1.4 - 2.0         • Status pTC detected?       YES >> Go to EC-211. "Diagnosis Procedure".         NO       >> INSPECTION END         Vacuum hoses       Intake in passage between air duct and intake manifold.         athe inspection result normal?       YES >> GO TO 2.         NO       >> Repa		ns:				F
<ul> <li>Accelerate with the accelerator pedal kept constant.</li> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> </ul> Accelerator pedal position sensor 1 Ground Voltage (V) <ul> <li><u>E112 3 Ground 1.4-2.0</u></li> </ul> or MT models Or MT models With selector lever in 3rd position, accelerate the vehicle from 20 to 88 km/h (13 to 55 MPH) under the following conditions: <b>CAUTON: Accelerate with the accelerator pedal kept constant.</b> • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses. <b>Accelerate with the accelerator pedal kept constant.</b> • The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses. <b>Accelerator pedal position sensor 1</b> Ground Voltage (V) <u>Connector Terminal Ground 1.4-2.0</u> • Check 1st trip DTC. <b>Accelerator pedal position sensor 1</b> Ground 1.4-2.0 • Check 1st trip DTC. <b>Accelerate with the accelerator pedal work of the accelerator pedal position sensor 1 <u>Ground 1.4-2.0</u> • Check 1st trip DTC. <b>Accelerator pedal position sensor 1</b> Ground 1.4-2.0 • Check 1st trip DTC detected? YES &gt;&gt; Go to <u>EC-211. "Diagnosis Procedure"</u>. NO &gt;&gt; INSPECTION END <b>Magnosis Procedure Around and the accelerator pedal intake manifold. Arite air passage between air duct and intake manifold. Air duct Vacuum hoses</b> Intake air passage between air duct and intake manifold. <b>Are pair or replace ground connection. Air duct OR OT 02.</b> NO &gt;&gt; Repair or replace ground connection. <b>Air duct OR OT 02.</b> NO &gt;&gt; Repair or replace ground connection. <b>Air duct OR OT 02.</b> NO &gt;&gt; Repair or replace ground connection. <b>ACHECK GROUND CONNECTION</b></b>		at a safe speed	i.			
<ul> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> <li>Accelerator pedal position sensor 1 Connector Terminal E112 3 Ground 1.4 - 2.0     </li> <li>or MT 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:         <ul> <li>Accelerate with the accelerator pedal kept constant.</li> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> </ul> </li> <li>Accelerate with the accelerator pedal kept constant.</li> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> </ul> Accelerator pedal position sensor 1 <ul> <li>Ground</li> <li>Voltage (V)</li> <li>E112 3 Ground</li> <li>Italian a ground</li> <li>Italian at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> </ul> Accelerator pedal position sensor 1 <ul> <li>Ground</li> <li>Voltage (V)</li> <li>E112 3 Ground</li> <li>Italian at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> </ul> Accelerator pedal position sensor 1 <ul> <li>Ground</li> <li>Voltage (V)</li> <li>E112 3 Ground</li> <li>Italian at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> </ul> Accelerator pedal position sensor 1 <ul> <li>Ground</li> <li>Voltage (V)</li> <li>E112 3 Ground</li> <li>Italian at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> </ul> Accelerator pedal position sensor 1 <ul> <li>Ground</li> <li>Voltage (V)</li> <li>E112 3 Ground</li> <li>Italian position sensor 1</li> </ul> More the following for connection. <ul> <li>Air duct</li> <li>Vacuum hoses</li> <li>Intake air passage between air duct and intake manifold.</li> <li>the inspection result normal?</li> </ul> Yes >> GO TO 2.		e with the accele	erator pedal ke	ept constant.		C
Connector         Terminal         Ground         Voltage (V)           E112         3         Ground         1.4 - 2.0           or MT 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:         Image: Connector         Terminal           Accelerate with the accelerator pedal kept constant.         Image: Connector         Terminal           Connector         Terminal         Ground         Voltage (V)           E112         3         Ground         1.4 - 2.0           Accelerator pedal position sensor 1         Ground         Voltage (V)           Connector         Terminal         Ground         Voltage (V)           E112         3         Ground         1.4 - 2.0           Check 1st trip DTC.         Stat trip DTC detected?         Stat trip DTC detected?           YES         > Go to EC-211. "Diagnosis Procedure".         NO         >> INSPECTION END           Wagnosis Procedure               CHECK INTAKE SYSTEM              Indica in passage between air duct and intake manifold.					n allows easy diagnoses.	
Connector         Terminal         Ground         Voltage (V)           E112         3         Ground         1.4 - 2.0           or MT 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:         Image: Connector         Terminal           Accelerate with the accelerator pedal kept constant.         Image: Connector         Terminal           Connector         Terminal         Ground         Voltage (V)           E112         3         Ground         1.4 - 2.0           Accelerator pedal position sensor 1         Ground         Voltage (V)           Connector         Terminal         Ground         Voltage (V)           E112         3         Ground         1.4 - 2.0           Check 1st trip DTC.         Stat trip DTC detected?         Stat trip DTC detected?           YES         > Go to EC-211. "Diagnosis Procedure".         NO         >> INSPECTION END           Wagnosis Procedure               CHECK INTAKE SYSTEM              Indica in passage between air duct and intake manifold.					-	
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or MT 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 pedal position sensor 1         Connector       Terminal         Ground       1.4 - 2.0         . Check 1st trip DTC.         1st trip DTC detected?         YES       >> Go to EC-211, "Diagnosis Procedure".         NO       >> INSPECTION END         biagnosis Procedure       wronoccessesse         . CHECK INTAKE SYSTEM         theck the following for connection.         Air duct         Yacuum hoses         Intake air passage between air duct and intake manifold.         atteinspection result normal?         YES       >> GOTO 2.         NO       >> Repair or replace ground connection.			Oneveral	4.4 0.0		
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 pedal position sensor 1       Ground         Connector       Terminal         Ground       1.4 - 2.0         Check 1st trip DTC.       Ground         1st trip DTC. detected?         YES       > Go to EC-211. "Diagnosis Procedure".         NO       >> INSPECTION END         Diagnosis Procedure       Mean connection.         Air duct       Vacuum hoses         Intake air passage between air duct and intake manifold.         Athe inspection result normal?         YES       > GO TO 2.         NO       >> Repair or replace ground connection.         Air inspection result normal?         YES       > GO TO 2.         NO       >> Repair or replace ground connection.         Air inspection result normal?         YES       > GO TO 2.         NO       >> Repair or replace ground connection.         .CHECK GROUND CONNECTION	E112	3	Ground	1.4 – 2.0		
<ul> <li>The acceleration at engine speed 2,000 and 3,000 rpm allows easy diagnoses.</li> <li><u>Accelerator pedal position sensor 1</u> <u>Connector</u> <u>Terminal</u> <u>Ground</u> Voltage (V) <u>E112 3 Ground 1.4 - 2.0</u></li> <li>Check 1st trip DTC.</li> <li><u>E1st trip DTC detected?</u> YES &gt;&gt; Go to <u>EC-211. "Diagnosis Procedure"</u>. NO &gt;&gt; INSPECTION END</li> <li>Diagnosis Procedure</li> <li><u>CHECK INTAKE SYSTEM</u></li> <li><u>Check the following for connection.</u> Air duct Vacuum hoses Intake air passage between air duct and intake manifold.</li> <li><u>The inspection result normal?</u> YES &gt;&gt; GO TO 2. NO &gt;&gt; Repair or replace ground connection.</li> <li><u>CHECK GROUND CONNECTION</u></li> </ul>	lowing cond CAUTION: Always drive NOTE:	ditions: at a safe speed	i.		e from 20 to 88 km/n (13 to 55 MPH) under the fol-	
Connector         Terminal         Ground         Voltage (V)           E112         3         Ground         1.4 – 2.0           Check 1st trip DTC.         .         .         .         .           1st trip DTC detected?         .         .         .         .           YES         >> Go to EC-211. "Diagnosis Procedure".         .         .         .           NO         >> INSPECTION END         .         .         .         .           Diagnosis Procedure					n allows easy diagnoses.	
Connector       Terminal         E112       3       Ground       1.4 – 2.0         Check 1st trip DTC.       1st trip DTC detected?         YES       >> Go to EC-211, "Diagnosis Procedure".         NO       >> INSPECTION END         Diagnosis Procedure	Accelerator peda	l position sensor 1				I
<ul> <li>Check 1st trip DTC.</li> <li><u>1st trip DTC detected?</u></li> <li>YES &gt;&gt; Go to <u>EC-211. "Diagnosis Procedure"</u>.</li> <li>NO &gt;&gt; INSPECTION END</li> <li>Diagnosis Procedure</li> <li>.CHECK INTAKE SYSTEM</li> <li>.CHECK INTAKE SYSTEM</li> <li>.heck the following for connection.</li> <li>Air duct</li> <li>Vacuum hoses</li> <li>Intake air passage between air duct and intake manifold.</li> <li><u>a the inspection result normal?</u></li> <li>YES &gt;&gt; GO TO 2.</li> <li>NO &gt;&gt; Repair or replace ground connection.</li> <li>.CHECK GROUND CONNECTION</li> </ul>	Connector	Terminal	Ground	Voltage (V)		
A 1st trip DTC detected?         YES       >> Go to EC-211, "Diagnosis Procedure".         NO       >> INSPECTION END         Diagnosis Procedure       INFOLLO000000832330         •CHECK INTAKE SYSTEM         •heck the following for connection.         Air duct         Vacuum hoses         Intake air passage between air duct and intake manifold.         athe inspection result normal?         YES       >> GO TO 2.         NO       >> Repair or replace ground connection.         •CHECK GROUND CONNECTION	E112	3	Ground	1.4 – 2.0	-	1
YES >> Go to EC-211, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure .CHECK INTAKE SYSTEM Theck the following for connection. Air duct Vacuum hoses Intake air passage between air duct and intake manifold. the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. .CHECK GROUND CONNECTION	. Check 1st t	rip DTC.			-	
NO >> INSPECTION END Diagnosis Procedure .CHECK INTAKE SYSTEM theck the following for connection. Air duct Vacuum hoses Intake air passage between air duct and intake manifold. the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. .CHECK GROUND CONNECTION	-					
Diagnosis Procedure       INFOID 00000000332339         .CHECK INTAKE SYSTEM         theck the following for connection.         Air duct         Vacuum hoses         Intake air passage between air duct and intake manifold.         a the inspection result normal?         YES       >> GO TO 2.         NO       >> Repair or replace ground connection.         .CHECK GROUND CONNECTION			<u>gnosis Proced</u>	lure".		
CHECK INTAKE SYSTEM heck the following for connection. Air duct Vacuum hoses Intake air passage between air duct and intake manifold. the inspection result normal? YES >> GO TO 2. NO >> Repair or replace ground connection. CHECK GROUND CONNECTION						
heck the following for connection. Air duct Vacuum hoses Intake air passage between air duct and intake manifold. <u>a the inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace ground connection. CHECK GROUND CONNECTION	Plagnosis Pl	rocedure			INFOID:000000006352339	(
Air duct Vacuum hoses Intake air passage between air duct and intake manifold. <u>a the inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace ground connection. .CHECK GROUND CONNECTION	.CHECK INTA	AKE SYSTEM				
Vacuum hoses Intake air passage between air duct and intake manifold. <u>the inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace ground connection. .CHECK GROUND CONNECTION		ving for connecti	on.			
Intake air passage between air duct and intake manifold. <u>a the inspection result normal?</u> YES >> GO TO 2. NO >> Repair or replace ground connection. .CHECK GROUND CONNECTION		S				
YES >> GO TO 2. NO >> Repair or replace ground connection. CHECK GROUND CONNECTION			r duct and inta	ake manifold.		
NO >> Repair or replace ground connection. CHECK GROUND CONNECTION	•					
			round connect	tion.		
	2.CHECK GRO	DUND CONNEC	TION			
	CHECK GRO		TION			

< DTC/CIRCUIT DIAGNOSIS >

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 MAP SENSOR POWER SUPPLY CIRCUIT

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

2. Turn ignition switch ON.

3. 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?

YES >> GO TO 4.

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

### **4.**CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

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

MAP sensor		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

1. 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

2. 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-213, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace MAP sensor. Refer to <u>EM-34, "Exploded View"</u>.

**I**.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

[VQ37VHR]

### < DTC/CIRCUIT DIAGNOSIS >

# Component Inspection

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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	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.

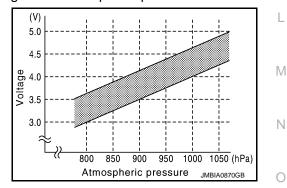
### NOTE:

As the atmospheric pressure described on the synoptic chart is the value at sea level, compensate the G 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-34, "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.

[VQ37VHR]

### < DTC/CIRCUIT DIAGNOSIS >

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 EM-34, "Exploded View".

### < DTC/CIRCUIT DIAGNOSIS >

# P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

# Description

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

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

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DTC Logic

### DTC DETECTION LOGIC

### NOTE:

If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-398, "DTC Logic"</u>.

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

# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

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

2. Check DTC.

Is DTC detected?

YES >> Go to EC-215, "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 MAP SENSOR POWER SUPPLY CIRCUIT

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

# EC-215

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### < DTC/CIRCUIT DIAGNOSIS >

### 2. Turn ignition switch ON.

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

MAP sensor		Ground	Voltage (V)
Connector	Terminal	Crodina	vollage (v)
F50	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.

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

# 3.CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

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

MAP sensor		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 4.

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

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

1. 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

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

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK MAP SENSOR

Refer to EC-216, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace MAP sensor. Refer to EM-34, "Exploded View".

**6.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

### >> INSPECTION END

**Component Inspection** 

1.CHECK MAP SENSOR-I

1. Turn ignition switch OFF.

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

[VQ37VHR]

INFOID:000000006352344

## P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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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.

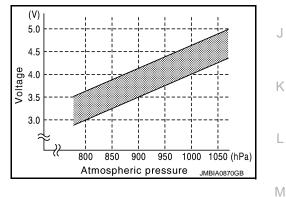
#### NOTE:

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

Compensated pressure (hPa)
0
-24
-47
-70
-92
-114
-168
-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 <u>EM-34, "Exploded View"</u>.

2.CHECK MAP SENSOR-II

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

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

ECM				
	+	-	_	
Connector	Terminal	Connector	Terminal	
F101	38	F102	96	

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

## P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

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-34</u>, "Exploded View".

## **P0111 IAT SENSOR**

## < DTC/CIRCUIT DIAGNOSIS >

## P0111 IAT SENSOR

## DTC Logic

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#### INFOID:000000006912878

[VQ37VHR]

## DTC DETECTION LOGIC

	r		
1	L	,	

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 IAT sensor • IAT sensor		
тс сс	NFIRMATION PROCEDUR	E		
I.INSPE	ECTION START			
YES NO	ssary to erase permanent DTC >> GO TO 3. >> GO TO 2. ORM COMPONENT FUNCTIC			
		er to EC-220, "Component Function Check	<u>("</u> .	
IOTE:				
	TC might not be confirmed.	heck the overall function of the IAT sensor	спочи. During this check, а	
s the ins	pection result normal?			
	>> INSPECTION END	in Due due - "		
	> Proceed to <u>EC-220, "Diagn</u> ONDITIONING	osis Procedure".		
dure befo I. Turn	pre conducting the next test. ignition switch OFF and wait a	has been previously conducted, always p t least 10 seconds.	erform the following proce-	
	ignition switch ON. ignition switch OFF and wait a	t least 10 seconds.		
ESTINC	CONDITION:			
	performing the following properties of the following pro-	ocedure, do not add fuel. ocedure, check that fuel level is betweer	n 1/4 and 4/4.	
		ocedure, confirm that battery voltage is		
	>> GO TO 4.			
	ORM DTC CONFIRMATION P	ROCEDURE		
2. Move	engine and let it idle for 60 mine the vehicle to a cool place.	nutes.		
3. Turn	—-	of ambient air temperature between –10°C he vehicle for 12 hours.	(14°F) and 35°C (95°F).	
	er turn ignition switch ON du	ring soaking.		
The 4. Start	vehicle must be cooled with the engine and let it idle for 5 min			
CAU	TION:			

Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Proceed to EC-220, "Diagnosis Procedure".
- NO >> INSPECTION END

#### **Component Function Check**

**1.**CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

#### 1. Turn ignition switch OFF.

- 2. Disconnect mass air flow sensor (bank 1) harness connector.
- 3. Check resistance between mass air flow sensor (bank 1) terminals as follows.

Terminals	Condition		Resistance (k $\Omega$ )
1 and 2	Temperature [°C (°F)]	25 (77)	1.800 – 2.200

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to <u>EC-220, "Diagnosis Procedure"</u>.

#### 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-220, "Diagnosis Procedure".

## Diagnosis Procedure

**1.**CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

#### Check intake air temperature sensor. Refer to EC-220, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace mass air flow sensor (with intake air temperature sensor) (bank 1). Refer to <u>EM-32</u>, <u>"Exploded View"</u>.

## 2. CHECK INTERMITTENT INCIDENT

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

#### >> INSPECTION END

## **Component Inspection**

## **1.**CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR

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

Terminals	Condition		Resistance (k $\Omega$ )
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-32</u>, <u>"Exploded View"</u>.

INFOID:000000006912879

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## P0112, P0113 IAT SENSOR

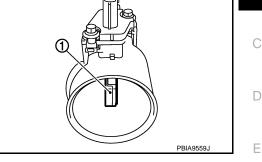
## Description

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

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

#### NOTE:

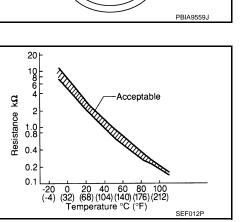
ECM used only the intake air temperature sensor (bank 1) for engine control and self-diagnosis. It does not use the intake air temperature sensor (bank 2).



#### <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).



#### INFOID:000000006352346

## **DTC Logic**

DTC DETECTION LOGIC

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

## 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. 1.
- 2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-222, "Diagnosis Procedure".
- >> INSPECTION END NO

## [VQ37VHR]

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## P0112, P0113 IAT SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

## Diagnosis Procedure

INFOID:000000006352347

#### **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 INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor (bank 1) (intake air temperature sensor is built-into) 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	Terminal	Ciouna	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.

 ${f 3.}$  CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between mass air flow sensor (bank 1) harness connector and ECM harness connector.

MAF sense	MAF sensor (bank 1)		ECM	
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-222, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor). Refer to <u>EM-32</u>, <u>"Exploded View"</u>.

## **5.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

#### >> INSPECTION END

## **Component Inspection**

## **1.**CHECK INTAKE AIR TEMPERATURE SENSOR

- 2. Disconnect mass air flow sensor (bank 1) harness connector.
- 3. Check resistance between mass air flow sensor (bank 1) terminals as follows.

## EC-222

<sup>1.</sup> Turn ignition switch OFF.

## P0112, P0113 IAT SENSOR

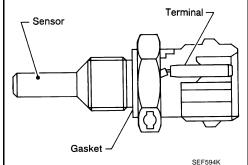
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
Terminals Condition Resistance (kΩ)	А
1 and 2 Temperature °C (°F) 25 (77) 1.800 - 2.200	
Is the inspection result normal?         YES       >> INSPECTION END         NO       >> Replace mass air flow sensor (with intake air temp	EC erature sensor) (bank 1). Refer to EM-32,
"Exploded View".	С
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	H
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## P0116 ECT SENSOR

## Description

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



#### 20 10 6 4 Acceptable Resistance kΩ 2 1.0 0.4 0.2 0.1 0 20 40 60 80 100 (32) (68) (104) (140) (176) (212) Temperature °C (°F) -20 (-4) SEE012P

INFOID:000000006912917

## <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (k $\Omega$ )
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
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 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/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 ECT sensor is higher/ lower than that of other temperature sensors when the engine is started with its cold state.	<ul> <li>Harness or connectors (High or low resistance in the ECT sensor circuit)</li> <li>ECT sensor</li> </ul>

## 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-225, "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-225, "Diagnosis Procedure".

3.PRECONDITIONING

## P0116 ECT SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

#### [VQ37VHR]

	CUIT DIAGNOSIS	>			
	nfirmation Procedure lucting the next test.	has beer	n previously cond	ducted, always perform the following procedure	Δ
1. Turn igr	nition switch OFF and	d wait at lea	ast 10 seconds.		А
	nition switch ON. nition switch OFF and	d wait at lea	ast 10 seconds.		
TEST CON	DITION: erforming the follow	vina proce	dure do not ado		EC
• Before pe	erforming the follow	ving proce	dure, check that	fuel level is between 1/4 and 4/4. at battery voltage is 11 V or more at idle.	С
>>	GO TO 4.				
4.PERFOR	RM DTC CONFIRMA	TION PRO	CEDURE		D
	ngine and let it idle fo ne vehicle to a cool p		es.		
NOTE:					Е
3. Turn igr	nition switch OFF and			rature between –10°C (14°F) and 35°C (95°F). Jrs.	_
CAUTION Never t	ON: turn ignition switch	ON during	a soaking.		F
NOTE:	•				
4. Start en	nicle must be cooled ngine and let it idle fo				G
CAUTION Never f	ON: turn ignition switch	OFF durir	na idlina.		
	1st trip DTC.		.gg.		Н
	TC detected?	"Diagnosic	Droooduro"		
	Proceed to <u>EC-225</u> , INSPECTION END	Diagnosis	<u>s Flocedule</u> .		
Compone	ent Function Che	eck		INFOID:000000006912918	
1.CHECK	ENGINE COOLANT	TEMPERA	TURE (ECT) SEI	NSOR	J
	nition switch OFF.				
2. Disconr	nect ECT sensor har e ECT sensor. Refer				Κ
4. Check	resistance between	ECT sens		heating	
with hot	t water as shown in t	he figure.			L
Terminals	Condition		Resistance (kΩ)		
		20 (68)	2.10 - 2.90		M
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00		
		90 (194)	0.236 - 0.260		Ν
	ction result normal? GO TO 2.				
NO >>	Proceed to EC-225,	-	<u>s Procedure"</u> .	JMBIA0080ZZ	0
2.CHECK	INTERMITTENT INC	DENT			0
	mittent incident. Refe	er to <u>GI-43.</u>	"Intermittent Inci	<u>dent"</u> .	
	ction result normal? INSPECTION END				Ρ
	Proceed to <u>EC-225.</u>	"Diagnosis	<u>s Procedure"</u> .		
Diagnosis	s Procedure			INFOID:000000006912919	
1.снеск	ENGINE COOLANT	TEMPERA	TURE (ECT) SEI	NSOR	
Check ECT	sensor. Refer to EC	-226, "Com	ponent Inspectio	<u></u>	

Is the inspection result normal?

OK >> GO TO 2.

NG >> Replace ECT sensor. Refer to <u>CO-26</u>, "Exploded View".

2.CHECK INTERMITTENT INCIDENT

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

#### >> INSPECTION END

#### Component Inspection

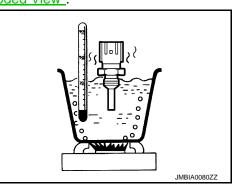
## 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to CO-26, "Exploded View".
- 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)	2.10 - 2.90
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00
	-	90 (194)	0.236 - 0.260

Is the inspection result normal?

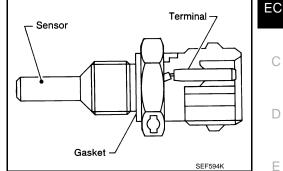
- YES >> INSPECTION END
- NO >> Replace engine coolant temperature sensor. Refer to <u>CO-26. "Exploded View"</u>.



## P0117, P0118 ECT SENSOR

## Description

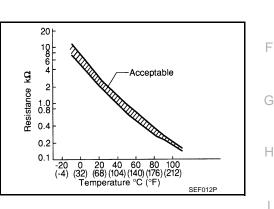
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



#### <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
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

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#### DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The conservation of shorted )
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul><li>(The sensor circuit is open or shorted.)</li><li>Engine coolant temperature sensor</li></ul>

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

#### Is DTC detected?

- YES >> Go to EC-228, "Diagnosis Procedure".
- NO >> INSPECTION END

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## Diagnosis Procedure

INFOID:000000006352355

#### **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 ECT SENSOR POWER SUPPLY CIRCUIT

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

ECT :	sensor	Ground	Voltage (V)	
Connector	Terminal	Glound	voltage (v)	
F17	1	Ground	Approx. 5	

Is the inspection result normal?

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

**3.** DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F106, F107

• Harness for open or short between engine coolant temperature sensor and ECM

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

## **4.**CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. 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

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 ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-229, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-26, "Exploded View"</u>.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

## P0117, P0118 ECT SENSOR

## < DTC/CIRCUIT DIAGNOSIS >

## **Component Inspection**

## 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

- 1. Turn ignition switch OFF.
- 2. Disconnect engine coolant temperature sensor harness connector.
- 3. Remove engine coolant temperature sensor. Refer to <u>CO-26. "Exploded View"</u>.
- 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)	2.10 - 2.90
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 <u>CO-26. "Exploded View"</u>.

## [VQ37VHR]

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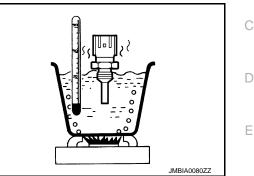
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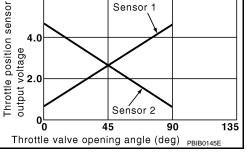
#### < DTC/CIRCUIT DIAGNOSIS >

## P0122, P0123, P0227, P0228 TP SENSOR

## Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls throttle valve opening angle in response to driving conditions via the throttle control motor.



Throttle position sensor

Sensor 1

6.0

#### INFOID:00000006352358

## DTC Logic

## DTC DETECTION LOGIC

#### NOTE:

If DTC P0122, P0123, P0227 or P0228 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-398, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor 2 (bank 1) circuit low in- put	An excessively low voltage from the TP sensor 2 is sent to ECM.	
P0123	Throttle position sensor 2 (bank 1) circuit high in- put	An excessively high voltage from the TP sensor 2 is sent to ECM.	<ul> <li>Harness or connectors (TP sensor 2 circuit is open or shorted.)</li> </ul>
P0227	Throttle position sensor 2 (bank 2) circuit low in- put	An excessively low voltage from the TP sensor 2 is sent to ECM.	<ul> <li>Electric throttle control actuator (TP sensor 2)</li> </ul>
P0228	Throttle position sensor 2 (bank 2) circuit high in- put	An excessively high voltage from the TP sensor 2 is sent to ECM.	

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

**TESTING CONDITION:** 

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

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- Check DTC. 2.

Is DTC detected?

- YES >> Go to EC-231, "Diagnosis Procedure".
- NO >> INSPECTION END

[VQ37VHR]

## [V037VHR]

iagnosis l	Proce	dure							INF0ID:000000	0006352359
.CHECK GI			TION							
			TION							
. Turn ignit			195 Refe	r to Ground	Inspecti	on in GI-46	3 "Circu	iit Inspectio	n"	
s the inspecti					, mopoou	011111 <u>011 10</u>	<u>, onou</u>		<u></u> .	
	O TO 2									
	•	r replace g								
2.CHECK TH	IROTT	LE POSITI	ON SENS	SOR 2 POV	VER SUF	PPLY CIRC	UIT			
		ric throttle	control ac	tuator harr	iess conn	nector.				
<ol> <li>Turn ignit</li> <li>Check the</li> </ol>			oloctric th	prottlo cont	rol actuat	tor bornoss	connor	ctor and gro	und	
	vollay	e between			ioi actuat	IOI HAIHESS		Stor and gro	unu.	
	Electi	ric throttle cor	ntrol actuato	r						
DTC	Bank	Connector	Termina	Ground	Voltage (	(V)				
P0122, P0123	1	F6	6		_					
P0227, P0228	2	F27	1	Ground	Approx.	5				
s the inspecti	on resu	It normal?								
•	on resu O TO 3									
YES >> G	о то з	3.	short to g	ground or s	hort to po	ower in harr	ness or	connectors		
YES >> G NO >> R CHECK TH Turn ignit Disconne Check the	O TO 3 epair o IROTT ion swit ct ECM	B. pen circuit, LE POSITI ch OFF. harness c	ON SENS	SOR 2 GR		RCUIT FOF	R OPEN	N AND SHC		s con-
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 $5. {\sf CHECK \ THROTTLE \ POSITION \ SENSOR}$ 

Refer to EC-232, "Component Inspection".

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.Replace electric throttle control actuator

- 1. Replace malfunctioning electric throttle control actuator. Refer to EM-34, "Exploded View".
- 2. Go to EC-232, "Special Repair Requirement".

#### >> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

#### >> INSPECTION END

Component Inspection

INFOID:000000006352360

[VQ37VHR]

## 1. CHECK THROTTLE POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (A/T) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	Connector +		Condition		Voltage (V)
Connector	Terminal	Terminal			
	30 [TP sensor 1 (bank 1)]	40		Fully released	More than 0.36
		40	40	Fully depressed	Less than 4.75
	31 [TP sensor 1 (bank 2)]	48		Fully released	More than 0.36
F101		40	Accelerator pedal	Fully depressed	Less than 4.75
FIUI	34 [TP sensor 2 (bank 1)]	40		Fully released	Less than 4.75
		40	_	Fully depressed	More than 0.36
	35 [TP sensor 2 (bank 2)]	48		Fully released	Less than 4.75
	55 [1F SCHSULZ (Dallk Z)]	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

1. Replace malfunctioning electric throttle control actuator. Refer to EM-34, "Exploded View".

2. Go to EC-232, "Special Repair Requirement".

>> INSPECTION END

## Special Repair Requirement

INFOID:000000006352361

## **1.**PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

## >> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

#### < DTC/CIRCUIT DIAGNOSIS >

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

#### >> END

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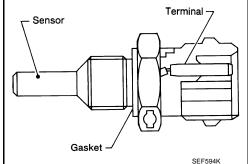
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## P0125 ECT SENSOR

## Description

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



#### 

INFOID:000000006352363

#### <Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (k $\Omega$ )
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
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 <u>EC-227, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125	Insufficient engine coolant temperature for closed loop fuel control	<ul> <li>Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine.</li> <li>Engine coolant temperature is insufficient for closed loop fuel control.</li> </ul>	<ul> <li>Harness or connectors (High resistance in the circuit)</li> <li>Engine coolant temperature sensor</li> <li>Thermostat</li> </ul>

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

#### >> GO TO 2.

## **2.**CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

- 1. Turn ignition switch ON.
- 2. Select "DATA MONITOR" mode with CONSULT-III.
- 3. Check that "COOLAN TEMP/S" is above 10°C (50°F).

Is the temperature above 10°C (50°F)?

## EC-234

YES >> INSPECTION END NO >> GO TO 3.	А
3. PERFORM DTC CONFIRMATION PROCEDURE	7.
<ol> <li>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.</li> </ol>	EC
CAUTION: Be careful not to overheat engine. 2. Check 1st trip DTC.	С
<u>Is 1st trip DTC detected?</u> YES >> <u>EC-235, "Diagnosis Procedure"</u> NO >> INSPECTION END	D
Diagnosis Procedure	Е
1. CHECK GROUND CONNECTION	
<ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection M95. Refer to Ground Inspection in <u>GI-46, "Circuit Inspection"</u>.</li> <li><u>Is the inspection result normal?</u></li> </ol>	F
YES >> GO TO 2. NO >> Repair or replace ground connection. 2.CHECK ENGINE COOLANT TEMPERATURE SENSOR	G
Refer to EC-235, "Component Inspection".	Н
Is the inspection result normal?	
YES >> GO TO 3. NO >> Replace engine coolant temperature sensor. Refer to <u>CO-26, "Exploded View"</u> . <b>3.</b> CHECK THERMOSTAT OPERATION	Ι
When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.	J
Is the inspection result normal?         YES       >> GO TO 4.         NO       >> Repair or replace thermostat. Refer to CO-24, "Removal and Installation".	К
4.CHECK INTERMITTENT INCIDENT	
Refer to <u>GI-43, "Intermittent Incident"</u> .	L
>> INSPECTION END	Μ
Component Inspection	IVI
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR	Ν
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect engine coolant temperature sensor harness connector.</li> <li>Remove engine coolant temperature sensor. Refer to <u>CO-26. "Exploded View"</u>.</li> </ol>	0

[VQ37VHR]

# P0125 ECT SENSOR < DTC/CIRCUIT DIAGNOSIS >

Revision: 2011 October

## **P0125 ECT SENSOR**

#### < DTC/CIRCUIT DIAGNOSIS >

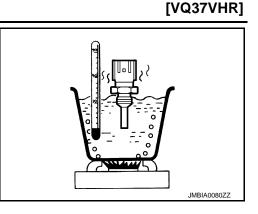
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k $\Omega$ )
		20 (68)	2.10 - 2.90
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 <u>CO-26, "Exploded View"</u>.



## P0127 IAT SENSOR

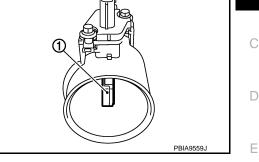
## Description

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

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

#### NOTE:

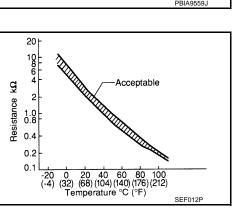
ECM used only the intake air temperature sensor (bank 1) for engine control and self-diagnosis. It does not use the intake air temperature sensor (bank 2)



#### <Reference data>

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

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



INFOID:000000006352367

## 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.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Intake air temperature sensor</li> </ul>	ŀ

## DTC CONFIRMATION PROCEDURE

## **1.**PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

**TESTING CONDITION:** 

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

## >> GO TO 2.

## 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Wait until engine coolant temperature is less than 90°C (194°F)
- Turn ignition switch ON.
- Select "DATA MONITOR" mode with CONSULT-III.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.

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## P0127 IAT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

#### NOTE:

Perform the following steps before engine coolant temperature is above 90°C (194°F).

- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- 4. Start engine.
- 5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds. CAUTION:

## Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-238, "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 INTAKE AIR TEMPERATURE SENSOR

Refer to EC-238, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace mass air flow sensor (bank 1) (with intake air temperature sensor). Refer to <u>EM-32.</u> <u>"Exploded View"</u>.

## **3.**CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

#### >> INSPECTION END

## **Component Inspection**

INFOID:000000006352369

## 1. CHECK INTAKE AIR TEMPERATURE SENSOR

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

Terminals	Condition		Resistance (k $\Omega$ )
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 (bank 1) (with intake air temperature sensor). Refer to <u>EM-32</u>, <u>"Exploded View"</u>.

## **P0128 THERMOSTAT FUNCTION**

#### < DTC/CIRCUIT DIAGNOSIS >

## P0128 THERMOSTAT FUNCTION

## **DTC Logic**

#### DTC DETECTION LOGIC

#### NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306, first perform the trouble diagnosis for P0300, P0301, P0302, P0303, P0304, P0305, P0306. Refer to <u>EC-303</u>. Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.

This is due to a leak in the seal or the thermostat being stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	<ul> <li>Thermostat</li> <li>Leakage from sealing portion of thermostat</li> <li>Engine coolant temperature sensor</li> </ul>
IOTE: lever ref .PREC DTC C efore cc . Turn . Turn . Turn	CONDITIONING-I Confirmation Procedu onducting the next tes ignition switch OFF a ignition switch ON. ignition switch OFF a	the following procedure. re has been previously conducted, alw	ays perform the following procedure
With C . Turn . Cheo	ONDITIONING-II ONSULT-III ignition switch ON. k the following condit		
	emperature	–10°C (14°F) or more	
A/C switcl		OFF	
		OFF mode of "ENGINE" using CONSULT-III. ions:	
COOLAN	TEMP/S	−10°C − 52°C (14 − 126°F)	
YES NO	ndition satisfied? >> GO TO 3. >> 1. Satisfy the col 2. GO TO 3.	ndition. IATION PROCEDURE-I	
With C 1. Start 2. Drive CAU	ONSULT-III engine. the vehicle until the t TION: ays drive vehicle at s	following condition is satisfied.	

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).

## EC-239

#### 2011 370Z

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COOLAN TEMP/S	71°C (159°F) or less		
		the value calculated by subtracting F) from "COOLAN TEMP/S".*	
*: Example			
COOLAN TEMP/S		FUEL T/TMP SE	
70°C (158°F)		45°C (113°F) or less	
65°C (149°F)		40°C (104°F) or less	

#### - STEP 2

Drive the vehicle at 50 km/h (32 MPH) or more with the difference between "COOLAN TEMP/S" and "FUEL T/TMP SE" maintained at 25°C (45°F) or more.

#### NOTE:

Keep the accelerator pedal as steady as possible during cruising.

#### STEP 3

Drive the vehicle at 50 km/h (32 MPH) or more until "COOLAN TEMP/S" increases by 6°C (11°F). **NOTE:** 

35°C (95°F) or less

Keep the accelerator pedal as steady as possible during cruising.

Is the condition satisfied?

60°C (140°F)

YES >> GO TO 4. NO >> GO TO 1.

**4.**PERFORM DTC CONFIRMATION PROCEDURE-II

#### With CONSULT-III

1. Drive the vehicle until the following condition is satisfied.

COOLAN TEMP/S

71°C (159°F) or more

#### **CAUTION:**

Always drive vehicle at safe speed.

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-240, "Diagnosis Procedure".

NO >> INSPECTION END

## **Diagnosis Procedure**

## **1.**CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-240, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace engine coolant temperature sensor. Refer to <u>CO-26, "Exploded View"</u>.

2. CHECK THERMOSTAT

Check thermostat. Refer to CO-25, "Inspection".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace thermostat. Refer to <u>CO-24, "Exploded View"</u>.

## **Component Inspection**

## 1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.

2. Disconnect engine coolant temperature sensor harness connector.

3. Remove engine coolant temperature sensor. Refer to CO-26. "Exploded View".

Revision: 2011 October

## EC-240

2011 370Z

INFOID:00000006352372

## **P0128 THERMOSTAT FUNCTION**

#### < DTC/CIRCUIT DIAGNOSIS >

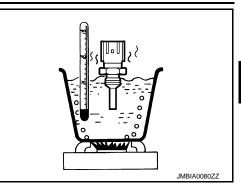
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k $\Omega$ )
		20 (68)	2.10 - 2.90
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 <u>CO-26, "Exploded View"</u>.



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## P0130, P0150 A/F SENSOR 1

## Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement  $\lambda = 1$ , but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide  $\lambda$  range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

## DTC Logic

## DTC DETECTION LOGIC

To judge malfunctions, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

tput 1500 o 1000 500 0⊾ 10 12 14 16 18

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0130	P0130 Air fuel ratio (A/F) sensor 1 (bank 1) circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in a range other than approx. 2.2 V.	
		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	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 a range other than approx. 2.2 V.	or shorted.) • A/F sensor 1
		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.

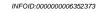
Turn ignition switch OFF and wait at least 10 seconds. 1.

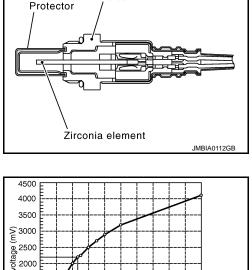
2. Turn ignition switch ON.

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

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.





20 22 24 26

Air fuel ratio

28 30

PBIB3354E

INFOID:00000006352374

Holder

## P0130, P0150 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOS		
2. PERFORM DTC CONFI	RMATION PROCEDURE FOR MALFUNCTION A	
<ol> <li>Start engine and warm</li> <li>Let engine idle for 2 mir</li> <li>Check 1st trip DTC.</li> </ol>	it up to normal operating temperature. nutes.	
s 1st trip DTC detected?		
YES >> Go to <u>EC-244</u> , '	' <u>Diagnosis Procedure"</u> .	
NO-1 >> With CONSULT NO-2 >> Without CONSULT		
•	O (A/F) SENSOR 1 FUNCTION	
	it up to normal operating temperature.	
<ol><li>Select "Ă/F SEN1 (B1)"</li></ol>	or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III. or "A/F SEN1 (B2)" indication.	
Does the indication fluctuate	e around 2.2 V?	
YES >> GO TO 4. NO >> Go to EC-244, '	'Diagnosis Procedure".	
4	RMATION PROCEDURE FOR MALFUNCTION B-I	
	P1276" (for DTC P0130) or "A/F SEN1 (B2) P1286" (for DTC P0150) of "A	/F
SEN1" in "DTC WORK	SUPPORT" mode with CONSULT-III.	
<ol> <li>Touch "START".</li> <li>When the following con</li> </ol>	ditions are met, "TESTING" will be displayed on the CONSULT-III screen.	
. When the following con		
ENG SPEED	1,100 - 3,200 rpm	
ENG SPEED VHCL SPEED SE	1,100 - 3,200 rpm More than 64 km/h (40 mph)	
VHCL SPEED SE	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T)	
VHCL SPEED SE B/FUEL SCHDL Selector lever	More than 64 km/h (40 mph) 1.0 - 8.0 msec	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION:	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) 5th position (M/T) splayed after 20 seconds, retry from step 2.	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) 5th position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed.	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) 5th position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed.	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on YES >> GO TO 5.	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) 5th position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed.	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) 5th position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen?	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sense D.PERFORM DTC CONFIL Release accelerator pedal f	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) 5th position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen? sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens D.PERFORM DTC CONFIL Release accelerator pedal f NOTE:	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) 5th position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen? sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II ully.	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens D.PERFORM DTC CONFIL Release accelerator pedal f NOTE: Never apply brake when rel	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) Sth position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen? sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II ully. easing the accelerator pedal.	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens D.PERFORM DTC CONFIL Release accelerator pedal f NOTE: Never apply brake when rel	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) Sth position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen? sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II ully. easing the accelerator pedal.	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens D.PERFORM DTC CONFIL Release accelerator pedal f NOTE: Never apply brake when rel Which does "TESTING" cha COMPLETED>>GO TO 6. OUT OF CONDITION>>R	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) 5th position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen? sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II ully. easing the accelerator pedal. unge to? etry DTC CONFIRMATION PROCEDURE. GO TO 4.	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens D.PERFORM DTC CONFIL Release accelerator pedal f NOTE: Never apply brake when rel Which does "TESTING" cha COMPLETED>>GO TO 6. OUT OF CONDITION>>R	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) Sth position (M/T) Splayed after 20 seconds, retry from step 2. At a safe speed. CONSULT-III screen? Sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II ully. easing the accelerator pedal. ange to?	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a s "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens D.PERFORM DTC CONFIL Release accelerator pedal f NOTE: Never apply brake when rel Which does "TESTING" cha COMPLETED>>GO TO 6. OUT OF CONDITION>>Re D.PERFORM DTC CONFIL	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) Sth position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen? sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II ully. easing the accelerator pedal. unge to? etry DTC CONFIRMATION PROCEDURE. GO TO 4. RMATION PROCEDURE FOR MALFUNCTION B-III	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a Is "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens 5.PERFORM DTC CONFII Release accelerator pedal f NOTE: Never apply brake when rel Which does "TESTING" cha COMPLETED>>GO TO 6. OUT OF CONDITION>>Re 6.PERFORM DTC CONFII Touch "SELF-DIAG RESULT Which is displayed on CON	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) Sth position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen? sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II ully. easing the accelerator pedal. inge to? etry DTC CONFIRMATION PROCEDURE. GO TO 4. RMATION PROCEDURE FOR MALFUNCTION B-III T". SULT-III screen?	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a Is "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens 5.PERFORM DTC CONFII Release accelerator pedal f NOTE: Never apply brake when rel Which does "TESTING" cha COMPLETED>>GO TO 6. OUT OF CONDITION>>Ref 6.PERFORM DTC CONFII Touch "SELF-DIAG RESULT Which is displayed on CON OK >> INSPECTION E	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) Sth position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen? sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II ully. easing the accelerator pedal. unge to? etry DTC CONFIRMATION PROCEDURE. GO TO 4. RMATION PROCEDURE FOR MALFUNCTION B-III T". SULT-III screen? ND	
VHCL SPEED SE B/FUEL SCHDL Selector lever If "TESTING" is not di CAUTION: Always drive vehicle a Is "TESTING" displayed on YES >> GO TO 5. NO >> Check A/F sens 5. PERFORM DTC CONFII Release accelerator pedal f NOTE: Never apply brake when rel Which does "TESTING" cha COMPLETED>>GO TO 6. OUT OF CONDITION>>Re 6. PERFORM DTC CONFII Touch "SELF-DIAG RESULT Which is displayed on CON OK >> INSPECTION E NG >> Go to EC-244.	More than 64 km/h (40 mph) 1.0 - 8.0 msec D position (A/T) Sth position (M/T) splayed after 20 seconds, retry from step 2. at a safe speed. CONSULT-III screen? sor 1 function again. GO TO 3. RMATION PROCEDURE FOR MALFUNCTION B-II ully. easing the accelerator pedal. inge to? etry DTC CONFIRMATION PROCEDURE. GO TO 4. RMATION PROCEDURE FOR MALFUNCTION B-III T". SULT-III screen?	

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 NO >> Go to <u>EC-244, "Diagnosis Procedure"</u>.

## Component Function Check

**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 (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.

- 4. Repeat steps 2 and 3 for five times.
- 5. Stop the vehicle and turn ignition switch OFF.
- 6. Turn ignition switch ON.
- 7. Turn ignition switch OFF and wait at least 10 seconds.
- 8. Restart engine.
- 9. 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?

YES >> Go to EC-244, "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 AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

- 1. Disconnect A/F sensor 1 harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC		A/F senso	r 1	Ground	Voltage	
	Bank	Connector	Terminal	Ciouna		
P0130	1	F3	4	Ground	Battery voltage	
P0150	2	F20	4	Giouna	Ballery vollage	

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

**3.** DETECT MALFUNCTIONING PART

Check the following.

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

>> Repair or replace harness or connectors.

## EC-244

## P0130, P0150 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

## 4.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	A/F sensor 1			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0130	1	F3	1		57	- Existed
10150		15	2	F102	61	
P0150	2	2 F20	1	1102	65	
P0150			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	Bank Connector			Giouna	
P0130	1	F3	1		Not existed	
F0130	I	ГJ	2	Ground		
P0150	2	E20	1	Ground	NOL EXISTED	
P0150	2 F20		2			

DTC	ECM			Ground	Continuity
DIC	Bank	Connector	Terminal	Gibunu	Continuity
P0130	1		57		Not existed
F0130	I	F102	61	- Ground	
P0150	2	FIUZ	65		
F0150	Z		66		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK INTERMITTENT INCIDENT

Perform GI-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. Refer to <u>EM-32, "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 P 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

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  $\lambda$  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.
- 2. Turn ignition switch ON.

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

#### **TESTING CONDITION:**

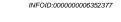
Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

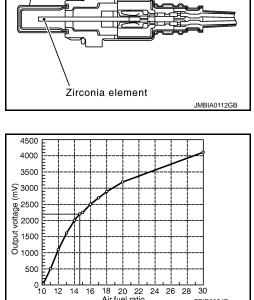
#### >> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

- Start engine and warm it up to normal operating temperature. 1.
- Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III. 2.
- Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication. 3.

Is the indication constantly approx. 0 V?





Air fuel ratio

Holder

Protector

PBIB3354E

< DTC/CIRCUIT DIAGNO		151 A/F SE	NSOR 1 [VQ37VHR]	
NO >> GO TO 3.	"Diagnosis Procedure			ļ
<b>3.</b> PERFORM DTC CONF	RMATION PROCED	URE		
<ol> <li>Turn ignition switch OF</li> <li>Turn ignition switch ON</li> <li>Turn ignition switch OF</li> </ol>	۱.			E
CAUTION:		0 km/h (25 MP⊦	I) within 20 seconds after restarting engine.	(
<ul><li>Always drive vehicle</li><li>6. Maintain the following of</li></ul>		0 consecutive s	econds.	[
ENG SPEED	1,000 - 3,200 rpm			
VHCL SPEED SE	More than 40 km/h (25 r	mph)		E
B/FUEL SCHDL	1.5 - 9.0 msec	. ,		
Selector lever	Suitable position			
NOTE:	1			
<ul> <li>Keep the accelerator</li> <li>If this procedure is</li> </ul>			ng cruising. er restarting engine at step 4, return to step	
1.	not completed with	ii i iiiiide alte	a restarting engine at step 4, return to step	(
7. Check 1st trip DTC.				
Is 1st trip DTC detected?				
YES >> Go to <u>EC-247.</u> NO >> INSPECTION	<u>"Diagnosis Procedur</u> END	<u>e"</u> .		
Diagnosis Procedure			INFOID:00000006352379	
1.CHECK GROUND CON	INECTION			
1. Turn ignition switch OF				
0		ound Inspection	in GI-46, "Circuit Inspection".	
Is the inspection result norr	mal?			
YES >> GO TO 2. NO >> Repair or repla	ce ground connectior	<b>`</b>		
2.CHECK AIR FUEL RAT	•		YCIRCUIT	
1. Disconnect A/F sensor				
2. Turn ignition switch ON				
3. Check the voltage betv	veen A/F sensor 1 ha	rness connector	r and ground.	
A/F sens	sor 1			
DTC Bank Connecto	r Terminal Ground	Voltage		
P0130 1 F3	4	Dotter		
P0150 2 F20	4 Ground	Battery voltage		
Is the inspection result norr	mal?			
YES >> GO TO 4.				
NO >> GO TO 3.				
3.DETECT MALFUNCTIC	INING PART			
<ul> <li>Check the following.</li> <li>Harness connectors E3, I</li> <li>IPDM E/R harness conne</li> <li>15 A fuse (No. 46)</li> <li>Harness for open or shor</li> </ul>	ector E7	1 and fuse		

## P0131, P0151 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

#### >> Repair or replace harness or connectors.

## **4.**CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	A/F sensor 1			ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0130	1	F3	1	F102	57	Existed
F0130	I	гэ	2		61	
P0150	2 F20	500	1	1102	65	
P0150		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	ank Connector Termi			Giouna	
P0130	1	F3	1		Not existed	
F0130	I	15	2	Ground		
P0150	2	F20	1	Giouna	NUL EXISTED	
P0150	2	F20	2			

DTC	ECM			Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0130	1		57		Not existed
F 0130	I	F102	61	Ground	
P0150	2		65	Giouna	NOT EXISTED
F0150	Z		66	-	

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK INTERMITTENT INCIDENT

Perform GI-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. Refer to <u>EM-32, "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

## P0132, P0152 A/F SENSOR 1

## Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement  $\lambda = 1$ , but also in the lean and rich range. Together with its control electronics, the sensor

outputs a clear, continuous signal throughout a wide  $\lambda$  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	k
P0132	Air fuel ratio (A/F) sensor 1 (bank 1) circuit high voltage		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	L

## DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

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

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

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

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

#### >> GO TO 2.

2. CHECK A/F SENSOR FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Select "A/F SEN1 (B1)" or "A/F SEN1 (B2)" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "A/F SEN1 (B1)" or "A/F SEN1 (B2)" indication.

Is the indication constantly approx. 5V?

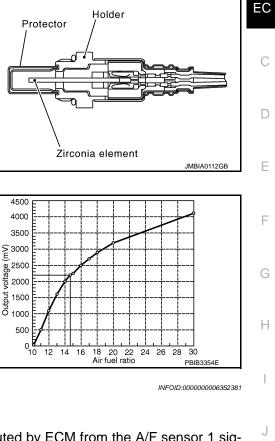
## EC-249

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## P0132, P0152 A/F SENSOR 1

< DTC/CIRCUIT DIAGNOSIS >

YES >> Go to EC-250, "Diagnosis Procedure".

NO >> GO TO 3.

**3.**PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Restart engine.
- 5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine. CAUTION:

#### Always drive vehicle at a safe speed.

6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

#### NOTE:

• Keep the accelerator pedal as steady as possible during cruising.

• If this procedure is not completed within 1 minute after restarting engine at step 4, return to step

1.

7. Check 1st trip DTC.

Is 1st trip DTC detected?

- YES >> Go to EC-250, "Diagnosis Procedure".
- NO >> INSPECTION END

## Diagnosis Procedure

INFOID:000000006352382

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

DTC	A/F sensor 1			Ground	Voltage
DIC	Bank	Connector	Terminal	Ciouna	voltage
P0130	1	F3	4	Ground Battery voltage	Battery voltage
P0150	2	F20	4	Ground	Ballery vollage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

## 3.DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

• IPDM E/R harness connector E7

• 15 A fuse (No. 46)

• Harness for open or short between A/F sensor 1 and fuse

## EC-250

## P0132, P0152 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

#### >> Repair or replace harness or connectors.

## 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

-	DTC	A/F sensor 1			ECM		Continuity
	DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
	P0130	1	F3	1		57	
	F0130	I	гэ	2	F102	61	Existed
-	P0150	2	2 F20	1	1102	65	LAISIGU
	F0150	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
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0130	1	F3	1		
F0130	I	гэ	2	Ground	Not existed
P0150	2	E20	F20 1		NUL EXISIEU
F0150	2	F20	2		

DTC	ECM			Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0130	1	F102	57	Ground	Not existed
F 0130	1		61		
P0150	2		65		
			66		

5. Also check harness for short to power.

<u>Is the ir</u>	nspection result normal?			
YES	>> GO TO 5.			
NO	>> Repair open circuit, short to ground or short to power in harness or connectors.			

5. 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. Refer to EM-32. "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

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  $\lambda$  range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

## DTC Logic

## DTC DETECTION LOGIC

To judge malfunctions, this diagnosis measures response time of the A/F signal computed by ECM from the A/ F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	
P0133	Air fuel ratio (A/F) sensor 1 (bank 1) circuit slow re- sponse		Harness or connectors (The A/F sensor 1 circuit is open or shorted.)	
P0153	Air fuel ratio (A/F) sensor 1 (bank 2) circuit slow re- sponse	<ul> <li>The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.</li> </ul>	<ul> <li>A/F sensor 1</li> <li>A/F sensor 1 heater</li> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> <li>Exhaust gas leaks</li> <li>PCV</li> <li>Mass air flow sensor</li> </ul>	

## DTC CONFIRMATION PROCEDURE

## **1.**PRECONDITIONING

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

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

2. Turn ignition switch ON.

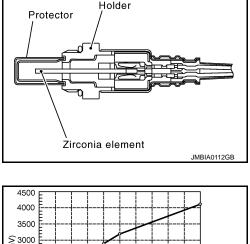
Turn ignition switch OFF and wait at least 10 seconds. 3.

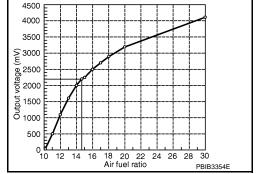
#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle. Do you have CONSULT-III?

## EC-252

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P0133,	, <b>P0153</b>	A/F SENSOR 1	
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FUISS, FUISS A/F SENSOR I	
< DTC/CIRCUIT DIAGNOSIS > [VQ:	37VHR]
YES >> GO TO 2.	
NO $>>$ GO TO 5.	A
2.PERFORM DTC CONFIRMATION PROCEDURE-I	
With CONSULT-III	EC
<ol> <li>Start engine and warm it up to normal operating temperature.</li> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> </ol>	
<ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Turn ignition switch ON.</li> </ol>	
4. Turn ignition switch OFF and wait at least 10 seconds.	C
<ol> <li>Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under</li> <li>Let engine idle for 1 minute.</li> </ol>	no load.
<ol> <li>Let engine idle for 1 minute.</li> <li>Select "A/F SEN1(B1) P1278/P1279" (for DTC P0133) or "A/F SEN1(B2) P1288/P1289" (for DTC</li> </ol>	C P0153)
of "A/F SEN1" in "DTC WORK SUPPORT" mode with CONSULT-III.	
8. Touch "START".	
Is "COMPLETED" displayed on CONSULT-III screen?	E
YES >> GO TO 3 NO >> GO TO 4.	
3.PERFORM DTC CONFIRMATION PROCEDURE-II	F
Touch "SELF-DIAG RESULT".	
Which is displayed on CONSULT-III screen?	G
OK >> INSPECTION END NG >> Go to <u>EC-254, "Diagnosis Procedure"</u> .	
4. PERFORM DTC CONFIRMATION PROCEDURE-II	
	ŀ
<ol> <li>After perform the following procedure, "TESTING" will be displayed on the CONSULT-III screen.</li> <li>Increase the engine speed up to about 3,600 rpm and maintain that speed for 10 seconds.</li> </ol>	
<ul> <li>Fully release accelerator pedal and then let engine idle for about 10 seconds.</li> </ul>	
If "TESTING" is not displayed after 10 seconds, go to <u>EC-164, "Component Function Check"</u>	
<ol> <li>Wait for about 20 seconds at idle under the condition that "TESTING" is displayed on the CON screen.</li> </ol>	150L1-III
3. Make sure that "TESTING" changes to "COMPLETED".	J
If "TESTING" changed to "OUT OF CONDITION", go to <u>EC-164, "Component Function Che</u>	<u>:ck"</u> .
4. Touch "SELF-DIAG RESULT".	
Which is displayed on CONSULT-III screen? OK >> INSPECTION END	ł
NG >> Go to <u>EC-254, "Diagnosis Procedure"</u> .	
5. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE	L
-	
<ul> <li>With GST</li> <li>Start engine and warm it up to normal operating temperature.</li> </ul>	
2. Select Service \$01 with GST.	N
3. Calculate the total value of "Short term fuel trim" and "Long term fuel trim" indications.	
Is the total percentage within $\pm 15\%$ ?	N
YES >> GO TO 7. NO >> GO TO 6.	ľ
6.DETECT MALFUNCTIONING PART	
Check the following.	
<ul> <li>Intake air leaks</li> <li>Exhaust gas leaks</li> </ul>	
Incorrect fuel pressure	F
Lack of fuel	
<ul> <li>Fuel injector</li> <li>Incorrect PCV hose connection</li> </ul>	
PCV value	

• Mass air flow sensor

PCV valve

# P0133, P0153 A/F SENSOR 1

#### < DTC/CIRCUIT DIAGNOSIS >

>> Repair or replace malfunctioning part.

### **7.**PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. 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. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
- 7. Fully release accelerator pedal and then let engine idle for about 1 minute.
- 8. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-254, "Diagnosis Procedure".
- NO >> INSPECTION END

### **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.

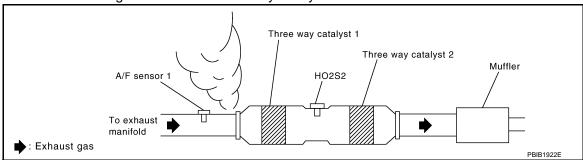
2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-39, "Removal and Installation".

>> GO TO 3.

# 3. 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.

**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.

**5.** CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

 Clear the mixture ratio self-learning value. Refer to <u>EC-24</u>, "MIXTURE RATIO SELF-LEARNING VALUE <u>CLEAR : Special Repair Requirement"</u>.

2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P172, P0174 or P0175 detected? Is it difficult to start engine?

## EC-254

# P0133, P0153 A/F SENSOR 1

			1.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
< DTC/CII	RCUIT	DIAGNOS	IS >			[VQ:	37VHR]
NO >	or <u>EC</u> > GO T	<u>C-282, "DT(</u> O 6.	<u>C Logic"</u> .			174 or P0172, P0175. Refer to <u>EC-278, "DT</u>	<u>C Logic"</u> A
<b>D</b> .CHEC	( AIR F	UEL RATIO	) (A/F) SE	ENSOR 1 I	POWER S	SUPPLY CIRCUIT	50
2. Turn i	gnition	/F sensor 1 switch ON. Itage betwe				nnector and ground.	C EC
DTC		A/F senso	r 1	Ground	Voltag		
DIC	Bank	Connector	Terminal		vonag	ye	D
P0133	1	F3	4	Ground	Battery vo	oltage	D
P0153	2	F20	4	Ground	Dattery V	olage	
YES > NO > 7.DETEC Check the • Harness • IPDM E/ • 15 A fus	> GO T > GO T CT MAL followin connec (R harno e (No. 4	O 7. FUNCTION ng. ctors E3, F <sup>r</sup> ess connec	NING PAR 1 tor E7		<sup>-</sup> 1 and fus	Se	F G
•	•	ir or replac ENSOR 1 I				R OPEN AND SHORT	Н
2. Disco	nnect E	switch OFF CM harnes ntinuity bet	s connec		harness c	connector and ECM harness connector.	J
DTC		A/F sensor	1	EC	CM	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	- Continuity	K
P0133	1	F3	1		57		
FU133		٢J	2	E102	61	Eviated	
			1	F102	65	Existed	L

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector M and ground.

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DTC		A/F sensor	1	Ground	Ground Continuity
	Bank	Connector	Terminal		
P0133	1	F3	1		
10133	P0133 1 F3	13	2	Ground	Not existed
P0153	2	F20	1	Ground	NUL EXISIEU
F0155	2	F20	2		

2

F20

P0153

# P0133, P0153 A/F SENSOR 1

### < DTC/CIRCUIT DIAGNOSIS >

DTC		ECM		Ground	Continuity	
DIC	Bank	Connector	Terminal	Gibulia		
P0133	1		57		Not existed	
F0133		F102	61	Ground		
P0153	2	1102	65			
	2		66			

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.

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

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

Refer to EC-190, "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-206, "Component Inspection".

Is the inspection result normal?

- YES >> GO TO 11.
- NO >> Replace malfunctioning mass air flow sensor. Refer to <u>EM-32</u>, "<u>Exploded View</u>".

11.CHECK PCV VALVE

Refer to EC-534, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair or replace PCV valve. Refer to <u>EM-52, "Exploded View"</u>.

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 malfunctioning air fuel ratio (A/F) sensor 1. Refer to <u>EM-32, "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

# P0137, P0157 HO2S2

### Description

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

### **DTC** Logic



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 volt- age		<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> </ul>	K
P0157	Heated oxygen sensor 2 (bank 2) circuit low volt- age	reach the specified voltage.	<ul><li>Fuel pressure</li><li>Fuel injector</li><li>Intake air leaks</li></ul>	L

#### DTC CONFIRMATION PROCEDURE

### **1.**INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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:**

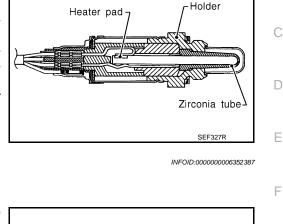
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

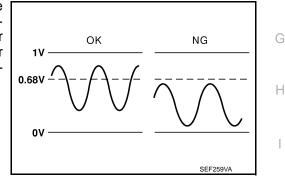
Revision: 2011 October

### EC-257

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# **3.** PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 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-III.
- 11. Start engine and follow the instruction of CONSULT-III display. **NOTE:**

It will take at most 10 minutes until "COMPLETED" is displayed.

12. Touch "SELF-DIAG RESULTS".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-259, "Diagnosis Procedure".

CAN NOT BE DIAGNOSED>>GO TO 4.

### **4.**PERFORM DTC CONFIRMATION PROCEDURE AGAIN

- 1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
- 2. Perform DTC confirmation procedure again.

>> GO TO 3.

### **5.**PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-258, "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-259, "Diagnosis Procedure".

### **Component Function Check**

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### **1.**PERFORM COMPONENT FUNCTION CHECK-I

#### Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

	ECM						
DTC	Connector	+	_	Condition	Voltage		
	Connector		Terminal				
P0137	F102	76	84	Revving up to 4,000 rpm under no load at			
P0157			04	least 10 times	least once during this procedure.		

#### Is the inspection result normal?

YES >> INSPECTION END

# P0137, P0157 HO2S2

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

А

# 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	Terminal		The voltage should be above 0.68 V at			
P0137 P0157	F102	76 80	84	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.			
s the in	spection re	sult norm	al?					
YES	>> INSPE		ND					
NO )	>> GO TC							
				TION CHECK-III				
Check t	he voltage l	between	ECM harr	ness connector terminals under the f	following condition.			
		ECM						
DTC		+	_	Condition	Voltage			
DIC	Connector	Terminal	Terminal	Condition	Voltage			
P0137		76		Coasting from 80 km/h (50 MPH) in D po-	The voltage should be above 0.68 V at			
P0157	F102	80	84	sition (A/T), 4th gear position (M/T)	least once during this procedure.			
s the in	spection re	sult norm	al?					
YES	>> INSPE							
NO	>> Go to [	<u> =C-259, "</u>	Diagnosi	<u>s Procedure"</u> .				
Jiagno	osis Proc	edure			INFOID:0000000635238			
1 CHE	CK GROUI							
	n ignition sw eck ground			Refer to Ground Inspection in GI-46.	"Circuit Inspection".			
	spection re							
YES	>> GO TC			_				
	•		•	connection.				
				LF-LEARNING VALUE				
1. Clea	ar the mixtu <u>EAR : Speci</u>	ure ratio s	self-learni	ing value. Refer to <u>EC-24, "MIXTUR</u>	RE RATIO SELF-LEARNING VALUE			
2. Rur	engine for	at least ?	10 minute	es at idle speed.				
	•			etected? Is it difficult to start engine?	2			
YES			diagnosis	s for DTC P0171 or P0174. Refer to	<u>EC-278, "DTC Logic"</u> .			
NO	>> GO TC							
<b>5.</b> CHE	CK HO2S2	GROUN	D CIRCU	IT FOR OPEN AND SHORT				
	n ignition sv							
	connect hea connect EC			or 2 harness connector.				
				02S2 harness connector and ECM h	arness connector.			

DTC		HO2S2		EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0137	1	F54	1	F102	84	Existed
P0157	2	F53	1	1102	04	LAISteu

# P0137, P0157 HO2S2

#### < DTC/CIRCUIT DIAGNOSIS >

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	
DIC	Bank	Connector	Terminal	Connector Terminal		Continuity
P0137	1	F54	4	F102	76	Existed
P0157	2	F53	4	FIUZ	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	Giouna		
P0137	1	F54	4	Ground	Not existed	
P0157	2	F53	4	Gibuliu	NUL EXISIEU	

DTC		ECM		Ground	Continuity	
DIC	Bank	Connector	Terminal	Cround	Continuity	
P0137	1	F102	76	Ground	Not existed	
P0157	2	1 102	80	Gibunu		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

**5.**CHECK HEATED OXYGEN SENSOR 2

Refer to EC-261, "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 <u>EM-39, "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 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

[VQ37VHR]

INFOID:000000006352390

EC

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### **1.**INSPECTION START

Do you have CONSULT-III?

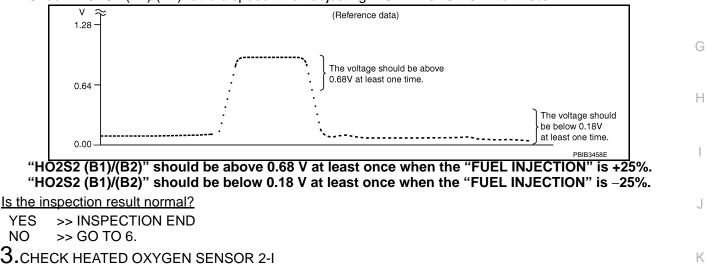
Do you have CONSULT-III?

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

2.CHECK HEATED OXYGEN SENSOR 2

### With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- 6. Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to  $\pm 25\%$ .



#### Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

4. Let engine idle for 1 minute.

5. Check the voltage between ECM harness connector terminals under the following condition.

ECM					
Connector	+	-	Condition	Voltage	
Connector	Terminal	Terminal			
	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 [HO2S2 (bank 2)]	04	least 10 times	The voltage should be below 0.18 V at least once during this procedure.	

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

# P0137, P0157 HO2S2

### < DTC/CIRCUIT DIAGNOSIS >

ECM						
Connector -	+ –		Condition	Voltage		
	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.		
F102 –	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 (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. Refer to EM-39, "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

### 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.

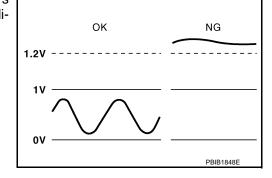
# Holder Heater pad D Zirconia tube-Е SEF327R INFOID:000000006352392

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.

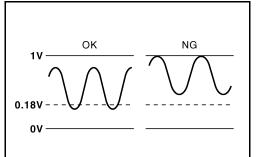
#### MALFUNCTION A

To judge 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	ouble diagnosis name DTC detecting condition		Possible cause	
	Heated oxygen sensor 2	A)	An excessively high voltage from the sen- sor is sent to ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> </ul>	0
P0138	(bank 1) circuit high volt- age	B)	The minimum voltage from the sensor is not reached to the specified voltage.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> </ul>	Ρ

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[VQ37VHR]

PBIB2376E

# P0138, P0158 HO2S2

### < DTC/CIRCUIT DIAGNOSIS >

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
	Heated oxygen sensor 2 P0158 (bank 2) circuit high volt- age	A)	An excessively high voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> </ul>
P0158		B)	The minimum voltage from the sensor is not reached to the specified voltage.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Fuel injector</li> </ul>

### 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. 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-266, "Diagnosis Procedure".
- NO-1 >> With CONSULT-III: GO TO 3.
- NO-2 >> Without CONSULT-III: GO TO 5.

### $\mathbf{3}.$ PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

#### NOTE:

#### For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

- 1. Select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 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) P1146" (for DTC P0138) or "HO2S2 (B2) P1166" (for DTC P0158) of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-III.
- 11. Start engine and follow the instruction of CONSULT-III display. **NOTE:**
- It will take at most 10 minutes until "COMPLETED" is displayed.
- 12. Touch "SELF-DIAG RESULTS".

#### Which is displayed on CONSULT-III screen?

OK >> INSPECTION END

NG >> Go to EC-266, "Diagnosis Procedure".

CON NOT BE DIAGNOSED>>GO TO 4.

#### **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).

# P0138, P0158 HO2S2

### - DTC/CIRCUIT DIAGNOSIS -

DTC/C		IAGNOSI	S >		[VQ37VHR]		
Perfo	orm DTC co	onfirmatio	n proced	ure again.			
	>> GO TO 3.						
-			FUNCT	ON CHECK FOR MALFUNCTION	В		
	component	function	check. Re	efer to EC-265, "Component Function	on Check".		
heck, a	ponent fun 1st trip DT spection res	C might n	ot be con		oxygen sensor 2 circuit. During this		
-	>> INSPE(			Procedure".			
	onent Fur		-	<u>riocedule</u> .			
					INFOID:00000006352393		
I.PERF	ORM COM	<b>IPONENT</b>	FUNCT	ON CHECK-I			
₹\\/:+h ~	ut CONSU						
. Start 2. Turn	ignition sw	vitch OFF	and wait	normal operating temperature. at least 10 seconds.	for at least 1 minute under no load		
. Start 2. Turn 3. Start 4. Let e	ignition sw engine and engine idle	ritch OFF d keep the for 1 minu	and wait e engine s ite.	at least 10 seconds.	n for at least 1 minute under no load. The following condition.		
<ol> <li>Start</li> <li>Turn</li> <li>Start</li> <li>Start</li> <li>Let e</li> </ol>	ignition sw engine and engine idle	ritch OFF d keep the for 1 minu	and wait e engine s ite.	at least 10 seconds. speed between 3,500 and 4,000 rpm			
<ol> <li>Start</li> <li>Turn</li> <li>Start</li> <li>Start</li> <li>Let e</li> </ol>	ignition sw engine and engine idle	vitch OFF d keep the for 1 minu ge betwee ECM +	and wait e engine s ite. en ECM I	at least 10 seconds. speed between 3,500 and 4,000 rpm			
Start     Turn     Start     Let e     DTC	ignition sw engine and engine idle ck the volta	ritch OFF d keep the for 1 minu ge betwee ECM + Terminal	and wait e engine s ite.	at least 10 seconds. speed between 3,500 and 4,000 rpm narness connector terminals under t Condition	he following condition. Voltage		
Start     Start     Turn     Start     Let e     Chee	ignition sw engine and engine idle ck the volta	vitch OFF d keep the for 1 minu ge betwee ECM +	and wait e engine s ite. en ECM I	at least 10 seconds. speed between 3,500 and 4,000 rpm narness connector terminals under t	he following condition.		
Start     Start     Turn     Start     Let e     DTC     P0138     P0158     Sthe ins     YES     NO	ignition sw engine and ck the volta Connector F102 >> INSPEC >> GO TO	ritch OFF d keep the for 1 minu ge betwee ECM + Terminal 76 80 sult norma CTION EN 2.	and wait e engine s ite. en ECM f Terminal 84 al? ND	at least 10 seconds. speed between 3,500 and 4,000 rpm narness connector terminals under t Condition Revving up to 4,000 rpm under no load at	the following condition. Voltage The voltage should be below 0.18 V at		
Start Start Let e DTC P0138 P0158 Sthe ins YES NO PERF	ignition sw engine and engine idle ck the volta Connector F102 >> INSPEC >> GO TO CORM COM	ritch OFF d keep the for 1 minu ge betwee ECM + Terminal 76 80 sult norma CTION EN 2. IPONENT	and wait e engine s ite. en ECM f - Terminal 84 ND T FUNCTI	at least 10 seconds. speed between 3,500 and 4,000 rpm narness connector terminals under t Condition Revving up to 4,000 rpm under no load at least 10 times	the following condition. Voltage The voltage should be below 0.18 V at least once during this procedure.		
Start Start Let e DTC P0138 P0158 Sthe ins YES NO PERF	ignition sw engine and engine idle ck the volta Connector F102 >> INSPEC >> GO TO CORM COM	vitch OFF d keep the for 1 minu ge betwee ECM + Terminal 76 80 Sult norma CTION EN 2. IPONENT eetween E	and wait e engine s ite. en ECM f - Terminal 84 ND T FUNCTI	at least 10 seconds. speed between 3,500 and 4,000 rpm narness connector terminals under t Condition Revving up to 4,000 rpm under no load at least 10 times	the following condition. Voltage The voltage should be below 0.18 V at least once during this procedure.		
Start Start Let e Chec DTC P0138 P0158 Sthe ins YES NO Check th	ignition sw engine and engine idle ck the volta Connector F102 >> INSPEC >> GO TO CORM COM	ritch OFF d keep the for 1 minu ge betwee ECM + Terminal 76 80 sult norma CTION EN 2. IPONENT	and wait e engine s ite. en ECM f - Terminal 84 ND T FUNCTI	at least 10 seconds. speed between 3,500 and 4,000 rpm narness connector terminals under the Condition Revving up to 4,000 rpm under no load at least 10 times ON CHECK-II ess connector terminals under the form	the following condition. Voltage The voltage should be below 0.18 V at least once during this procedure. Dllowing condition.		
Start Start Let e DTC P0138 P0158 Sthe ins YES NO PERF	ignition sw engine and engine idle ck the volta Connector F102 >> INSPEC >> GO TO CORM COM	vitch OFF d keep the for 1 minu ge betwee ECM + Terminal 76 80 sult norma CTION EN 2. IPONENT petween E	and wait e engine s ite. en ECM f - Terminal 84 ND T FUNCTI	at least 10 seconds. speed between 3,500 and 4,000 rpm narness connector terminals under t Condition Revving up to 4,000 rpm under no load at least 10 times	the following condition. Voltage The voltage should be below 0.18 V at least once during this procedure.		
Start Start Let e Chec DTC P0138 P0158 Sthe ins YES NO Check th	ignition sw engine and engine idle ck the volta Connector F102 >> INSPEC >> INSPEC >> GO TO ORM COM re voltage b	ritch OFF d keep the for 1 minu ge betwee ECM + Terminal 76 80 Sult norma CTION EN 2. IPONENT between E ECM +	and wait e engine s ite. en ECM f Terminal 84 al? ND FUNCTI	at least 10 seconds. speed between 3,500 and 4,000 rpm narness connector terminals under the Condition Revving up to 4,000 rpm under no load at least 10 times ON CHECK-II ess connector terminals under the form	the following condition. Voltage The voltage should be below 0.18 V at least once during this procedure. Dllowing condition.		

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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	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	F102	80	04	sition (A/T), 4th gear position (M/T)	least once during this procedure.		

- <u>Is the inspection result normal?</u> YES >> INSPECTION END
- NO >> Go to EC-266, "Diagnosis Procedure".

### Diagnosis Procedure

INFOID:000000006352394

# **1.**INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-263, "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.

# $\mathbf{3.}$ CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. 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	1102	04	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 HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. 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	4	F102	76	Existed	
P0158	2	F53	4	1102	80	LAISIEU	

2. Check the continuity between HO2S2 harness connector or ECM harness connector and ground.

DTC		HO2S2		EC	CM	Ground	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Ground	Continuity	
P0138	1	F54	4	F102	76	Ground	Not existed	
P0158	2	F53	4	1102	80	Giouna	NOT EXISTED	

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Revision: 2011 October

Water should not exist.	А
Is the inspection result normal?	
YES >> GO TO 6.	
NO >> Repair or replace harness or connectors.	EC
6.CHECK HEATED OXYGEN SENSOR 2	
Refer to EC-268, "Component Inspection".	С
Is the inspection result normal?	
YES >> GO TO 8.	
NO >> GO TO 7.	D
REPLACE HEATED OXYGEN SENSOR 2	
Replace malfunctioning heated oxygen sensor 2. Refer to EM-39, "Exploded View".	E
• 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	F
Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubri- cant (commercial service tool).	
>> INSPECTION END	G
8. CHECK INTERMITTENT INCIDENT	
Refer to GI-43, "Intermittent Incident".	Н
Refer to <u>OP-10, Intermittent Incident</u> .	
>> INSPECTION END	
9. CHECK GROUND CONNECTION	
<ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection M95. Refer to Ground Inspection in <u>GI-46, "Circuit Inspection"</u>.</li> </ol>	J
Is the inspection result normal?	
YES >> GO TO 10.	
NO >> Repair or replace ground connection.	K
10.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE	
1. Clear the mixture ratio self-learning value. Refer to EC-24, "MIXTURE RATIO SELF-LEARNING VALUE	I
CLEAR : Special Repair Requirement".	
2. Run engine for at least 10 minutes at idle speed.	
<u>Is the 1st trip DTC P0172 or P0175 detected? Is it difficult to start engine?</u> YES >> Perform trouble diagnosis for DTC P0172, P0175, Refer to EC-282, "DTC Logic".	M
<ul> <li>YES &gt;&gt; Perform trouble diagnosis for DTC P0172, P0175. Refer to <u>EC-282, "DTC Logic"</u>.</li> <li>NO &gt;&gt; GO TO 11.</li> </ul>	
11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT	K I
	Ν
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect heated oxygen sensor 2 harness connector.</li> </ol>	
3. Disconnect ECM harness connector.	0
4. Check the continuity between HO2S2 harness connector and ECM harness connector.	
HO2S2 ECM	

DTC	HO2S2			EC	Continuity	
ыс	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0138	1	F54	1	F102	84	Existed
P0158	2	F53	1	1102	04	LAISteu

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

Is the inspection result normal?

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# P0138, P0158 HO2S2

#### < DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 12.

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

12.CHECK H02S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. 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	4	F102	76	Existed	
P0158	2	F53	4	1102	80	EXISIEU	

 Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

DTC		HO2S2	Ground	Continuity		
DIC	Bank	Connector	Terminal	Giouna	Continuity	
P0138	1	F54	4	Ground	Not existed	
P0158	2	F53	4	Giouna	NUL EXISTED	

DTC		ECM	Ground	Continuity		
DIC	Bank	Connector	Terminal	Cround	Continuity	
P0138	1	F102	76	Ground	Not existed	
P0158	2	1102	80	Gibulu		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 13.

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

**13.**CHECK HEATED OXYGEN SENSOR 2

Refer to EC-268, "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. Refer to <u>EM-39, "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 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

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

**Component Inspection** 

**1.**INSPECTION START

Do you have CONSULT-III?

Revision: 2011 October

2011 370Z

INFOID:000000006352395

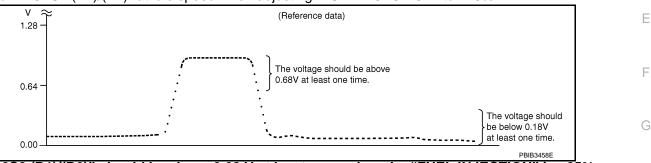
Do you have CONSULT-III? YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

### With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 5. Let engine idle for 1 minute.
- Select "FUEL INJECTION" in "ACTIVE TEST" mode, and select "HO2S2 (B1)/(B2)" as the monitor item with CONSULT-III.
- 7. Check "HO2S2 (B1)/(B2)" at idle speed when adjusting "FUEL INJECTION" to ±25%.



"HO2S2 (B1)/(B2)" should be above 0.68 V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)/(B2)" should be below 0.18 V at least once when the "FUEL INJECTION" is -25%.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

**3.**CHECK HEATED OXYGEN SENSOR 2-1

#### Without CONSULT-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

	ECM				
Connector	+	-	Condition	Voltage	
Connector Terminal	Terminal	Terminal			
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 [HO2S2 (bank 2)]	04	least 10 times	The voltage should be below 0.18 V at least once during this procedure.	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 4.

**4.**CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following condition.

[VQ37VHR]

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# P0138, P0158 HO2S2

### < DTC/CIRCUIT DIAGNOSIS >

ECM					
Connector	+	-	Condition	Voltage	
Connector	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)]		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)]	84	Neeping engine at lot 10 10 minutes		

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				Voltage	
Connector	+ –		Condition		
Connector	Terminal	Terminal			
E102	76 [HO2S2 (bank 1)]	94	Coasting from 80 km/h (50 MPH) in D posi- tion (A/T), 4th gear position (A/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.	
F102 -	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 EM-39, "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

### P0139, P0159 HO2S2

### Description

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The 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

#### 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 than the specified	al delays more than the specified	
P0159	Heated oxygen sensor 2 (bank 2) circuit slow response	time computed by ECM.		

#### DTC CONFIRMATION PROCEDURE

### **1.**INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

2.preconditioning

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

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

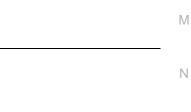
2. Turn ignition switch ON.

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

#### **TESTING CONDITION:**

For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.



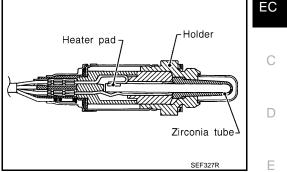
		Ì
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INFOID:000000006352396



OK

1V

0V

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# **3.** PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.
- 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
- 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)	CMFLI	
P0159	HO2 S2 DIAG2 (B2)		

Is "CMPLT" displayed on CONSULT-III 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-III.
- 3. Start engine and follow the instruction of CONSULT-III display. **NOTE:**

It will take at most 10 minutes until "COMPLETED" is displayed.

#### Is "COMPLETED" displayed on CONSULT-III 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).
- 2. Perform DTC confirmation procedure again.

>> GO TO 3.

**6.**PERFORM SELF-DIAGNOSIS

#### With CONSULT-III

Perform ECM self-diagnosis.

Is DTC "P0139" or "P0159" detected?

YES >> Proceed to EC-274, "Diagnosis Procedure".

NO >> INSPECTION END

**/**.PERFORM COMPONENT FUNCTION CHECK

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Perform component function check. Refer to EC-273, "Component Function Check". NOTE: А 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? EC YES >> INSPECTION END NO >> Proceed to EC-274, "Diagnosis Procedure". Component Function Check INFOID:000000006352398 1.PERFORM COMPONENT FUNCTION CHECK-I D Without CONSULT-III Start engine and warm it up to the normal operating temperature. 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. Ε 3. Let engine idle for 1 minute. 4. Check the voltage between ECM harness connector terminals under the following condition. 5. F ECM DTC + Condition Voltage Connector Terminal Terminal P0139 76 Revving up to 4,000 rpm under no load at A change of voltage should be more than F102 84 least 10 times 0.24 V for 1 second during this procedure. P0159 80 Н 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 Condition + Voltage \_ Κ Connector Terminal Terminal

Is the inspection result normal?

F102

### YES >> INSPECTION END

NO >> GO TO 3.

P0139

P0159

### 3. PERFORM COMPONENT FUNCTION CHECK-III

76

80

84

Check the voltage between ECM harness connector terminals under the following condition.

	ECM					
DTC	Connector	+	-	Condition	Voltage	0
	Connector	Terminal	Terminal			
P0139	F102	76	84	Coasting from 80 km/h (50 MPH) in D po-	A change of voltage should be more than	Ρ
P0159			04	sition (A/T), 4th gear position (M/T)	0.24 V for 1 second during this procedure.	

Keeping engine at idle for 10 minutes

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-274, "Diagnosis Procedure".

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A change of voltage should be more than

0.24 V for 1 second during this procedure.

### 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.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

 Clear the mixture ratio self-learning value. Refer to <u>EC-24</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".

2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-278, "DTC Logic"</u> or <u>EC-282, "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 harness connector.
- 3. Disconnect ECM harness connector.
- 4. 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	1	F102	84	Existed
P0159	2	F53	1	1102	04	LAISted

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	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0139	1	F54	4	F102	76	Existed
P0159	2	F53	4	FIUZ	80	Existed

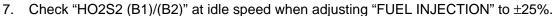
2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

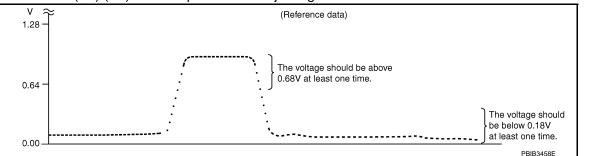
DTC		HO2S2		Ground	Continuity	
DIC	Bank	Connector	Terminal	Giouna	Continuity	
P0139	1	F54	4	Ground	Not existed	
P0159	2	F53	4	Ciouna		

### < DTC/CIRCUIT DIAGNOSIS >

		ECM					А
DTC	Bank	Connector	Terminal	Ground	Continuity		
P0139	1	Connector	76				
P0159	2	F102	80	Ground	Not existed		EC
3. Also c	heck h	arness for	short to po	ower.	I	_	
Is the insp	ection	result norm	nal?				С
	> GO T		ouit chart	to ground	or chort to	oower in harness or connectors.	
5.CHECK		•		•			D
Refer to E							
Is the insp		-	-				Е
	> GO 1						
	> GO 1						
6.REPLA							F
Replace m	alfunct	ioning hea	ted oxyge	n sensor 2	2. Refer to E	M-39, "Exploded View".	
<ul> <li>Discard</li> </ul>	any he					ropped from a height of more than 0.5 m (19.7	G
					floor; use a or. clean e	new one. xhaust system threads using Oxygen Sensor	
Thread	Cleane	r [comme	rcial serv			or J-43897-12)] and approved Anti-seize Lubri-	Н
cant (co	mmero	cial servic	e tool).				
>	> INSP	ECTION E	ND				
7.CHECK	-			Т			I
Refer to G							
							J
>	> INSP	ECTION E	ND				
Compon	ent Ir	nspectio	n			INFOID:00000006352400	Κ
1.INSPEC	CTION	START					
Do you ha	ve COI	NSULT-III?					L
<u>Do you ha</u>							
	> GO 1 > GO 1						Μ
			EN SENS	OR 2			
-							
With CO			and selec	t "DATA M	IONITOR" n	node with CONSULT-III.	Ν
2. Start e	ngine a	and warm i	it up to the	e normal o	perating ten		
					0 seconds. ween 3,500	and 4,000 rpm for at least 1 minute under no load.	0
5. Let en	gine id	le for 1 mir	nute.	·			
	ONSU				Si moue, a	and select "HO2S2 (B1)/(B2)" as the monitor item	Ρ

### < DTC/CIRCUIT DIAGNOSIS >





"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-III

- 1. Start engine and warm it up to the normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 4. Let engine idle for 1 minute.
- 5. Check the voltage between ECM harness connector terminals under the following condition.

ECM					
Connector	+ –		Condition	Voltage	
Connector —	Terminal	Terminal			
F102	76 [HO2S2 (bank 1)]	94	Revving up to 4,000 rpm under no load at	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	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	
	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)]	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.

# < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Connector	ECM +	_	Condition	Voltage
	Terminal	Terminal		
F102 –	76 [HO2S2 (bank 1)] 80 [HO2S2 (bank 2)]	84	Coasting from 80 km/h (50 MPH) in D posi- tion (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	ction result i			
	INSPECTIO GO TO 6.	ON END		
	E HEATED		SENSOR 2	
			rgen sensor 2. Refer to EM-39, "Explo	ded View"
AUTION:				
			nsor which has been dropped from a concrete floor; use a new one.	a height of more than 0.5 m (19.7
Before in	stalling hea	ated new o	oxygen sensor, clean exhaust syst	em threads using Oxygen Sensor
	nmercial se		ervice tool (J-43897-18 or J-43897-1	2)] and approved Anti-Seize Lubri-
,		,		
>>	INSPECTIO	ON END		

### < DTC/CIRCUIT DIAGNOSIS >

# P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

### DTC Logic

INFOID:000000006352401

[VQ37VHR]

### DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (the actual mixture ratio is too lean), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator	
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector	

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean (bank 1)		<ul> <li>Intake air leaks</li> <li>A/F sensor 1</li> </ul>
P0174	Fuel injection system too lean (bank 2)	<ul> <li>Fuel injection system does not operate properly.</li> <li>The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)</li> </ul>	<ul> <li>Fuel injector</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Lack of fuel</li> <li>Mass air flow sensor</li> <li>Incorrect PCV hose connection</li> </ul>

#### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

#### >> GO TO 2.

### 2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to <u>EC-24, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.

2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.

NO >> GO TO 4.

**3.**RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.

Crank engine while depressing accelerator pedal.

#### NOTE:

When depressing accelerator pedal three fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-279, "Diagnosis Procedure".

NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 5 minutes.

2. Check 1st trip DTC.

P0171, P0174 FUEL INJECTION SYSTEM FUNCTION	
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
Is 1st trip DTC detected?	
YES >> Go to <u>EC-279, "Diagnosis Procedure"</u> . NO >> GO TO 5.	A
5. PERFORM DTC CONFIRMATION PROCEDURE-III	
1. Turn ignition switch OFF and wait at least 10 seconds.	EC
2. Start engine.	
<ol> <li>Maintain the following conditions for at least 10 consecutive minutes. Hold the accelerator pedal as steady as possible.</li> </ol>	С
VHCL SPEED SE 50 - 120 km/h (31 - 75 MPH)	
CAUTION:	D
Always drive vehicle at a safe speed. 4. Check 1st trip DTC.	
Is 1st trip DTC detected?	E
YES >> Go to EC-279, "Diagnosis Procedure".	
NO >> INSPECTION END	
Diagnosis Procedure	INFOID:00000006352402
1.CHECK EXHAUST GAS LEAK	G
1. Start engine and run it at idle.	
2. Listen for an exhaust gas leak before three way catalyst 1.	
	H
Three way catalyst 1	
A/F sensor 1 HO2S2 / Muffler	
To exhaust  manifold	J
Exhaust gas	PBIB1922E
Is exhaust gas leak detected?	K
YES >> Repair or replace.	
NO >> GO TO 2.	
2.CHECK FOR INTAKE AIR LEAK	L
1. Listen for an intake air leak after the mass air flow sensor.	
2. Check PCV hose connection.	M
Is intake air leak detected?	IVI
YES >> Repair or replace. NO >> GO TO 3.	
3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT	Ν
1. Turn ignition switch OFF.	
<ol><li>Disconnect corresponding A/F sensor 1 harness connector.</li></ol>	0
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		
DTC	Bank Connector		Terminal	Connector	Terminal	Continuity
D0474		F0	1	<b>F100</b>	57	Existed
P0171	1	F3	2		61	
D0174	2	E20	1	F102	65	
FU174	P0174 2	F20	2		66	

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### < DTC/CIRCUIT DIAGNOSIS >

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

DTC		A/F sensor	Ground	Continuity	
DIC	Bank Connector Terminal		Gibuliu	Continuity	
P0171	1	F3	1		Not existed
PUITI	I	гJ	2	Ground	
D0174	2	F20	1	Ground	
P0174	2		2	-	

DTC		ECM		Ground	Continuity
	Bank Connector Terminal		Terminal	Giouna	Continuity
P0171	1		57		Not existed
PUITI	1	F102	61	Ground	
P0174	0	FIUZ	65		
	2		66		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

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

**4.**CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-636, "Inspection".

2. Install fuel pressure gauge and check fuel pressure. Refer to EC-636, "Inspection".

### At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

**5.** DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace "fuel filter and fuel pump assembly". Refer to FL-5. "Exploded View".

NO >> Repair or replace.

6.CHECK MASS AIR FLOW SENSOR

#### With CONSULT-III

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III. For specification, refer to <u>EC-639, "Mass Air Flow Sensor"</u>.

#### With GST

- 1. Install all removed parts.
- Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to <u>EC-639</u>, "<u>Mass Air Flow Sensor</u>".

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-205, "Diagnosis Procedure"</u>.

### 7. CHECK FUNCTION OF FUEL INJECTOR

#### With CONSULT-III

1. Start engine.

[VQ37VHR]

#### < DTC/CIRCUIT DIAGNOSIS >

- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

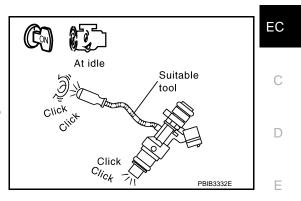
#### Without CONSULT-III

- 1. Start engine and let it idle.
- 2. Listen to each fuel injector operating sound.

#### Clicking sound should be heard.

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-517, "Diagnosis Procedure"</u>.



[VQ37VHR]

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# 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-43</u>, "<u>Removal and Installation</u>". Keep fuel hose and all fuel injectors connected to fuel tube.
- 5. For DTC P0171, reconnect fuel injector harness connectors on bank 1. For DTC P0174, reconnect fuel injector harness connectors on bank 2.
- 6. Disconnect all ignition coil harness connectors.
- 7. Prepare pans or saucers under each fuel injector.
- Crank engine for about 3 seconds.
   For DTC P0171, make sure that fuel sprays out from fuel injectors on bank 1.
   For DTC P0174, make sure that fuel sprays out from fuel injectors.

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?

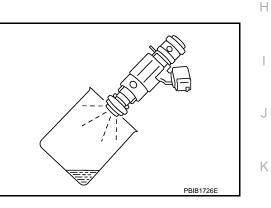
YES >> GO TO 9.

NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones. Refer to <u>EM-</u> <u>43, "Removal and Installation"</u>.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END



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#### < DTC/CIRCUIT DIAGNOSIS >

# P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

### DTC Logic

INFOID:000000006352403

[VQ37VHR]

### DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from A/F sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (the actual mixture ratio is too rich), the ECM judges the condition as the fuel injection system malfunction and illuminates the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich (bank 1)	• Fuel injection system does not operate properly.	<ul><li> A/F sensor 1</li><li> Fuel injector</li></ul>
P0175	Fuel injection system too rich (bank 2)	• The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	<ul> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Mass air flow sensor</li> </ul>

### 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-24</u>, "<u>MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement</u>".
- 2. Start engine.

Is it difficult to start engine?

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

**3.**RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too. Crank engine while depressing accelerator pedal.

#### NOTE:

When depressing accelerator pedal three fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-283, "Diagnosis Procedure".

NO >> Remove spark plugs and check for fouling, etc.

#### **4.**PERFORM DTC CONFIRMATION PROCEDURE-II

1. Keep engine idle for at least 10 minutes.

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-283, "Diagnosis Procedure".

NO >> GO TO 5.

#### [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > 5. PERFORM DTC CONFIRMATION PROCEDURE-III А Turn ignition switch OFF and wait at least 5 seconds. 1. 2. Turn ignition switch ON. 3. Start engine. EC Maintain the following conditions for at least 10 consecutive minutes. 4. 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. 5. Check 1st trip DTC. D Is 1st trip DTC detected? YES >> Go to EC-283, "Diagnosis Procedure". Е >> INSPECTION END NO Diagnosis Procedure INFOID:00000006352404 F **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. Three way catalyst 1 Н Three way catalyst 2 Muffler HO2S2 A/F sensor 1 To exhaust manifold : Exhaust gas PBIB1922E Is exhaust gas leak detected? YES >> Repair or replace. NO >> GO TO 2. Κ 2.CHECK FOR INTAKE AIR LEAK Listen for an intake air leak after the mass air flow sensor. L Is intake air leak detected? YES >> Repair or replace. NO >> GO TO 3. Μ 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		CM	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0172	1	F3			57	
10172	1	15	2	F102	61	Existed
P0175	2	F20	1		65	EXISTED
FU175	2	F20	2		66	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

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### < DTC/CIRCUIT DIAGNOSIS >

DTC	A/F sensor 1			Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0172	1	F3	1		Not existed
FUITZ	12 1 F3	15	2	Ground	
P0175	2	<b>1</b>		Giouna	NUL EXISTED
FU1/5	2 F20	2 F20 2	2		

DTC	ECM			Ground	Continuity
DIC	Bank	Connector	Terminal	Giouna	Continuity
P0172	P0172 1 F102 P0175 2	F102	57	Ground	Not existed
FUITZ			61		
D0175		65	Gibuna	NUL EXISLEU	
FU175			66	-	

- 6. Also check harness for short to power.
- Is the inspection result normal?

YES >> GO TO 4.

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

**4.**CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-636, "Inspection".

2. Install fuel pressure gauge and check fuel pressure. Refer to EC-636, "Inspection".

### At idling: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace "fuel filter and fuel pump assembly". Refer to <u>FL-5, "Exploded View"</u>.

5.CHECK MASS AIR FLOW SENSOR

#### With CONSULT-III

- 1. Install all removed parts.
- 2. Check "MASS AIR FLOW" in "DATA MONITOR" mode with CONSULT-III. For specification, refer to <u>EC-639, "Mass Air Flow Sensor"</u>.

### With GST

- 1. Install all removed parts.
- Check mass air flow sensor signal in "Service \$01" with GST. For specification, refer to <u>EC-639, "Mass Air Flow Sensor"</u>.

Is the measurement value within the specification?

- YES >> GO TO 6.
- NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to <u>EC-205, "Diagnosis Procedure"</u>.

### **6.**CHECK FUNCTION OF FUEL INJECTOR

#### With CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

#### Without CONSULT-III

1. Start engine and let it idle.

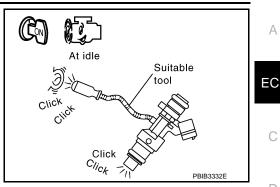
### < DTC/CIRCUIT DIAGNOSIS >

#### 2. Listen to each fuel injector operating sound.

#### Clicking sound should be heard.

#### Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-517, "Diagnosis Procedure"</u>.



[VQ37VHR]

#### D 7. CHECK FUEL INJECTOR 1. Remove fuel injector assembly. Refer to EM-43, "Removal and Installation". Keep fuel hose and all fuel injectors connected to fuel tube. Ε 2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle. Disconnect all fuel injector harness connectors. 3. 4. Disconnect all ignition coil harness connectors. 5. Prepare pans or saucers under each fuel injector. F 6. Crank engine for about 3 seconds. Make sure fuel that does not drip from fuel injector. Is the inspection result normal? YES >> GO TO 8. NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one. Refer to EM-43, "Removal and Installation". Н 8. CHECK INTERMITTENT INCIDENT Refer to GI-43, "Intermittent Incident". >> INSPECTION END Κ

Revision: 2011 October

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### P0181 FTT SENSOR

### Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. <**Reference data**>

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance ( $k\Omega$ )
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 (Trouble diagnosis content)		DTC detecting condition		Possible cause
	FTT SENSOR [Fuel tank temperature		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	(FTT) sensor circuit range/ performance]	B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other tempera- ture 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.

- 2. 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.

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

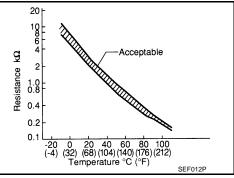
YES >> Go to EC-288, "Diagnosis Procedure".

NO >> GO TO 4.



INFOID:000000006913131

INFOID:000000006913132



# P0181 FTT SENSOR

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
4.CHECK ENGINE COOLANT TEMPERATURE	
<ol> <li>Select "COOLAN TEMP/S" in "DATA MONITOR" with CONSULT-III.</li> <li>Check "COOLAN TEMP/S" value.</li> </ol>	
<u>"COOLAN TEMP/S" less than 60°C (140°F)?</u> YES >> INSPECTION END	E
NO >> GO TO 5.	
5.PERFORM DTC CONFIRMATION PROCEDURE-II	
<ol> <li>Cool engine down until "COOLAN TEMP/S" is less than 60°C (140°F).</li> <li>Wait at least 10 seconds.</li> <li>Check 1st trip DTC.</li> </ol>	
Is 1st trip DTC detected?	
YES >> Go to <u>EC-288, "Diagnosis Procedure"</u> . NO >> GO TO 6.	
<b>6.</b> PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)	
Perform component function check. Refer to <u>EC-288, "Component Function Check"</u> .	
<b>NOTE:</b> Use the component function check to check the overall function of the FTT sensor circuit 1st trip DTC might not be confirmed.	it. During this check, a
Is the inspection result normal?	
YES >> INSPECTION END NO >> Proceed to <u>EC-288, "Diagnosis Procedure"</u> .	
7. PRECONDITIONING	
If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform	n the following proce-
<ul><li>dure before conducting the next test.</li><li>1. Turn ignition switch OFF and wait at least 10 seconds.</li></ul>	
<ol> <li>Turn ignition switch ON.</li> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> </ol>	
TEST CONDITION:	
<ul> <li>Before performing the following procedure, do not add fuel.</li> <li>Before performing the following procedure, check that fuel level is between 1/4 a</li> <li>Before performing the following procedure, confirm that battery voltage is 11 V or the following procedure.</li> </ul>	
>> GO TO 8.	
8.PERFORM DTC CONFIRMATION PROCEDURE B	
<ol> <li>Start engine and let it idle for 60 minutes.</li> <li>Move the vehicle to a cool place. NOTE:</li> </ol>	
Cool the vehicle in an environment of ambient air temperature between -10°C (14°I 3. Turn ignition switch OFF and soak the vehicle for 12 hours. CAUTION:	<sup>-</sup> ) and 35°C (95°F).
Never turn ignition switch ON during soaking. NOTE:	
<ul><li>The vehicle must be cooled with the food open.</li><li>4. Start engine and let it idle for 5 minutes or more.</li><li>CAUTION:</li></ul>	
<ul><li>Never turn ignition switch OFF during idling.</li><li>5. Check 1st trip DTC.</li></ul>	
Is 1st trip DTC detected?	
YES >> Proceed to <u>EC-288, "Diagnosis Procedure"</u> . NO >> INSPECTION END	

NO >> INSPECTION END

# **Component Function Check**

# 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. Refer to FL-17, "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	Tomporaturo [°C (°E)]	20 (68)	2.3 - 2.7
4 anu 5	Temperature [°C (°F)]	50 (122)	0.79 - 0.90

Is the inspection result normal?

YES >> GO TO 2.

NO >> Proceed to EC-288, "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-288, "Diagnosis Procedure".

# Diagnosis Procedure

## **1.**INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-286, "DTC Logic".

Which malfunction is detected?

YES >> GO TO 2.

NO >> GO TO 7.

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-34, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

>> Go to MWI-48, "Component Function Check". NO

3.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

Disconnect "fuel level sensor unit and fuel pump (main)" harness connector. 2.

Turn ignition switch ON. 3.

Check the voltage between "fuel level sensor unit and fuel pump (main)" harness connector and ground. 4.

Fuel level sensor unit	Ground	Voltage (V)	
Connector	Terminal	Cround	voltage (v)
B22	4	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 5.

>> GO TO 4. NO

4. DETECT MALFUNCTIONING PART

#### Check the following.

Harness connectors M7, B1

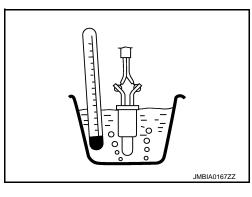
• Harness for open or short between ECM and "fuel level sensor unit and fuel pump (main)"

## **EC-288**

#### 2011 370Z

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INFOID:000000006913134



# P0181 FTT SENSOR

### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

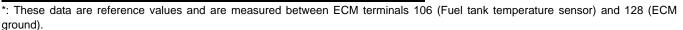
>	> Repair open	circuit or she	ort to groun	d or short to	power in	harness or connector.	
5.CHECH	K FUEL TANK	TEMPERAT	URE SENS	OR GROUN	ID CIRCU	IT FOR OPEN AND SHORT	А
<ol> <li>Disco</li> <li>Check</li> </ol>	gnition switch nnect combina the continuity meter harnes	tion meter ha			fuel pump	ס (main)" harness connector and combi-	EC
	sensor unit and ump (main)	Combinat	ion meter	Continuity	-		С
Connecto	r Terminal	Connector	Terminal		_		D
B22	5	M53	24	Existed	_		D
Is the insp YES > NO >	heck harness <u>ection result n</u> > GO TO 7. > GO TO 6.	ormal?		short to powe	er.		E
<b>6.</b> DETEC	T MALFUNC	IONING PAR	RT				F
	connectors M for open or sh		"fuel level s	ensor unit ar	nd fuel pu	mp (main)" and "unified meter and com-	G
_	> Repair open K FUEL TANK				power in	harness or connector.	Η
Is the insp	<u>C-289, "Comp</u> <u>ection result n</u> > GO TO 8.		<u>stion"</u> .				I
NO >	> Replace "fue			uel pump (m	nain)". Ref	fer to FL-5, "Removal and Installation".	J
	(INTERMITTE						
Refer to G	I-43, "Intermitt	ent Incident"					К
>	> INSPECTIO	N END					
Compor	ent Inspec	tion				INFOID:00000006913135	L
	K FUEL TANK			סר			
	gnition switch		URE SENS	JR			Μ
<ol> <li>Disco</li> <li>Remo</li> <li>Check</li> </ol>	nnect "fuel leve	el sensor unit ensor unit an etween "fuel l	d fuel pump evel sensor	(main). Ref	fer to <u>FL-5</u> el pump	connector. 5. "Exploded View".	Ν
Terminals	C	ondition	Rosis	stance (kΩ)			0
4 and 5	Temperature [	20 C (°F)]	(68) 2	.3 - 2.7 79 - 0.90			Ρ
YES >	ection result n > INSPECTIO > Replace "fue Refer to <u>FL-</u>	N END		fuel pump	(main)".	JMBIA0167ZZ	

# P0182, P0183 FTT SENSOR

# Description

The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases. <**Reference data**>

Fluid temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90



# DTC Logic

INFOID:000000006352410

# DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	Harness or connectors     (The sensor circuit is open or shorted.)
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

# DTC CONFIRMATION PROCEDURE

# **1.**PRECONDITIONING

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

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

### >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

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

2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-290, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

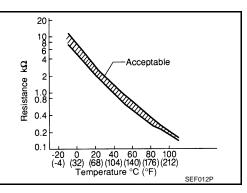
### **1.**CHECK GROUND CONNECTION

- 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 DTC WITH COMBINATION METER



INFOID:00000006352409

INFOID:000000006352411

# P0182, P0183 FTT SENSOR

			P01	182, P018	B3 FTT SENSOR	
< DTC/CIF		AGNOSIS	>		[VQ37VH	R]
Refer to M	WI-34, "C	ONSULT-II	I Functio	n (METER/M	<u>M&amp;A)"</u> .	
Is the inspe	ection res	ult normal?				/
	> GO TO :					
•			-	Function C		E
<b>3.</b> CHECK	FUEL TA	NK TEMP	ERATUR	E SENSOR	POWER SUPPLY CIRCUIT	
	nition swi					
	nect "fuel nition swi		or unit ar	id fuel pump	p" harness connector.	(
			n "fuel lev	el sensor ur	nit and fuel pump" harness connector and ground.	
	-	-				
Fuel level se		d				
	pump	Ground	Voltage	e (V)		
Connector	Terminal					E
B22	4	Ground	Approx	k. 5		
Is the inspe			-			
	> GO TO					
4.DETEC						
<ul><li>Check the</li><li>Harness</li></ul>		rs M7 B1				
			ween EC	M and "fuel	l level sensor unit and fuel pump"	
_ >>	> Repair o	pen circuit	, short to	ground or s	short to power in harness or connector.	
<b>5.</b> CHECK	FUEL TA	NK TEMP	ERATUR	E SENSOR	GROUND CIRCUIT FOR OPEN AND SHORT	
	nition swi					
				ess connect	tor. r unit and fuel pump" harness connector and combination	<u>on</u>
	harness c				r unit and rue pump namess connector and combination	UII
Fuel level s		Combinat	ion meter			
and fue				Continuity		
Connector	Terminal	Connector	Terminal			
B22	5	M53	24	Existed		
				ind and sho	ort to power.	
Is the inspe			-			
	> GO TO ; > GO TO (					
6.DETEC						
Check the • Harness		rs M7 R1				
			ween "fu	el level sens	sor unit and fuel pump" and combination meter	
>:	> Repair o	pen circuit	, short to	ground or s	short to power in harness or connector.	
7.снеск	FUEL TA		ERATUR	E SENSOR		
Refer to E						
Is the inspe				<u> </u>		
•	> GO TO 8					
	<b>D</b> 1				norman", Defende El, El "Engle de d'Africal	

NO >> Replace "fuel level sensor unit and fuel pump". Refer to <u>FL-5, "Exploded View"</u>.

8. CHECK INTERMITTENT INCIDENT

< DTC/CIRCUIT DIAGNOSIS >

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

### **Component Inspection**

INFOID:000000006352412

[VQ37VHR]

# 1.CHECK FUEL TANK TEMPERATURE SENSOR

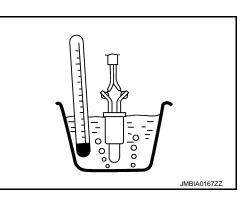
- 1. Turn ignition switch OFF.
- Disconnect "fuel level sensor unit and fuel pump" harness connector. 2.
- Remove fuel level sensor unit. Refer to FL-5, "Exploded View". 3.
- Check resistance between "fuel level sensor unit and fuel pump" 4. terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k $\Omega$ )	
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7
4 anu 5		50 (122)	0.79 - 0.90

Is the inspection result normal?

YES >> INSPECTION END

>> Replace "fuel level sensor unit and fuel pump". Refer to NO FL-5, "Exploded View".

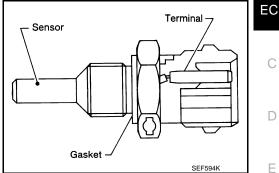


#### < DTC/CIRCUIT DIAGNOSIS >

# 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>

Voltage* (V)	Resistance (k $\Omega$ )
4.4	7.0 - 11.4
3.5	2.10 - 2.90
2.2	0.68 - 1.00
0.9	0.236 - 0.260
0.6	0.143 - 0.153
	4.4 3.5 2.2 0.9

\*: These data are reference values and are measured between ECM terminals 78 (Engine oil temperature sensor) and 84 (Sensor ground).

# DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

If DTC P0196 is displayed with P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to <u>EC-297, "DTC Logic"</u>.

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INFOID:000000006913217

DTC No.	Trouble diagnosis (Trouble diagnosis content)				L
	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.	<ul> <li>Harness or connectors (The EOT sensor circuit is open or shorted)</li> <li>EOT sensor</li> </ul>	N
P0196	[Engine oil temperature (EOT) sensor range/performance	B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT 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.	<ul> <li>Harness or connectors (High or low resistance in the EOT sensor circuit)</li> <li>EOT sensor</li> </ul>	N

### DTC CONFIRMATION PROCEDURE

**1.**INSPECTION START

#### Is it necessary to erase permanent DTC?

YES	>> GO TO 6.
NO	>> GO TO 2.
<b>2.</b> pre	CONDITIONING

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# P0196 EOT SENSOR

### < DTC/CIRCUIT DIAGNOSIS >

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

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

#### **TESTING CONDITION:**

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 3.

# **3.**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. Start engine and let it idle for 5 minutes and 10 seconds.
- 6. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> EC-296, "Diagnosis Procedure".

NO >> GO TO 4.

**4.**PERFORM DTC CONFIRMATION PROCEDURE-II

- 1. Select "DATA MONITOR" mode with CONSULT-III.
- 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.
- 3. Turn ignition switch OFF and soak the vehicle in a cool place.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Turn ignition switch ON.

# NOTE:

#### Do not turn ignition switch OFF until step 10.

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

NOTĚ:

• 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-296, "Diagnosis Procedure".

NO >> GO TO 5.

**5.**PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-295, "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

# **P0196 EOT SENSOR**

< DTC/CIF	RCUIT DIAGNOSIS :	>		[VQ37VHR]
NO >>	> Proceed to <u>EC-296</u> .	"Diagnos	is Procedure".	
6.PRECO	NDITIONING	-		
dure before 1. Turn ig 2. Turn ig 3. Turn ig <b>TEST CON</b> • Before p	e conducting the next gnition switch OFF an- gnition switch ON. gnition switch OFF an- NDITION: performing the follow	test. d wait at le d wait at le <b>/ing proc</b>	east 10 seconds. east 10 seconds. <b>edure, do not add f</b>	conducted, always perform the following proce- uel. uel level is between 1/4 and 4/4.
				battery voltage is 11 V or more at idle.
	> GO TO 7.			
_	RM DTC CONFIRMA			
	ngine and let it idle fo			
2. Move t	the vehicle to a cool p			
3. Turn ig	ne vehicle in an enviro gnition switch OFF an			ture between –10°C (14°F) and 35°C (95°F). 3.
CAUT Never	ION: turn ignition switch	ON durir	ng soaking.	
NOTE: The ve		with the f	ood open.	
CAUT	ION:			
	turn ignition switch 1st trip DTC.	OFF duri	ing idling.	
	DTC detected?			
	Proceed to <u>EC-296</u> , NSPECTION END	<u>"Diagnos</u>	is Procedure".	
Compon	ent Function Che	eck		INFOID:000000006913218
1.снеск	ENGINE OIL TEMPE	ERATURE	(EOT) SENSOR	
	nition switch OFF.	noss conr	octor	
3. Remov	ve EOT sensor. Refer	to <u>EM-82</u>	, "Exploded View".	
	resistance between		nsor terminals by h	eating
	ot water as shown in t	ne ngure.		
Terminals	Condition		Resistance (kΩ)	
		20 (68)	2.10 - 2.90	
1 and 2	Temperature [°C (°F)]	50 (122)	0.68 - 1.00	
		90 (194)	0.236 - 0.260	
YES >>	<u>ection result normal?</u> > GO TO 2. > Proceed to <u>EC-296.</u>	"Diagnos	is Procedure".	JMBIA0080ZZ
2.снеск	INTERMITTENT INC	DENT		
Check inte	rmittent incident. Refe	er to <u>GI-43</u>	3, "Intermittent Incide	<u>nt"</u> .
•	ection result normal?			
	> INSPECTION END > Proceed to <u>EC-296</u> ,	"Diagnos	is Procedure".	

# P0196 EOT SENSOR

### < DTC/CIRCUIT DIAGNOSIS >

# 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 ENGINE OIL TEMPERATURE SENSOR

Refer to EC-296. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace engine oil temperature sensor. Refer to EM-82, "Exploded View".

**3.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

#### >> INSPECTION END

### Component Inspection

# 1.CHECK ENGINE OIL TEMPERATURE SENSOR

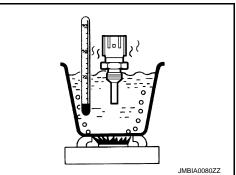
- 1. Turn ignition switch OFF.
- 2. Disconnect engine oil temperature sensor harness connector.
- 3. Remove engine oil temperature sensor. Refer to EM-82, "Exploded View".
- 4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition	Resistance (k $\Omega$ )	
		20 (68)	2.10 - 2.90
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 <u>EM-82.</u> <u>"Exploded View"</u>.



INFOID:000000006913219

INFOID:000000006913220

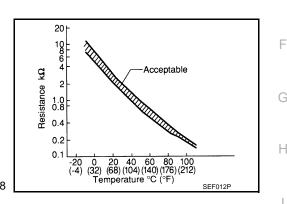
#### < DTC/CIRCUIT DIAGNOSIS >

# P0197, P0198 EOT SENSOR

### Description

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

# EC Terminal Sensor Gasket SEF594K



#### <Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (k $\Omega$ )
-10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.10 - 2.90
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

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#### DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause	IZ.
P0197	Engine oil 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.)	n
P0198	Engine oil temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.		L

#### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

#### >> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is 1st trip DTC detected?

- >> Go to EC-298, "Diagnosis Procedure". YES
- >> INSPECTION END NO

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### < DTC/CIRCUIT DIAGNOSIS >

### Diagnosis Procedure

INFOID:000000006352419

### **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 EOT SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect engine oil temperature (EOT) sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between EOT sensor harness connector and ground.

EOT	sensor	Ground	Voltage (V)	
Connector	Terminal	Glound	voltage (v)	
F38	1	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 3.

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

# 3.CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

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

EOT	sensor	EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
F38	2	F102	84	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

**4.**CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-298, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace engine oil temperature sensor. Refer to <u>EM-82, "Exploded View"</u>.

**5.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

#### >> INSPECTION END

### **Component Inspection**

INFOID:000000006352420

# 1.CHECK ENGINE OIL TEMPERATURE SENSOR

1. Turn ignition switch OFF.

2. Disconnect engine oil temperature sensor harness connector.

Remove engine oil temperature sensor. Refer to <u>EM-82, "Exploded View"</u>.

# P0197, P0198 EOT SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

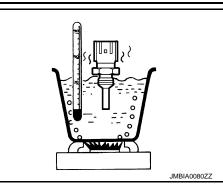
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.

Terminals	Condition		Resistance (k $\Omega$ )
		20 (68)	2.10 - 2.90
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 <u>EM-82.</u> <u>"Exploded View"</u>.



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# P0222, P0223, P2132, P2133 TP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

# P0222, P0223, P2132, P2133 TP SENSOR

### Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to Throttle position sensor the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



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# 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-398, "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.	<ul> <li>Harness or connectors (TP sensor 1 circuit is open or shorted.)</li> </ul>
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.

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

- 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:** 

# >> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for 1 second. 1.
- Check DTC. 2.

#### Is DTC detected?

- YES >> Go to EC-300, "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". 2.

#### EC-300

INFOID:00000006352423



Throttle position sensor

Sensor 1

Seńsor 2

45

Throttle valve opening angle (deg) PBIB0145E

6.0

4.0

output voltage

0<sup>⊾</sup>0

[VQ37VHR]

INFOID:00000006352421

# P0222, P0223, P2132, P2133 TP SENSOR

			-	223, P21	<b>32, P2</b> 1	33 TP SE		
< DTC/CIRCL			>				[VQ37VHR]	
Is the inspection								Δ
	O TO 2 epair o	z. r replace gi	round cor	nection				А
2.CHECK TH					NER SUF	PLY CIRCU	IT	
		ric throttle						EC
2. Turn igniti	on swit	tch ON.						
3. Check the	e voltag	e between	electric th	nrottle cont	trol actuat	or harness c	connector and ground.	С
	Elect	ric throttle cor		r				
DTC	Bank	Connector		— Ground	Voltage	e (V)		
P0222, P0223	1 1	F6	6					D
P2132, P2133	2	F27	1	Ground	Appro	x. 5		
Is the inspecti			•					Е
•	0 TO 3							
•	•		-	-	•		ess or connectors.	_
3. СНЕСК ТН	IROTT	LE POSITI	ON SENS	SOR 1 GR	OUND CII	RCUIT FOR	OPEN AND SHORT	F
1. Turn igniti								
		harness c		c throttle c	ontrol act	lator harnes	s connector and ECM harness con-	G
nector.	, contin	iuity betwee						
								Н
DTC	Electric	c throttle conti	ol actuator	EC	CM	Continuity		
	Bank	Connector	Terminal	Connector	Terminal			
P0222, P0223	1	F6	3	F101	40	Existed		
P2132, P2133	2	F27	4		48			
		ess for sho	rt to grour	nd and sho	ort to powe	er.		J
<u>Is the inspection</u> YES >> G	O TO 4							
			short to g	ground or s	short to po	wer in harne	ess or connectors.	
4. СНЕСК ТН	IROTT	LE POSITI	ON SENS	SOR 1 INP	UT SIGN	AL CIRCUIT	FOR OPEN AND SHORT	K
1. Check the	e contir	uity betwe	en electri	c throttle c	ontrol act	uator harnes	s connector and ECM harness con-	
nector.		-						L
	<b>F</b> 1	4			204			
DTC		c throttle conti		Connector	CM	Continuity		M
P0222, P0223	Bank 1	Connector F6	Terminal 4	Connector	Terminal 30			
P2132, P2133	2	F27	2	F101	30	Existed		
2. Also chec				nd and sho		۲		Ν
Is the inspection			t to grou					
	O TO 5							0
_	•		-	-	short to po	wer in harne	ess or connectors.	
5. CHECK THROTTLE POSITION SENSOR								
Refer to EC-302, "Component Inspection".							Р	
Is the inspection result normal?								
	О ТО 7 О ТО 6							
6.REPLACE					CTUATO	R		

1. Replace malfunctioning electric throttle control actuator. Refer to EM-34, "Exploded View".

# P0222, P0223, P2132, P2133 TP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

2. Go to EC-302, "Special Repair Requirement".

#### >> 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-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
- 4. Turn ignition switch ON.
- 5. Set selector lever to D (A/T) or 1st (M/T) position.
- 6. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM				
Connector	+	-	Condition		Voltage (V)
	Terminal	Terminal			
	20 ITD concort 1 (bonk 1)]	40		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
<b>E404</b>				Fully depressed	Less than 4.75
F101	34 [TP sensor 2 (bank 1)]	40		Fully released	Less than 4.75
				Fully depressed	More than 0.36
		40		Fully released	Less than 4.75
	35 [TP sensor 2 (bank 2)]	bank 2)] 48		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-34, "Exploded View".

2. Go to EC-302. "Special Repair Requirement".

#### >> INSPECTION END

Special Repair Requirement

INFOID:000000006352425

# **1.**PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

INFOID:000000006352424

### < DTC/CIRCUIT DIAGNOSIS >

# P0300, P0301, P0302, P0303, P0304, P0305, P0306 MISFIRE

# **DTC** Logic

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### 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 illuminating.

If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.

2. Two Trip Detection Logic (Exhaust quality deterioration)

For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only illuminate when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP H 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.	<ul> <li>Insufficient compression</li> <li>Incorrect fuel pressure</li> </ul>	J
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	k
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.	<ul> <li>Signal plate</li> <li>A/F sensor 1</li> <li>Incorrect PCV hose connection</li> </ul>	L

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### >> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE-I

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Restart engine and let it idle for about 15 minutes.
- 6. Check 1st trip DTC.

< DTC/CIRCUIT DIAGNOSIS >

Is 1st trip DTC detected?

YES >> Go to EC-304, "Diagnosis Procedure".

NO >> GO TO 3.

**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.
- 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 driving.

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

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-304, "Diagnosis Procedure".

NO >> INSPECTION END

# **Diagnosis Procedure**

# **1.**CHECK FOR INTAKE AIR LEAK AND PCV HOSE

- 1. 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-III: GO TO 3.

- YES-2 >> Without CONSULT-III: GO TO 4.
- NO >> Repair or replace it.
- 3.PERFORM POWER BALANCE TEST

#### With CONSULT-III

1. Start engine.

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#### < DTC/CIRCUIT DIAGNOSIS >

- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9. NO >> GO TO 4.

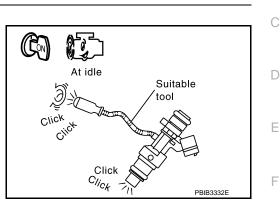
**4.**CHECK FUNCTION OF FUEL INJECTOR-I

- 1. Start engine and let it idle.
- 2. Listen to each fuel injector operation sound.

#### Clicking sound should be heard.

#### Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to <u>EC-517, "Diagnosis Procedure"</u>.



# 5. CHECK FUNCTION OF IGNITION COIL-I

#### **CAUTION:**

#### Perform the following procedure in a place where with no combustible objects and good ventilation.

- 1. Turn ignition switch OFF.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

#### NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 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.

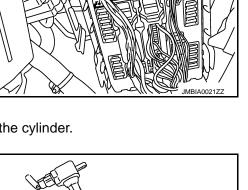
#### CAUTION:

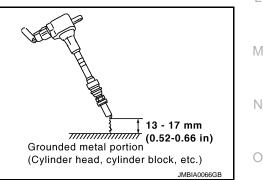
- During the operation, always stay 50 cm (19.7 in) or more away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 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.





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### < DTC/CIRCUIT DIAGNOSIS >

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6.CHECK FUNCTION OF IGNITION COIL-II

- 1. Turn ignition switch OFF.
- 2. Disconnect spark plug and connect a non-malfunctioning spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

Is the inspection result normal?

YES >> GO TO 7.

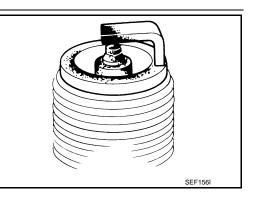
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-523. "Diagnosis Procedure".

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 <u>EM-22, "Inspection"</u>.
- NO >> Repair or clean spark plug. Then GO TO 8.



### 8. CHECK FUNCTION OF IGNITION COIL-III

- 1. Reconnect the initial spark plugs.
- 2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

#### Spark should be generated.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-21, "Removal</u> <u>and Installation"</u>.

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-28, "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.

- 2. Release fuel pressure to zero. Refer to EC-636, "Inspection".
- 3. Install fuel pressure gauge and check fuel pressure. Refer to EC-636, "Inspection".

### At idle: Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 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". Refer to <u>FL-5, "Exploded View"</u>.

NO >> Repair or replace.

### EC-306

< DTC/CIRCUIT DIAGNOSIS >

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12. CHECK IDLE SPEED AND IGNITION TIMING For procedure, refer to EC-14, "BASIC INSPECTION : Special Repair Requirement". For specification, refer to EC-639, "Idle Speed" and EC-639, "Ignition Timing". Is the inspection result normal? EC YES >> GO TO 13. >> Follow the EC-14, "BASIC INSPECTION : Special Repair Requirement". NO 13. 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. 3.

Check the continuity between A/F sensor 1 harness connector and ECM harness connector. 4.

		A/F sensor	1	EC	CM	Continuity
	Bank	Connector	Terminal	Connector	Terminal	Continuity
	1	F3	1	F102	57	
	I	гэ	2		61	Existed
	2	F20	1	FIUZ	65	Existed
			2		66	•

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

	A/F sensor	Ground	Continuity	
Bank	Connector	Terminal	Ground	Continuity
1	F3	1		Not existed
I	15	2	Ground	
2	F20	1		
2		2		

		ECM		Ground	Continuity
	Bank	Connector	Terminal	Ciouna	Continuity
	1		57		Not existed
	1	F102	61	Ground	
	2		65		
			66		

Also check harness for short to power. 6.

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-190, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

>> Replace (malfunctioning) A/F sensor 1. Refer to EM-39, "Exploded View". NO

15. CHECK MASS AIR FLOW SENSOR

### (P)With CONSULT-III

Check mass air flow sensor signal in "DATA MONITOR" mode with CONSULT-III. For specification, refer to EC-639, "Mass Air Flow Sensor".

With GST

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

Check mass air flow sensor signal in Service \$01 with GST. For specification, refer to <u>EC-639</u>, "<u>Mass Air Flow Sensor</u>".

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-205, "Diagnosis Procedure"</u>.

16.CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-620, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or replace.

**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-154. "CONSULT-III</u> <u>Function"</u>.

>> GO TO 18.

**18.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

#### < DTC/CIRCUIT DIAGNOSIS >

# P0327, P0328, P0332, P0333 KS

### Description

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.

# DTC Logic

INFOID:000000006352429

[VQ37VHR]

INFOID:000000006352428

# 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.		E				
P0328	Knock sensor (bank 1) circuit high input	An excessively high voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors         <ul> <li>(The sensor circuit is open or shorted.)</li> </ul> </li> </ul>	F				
P0332	Knock sensor (bank 2) circuit low input	An excessively low voltage from the sensor is sent to ECM.	Knock sensor					
P0333	Knock sensor (bank 2) circuit high input	An excessively high voltage from the sensor is sent to ECM.						

### DTC CONFIRMATION PROCEDURE

# **1.**PRECONDITIONING

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

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

#### TESTING CONDITION:

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

Κ >> GO TO 2. 2. PERFORM DTC CONFIRMATION PROCEDURE 1. Start engine and run it for at least 5 seconds at idle speed. L Check 1st trip DTC. 2. Is 1st trip DTC detected? YES >> Go to EC-309, "Diagnosis Procedure". M NO >> INSPECTION END Diagnosis Procedure INFOID:000000006352430 Ν **1.**CHECK GROUND CONNECTION Turn ignition switch OFF. 1 Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection". 2 Is the inspection result normal? >> GO TO 2. YES Ρ NO >> Repair or replace ground connection.

**2.**CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector and ECM harness connector.

2. Check the continuity between knock sensor harness connector and ECM harness connector.

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# P0327, P0328, P0332, P0333 KS

#### < DTC/CIRCUIT DIAGNOSIS >

DTC	Knock sensor			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0327, P0328	1	F203	2	F102	72	Existed
P0332, P0333	2	F202	2	1102	12	LAISIEU

3. 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			EC	Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0327, P0328	1	F203	1	F102	73	Existed
P0332, P0333	2	F202	1	1102	69	LAISIEU

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.

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-310, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning knock sensor. Refer to <u>EM-117, "Exploded View"</u>.

**I**.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

### Component Inspection

**1.**CHECK KNOCK SENSOR

1. Turn ignition switch OFF.

- 2. Disconnect knock sensor harness connector.
- 3. Check resistance between knock sensor terminals as per the following. **NOTE:**

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# EC-310

2011 370Z

INFOID:000000006352431

# P0327, P0328, P0332, P0333 KS

### < DTC/CIRCUIT DIAGNOSIS >

Terminals       Resistance (kΩ)         1 and 2       Approx. 532 - 588 [at 20°C (68°F)]         CAUTION:       Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.         as the inspection result normal?         YES       >> INSPECTION END         NO       >> Replace malfunctioning knock sensor. Refer to EM-117. "Exploded View".		essary to use an ohmmeter which can measure more than 10 M $\Omega$ .	
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.         s the inspection result normal?         YES       >> INSPECTION END	Terminals	Resistance (kΩ)	ŀ
AUTION: To not use any knock sensors that have been dropped or physically damaged. Use only new ones. So the inspection result normal? YES >> INSPECTION END			-
<u>the inspection result normal?</u> YES >> INSPECTION END			E
YES >> INSPECTION END			y new ones.
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# P0335 CKP SENSOR (POS)

#### < DTC/CIRCUIT DIAGNOSIS >

# P0335 CKP SENSOR (POS)

### Description

The crankshaft position sensor (POS) is located on the cylinder block facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.

The sensor consists of a permanent magnet and Hall IC.

When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

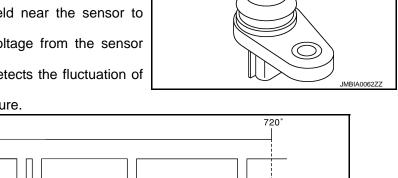
The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.

ECM receives the signals as shown in the figure.

Crankshaft angle Camshaft position sensor (PHASE) (bank 1)



Camshaft position sensor (PHASE) (bank 2) Crankshaft position sensor (POS) NOTE: Camshaft position sensor (PHASE) signal timing varies with intake valve timing control

# DTC Logic

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# DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sen- sor (POS) circuit	<ul> <li>The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking.</li> <li>The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running.</li> <li>The crankshaft position sensor (POS) signal is not in the normal pattern during engine run- ning.</li> </ul>	<ul> <li>Harness or connectors [CKP sensor (POS) circuit is open or shorted.]</li> <li>(APP sensor 2 circuit is shorted.)</li> <li>(EVAP control system pressure sensor circuit is shorted.)</li> <li>(Refrigerant pressure sensor circuit is shorted.)</li> <li>(Brake booster pressure sensor circuit is shorted)</li> <li>(Gear lever position sensor circuit is shorted)</li> <li>Crankshaft position sensor (POS)</li> <li>Accelerator pedal position sensor</li> <li>EVAP control system pressure sensor</li> <li>Refrigerant pressure sensor</li> <li>Brake booster pressure sensor.</li> <li>Gear lever position sensor</li> <li>Signal plate</li> </ul>

### 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.

INFOID:00000006352432



# P0335 CKP SENSOR (POS)

# < DTC/CIRCUIT DIAGNOSIS >

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

~	> GO TO : RM DTC		ATION PR	OCEDURE					EC
If engir 2. Check	ne does n 1st trip D	ot start, cra TC.		5 seconds. e for at least 2	seconds.				С
	> Go to <mark>E</mark>	: <u>ted?</u> <u>C-313, "Dia</u> :TION ENE		ocedure".					D
Diagnosi	s Proce	edure						INFOID:00000006352434	Е
1.снеск	GROUN		CTION						
	•	onnection		r to Ground In	spection in	GI-46, '	Circuit Insp	ection".	F
YES >>	GO TO			nection.					G
				KP) SENSOR				CUIT-I	Н
2. Turn ig	inition swi	tch ON.		) sensor (POS sor (POS) har	-				I
CKP sen	sor (POS)	Ground	Voltage						
Connector	Termina								J
F2	1	Ground	Approx	. 5					
NO >>	> GO TO > GO TO 3	8. 3.							Κ
			SITION (C	KP) SENSOR	(POS) PO	WER S	JPPLY CIR	CUIT-II	L
2. Discon		I harness of			arness con	nector a	and ECM ha	arness connector.	M
CKP sens	or (POS)	EC	СМ	Continuity					
Connector	Terminal	Connector	Terminal						Ν
F2	1	F101	46	Existed					
	> GO TO - > Repair c	4. pen circuit	t.	CIRCUIT					0
				ort to ground,	between the	e followi	ng terminal	S.	Ρ
EC	١M			Sensor					
Connector	Terminal		Name	3611301	Connector	Termir	al		

F101

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Brake booster pressure sensor

CKP sensor (POS)

E48

F2

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# P0335 CKP SENSOR (POS)

### < DTC/CIRCUIT DIAGNOSIS >

E	ECM Sensor			
Connector	Terminal	Name	Connector	Terminal
F102	74	Gear lever position sensor	F57	3
	103	APP sensor	E112	6
M107	107	EVAP control system pressure sensor	B30	3
	107	Refrigerant pressure sensor	E172	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.

- Brake booster pressure sensor (Refer to EC-391, "Component Inspection".)
- Gear lever position sensor (Refer to EC-404, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-348. "Component Inspection".)

• Refrigerant pressure sensor (Refer to EC-536. "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace malfunctioning component.

**6.**CHECK APP SENSOR

Refer to EC-486, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

**7.**REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".

2. Go to EC-486, "Special Repair Requirement".

#### >> INSPECTION END

# $\mathbf{8}$ .CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. 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	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, 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.

CKP sens	or (POS)	EC	Continuity	
Connector Termina		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?

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P0335 CKP SENSOR (POS)					
< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]	<u> </u>				
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)	A				
Refer to EC-315, "Component Inspection".	EC				
Is the inspection result normal? YES >> GO TO 11.					
NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-117, "Exploded View"</u> . <b>11.</b> CHECK GEAR TOOTH	С				
Visually check for chipping signal plate gear tooth.	D				
Is the inspection result normal? YES >> GO TO 12.	D				
NO >> Replace the signal plate. Refer to EM-56, "Removal and Installation".	_				
12.CHECK INTERMITTENT INCIDENT	E				
Refer to GI-43, "Intermittent Incident".	-				
>> INSPECTION END	F				
Component Inspection	35 G				
1.CHECK CRANKSHAFT POSITION SENSOR (POS)-I	_				
<ol> <li>Turn ignition switch OFF.</li> <li>Loosen the fixing bolt of the sensor.</li> </ol>	Н				
<ul> <li>3. Disconnect crankshaft position sensor (POS) harness connector.</li> <li>4. Remove the sensor.</li> <li>5. Visually check the sensor for chipping.</li> <li><u>Is the inspection result normal?</u></li> <li>YES &gt;&gt; GO TO 2.</li> <li>NO &gt;&gt; Replace crankshaft position sensor (POS). Refer to EM-</li> </ul>	J				
117, "Exploded View".	K				
2.CHECK CRANKSHAFT POSITION SENSOR (POS)-II	J				
Check resistance between crankshaft position sensor (POS) terminals as follows.	M				
	101				
Terminals (Polarity)     Resistance ( $\Omega$ )	NI				
$\frac{1(+) - 2(-)}{1(+) - 2(-)} = \sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n$	Ν				
$\frac{1 (+) - 3 (-)}{2 (+) - 3 (-)} $ Except 0 or $\infty$ [at 25°C (77°F)]					
Is the inspection result normal?	0				
YES >> INSPECTION END					
NO >> Replace crankshaft position sensor (POS). Refer to <u>EM-117, "Exploded View"</u> .	Ρ				

### < DTC/CIRCUIT DIAGNOSIS >

# P0340, P0345 CMP SENSOR (PHASE)

# Description

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.

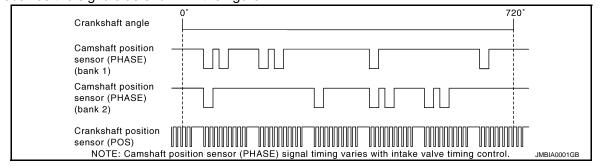
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

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

INFOID:000000006352437

### DTC DETECTION LOGIC

#### NOTE:

If DTC P0340 or P0345 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-398, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) (bank 1) circuit	<ul> <li>The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.</li> <li>The cylinder No. signal is not sent to ECM during engine running.</li> <li>The cylinder No. signal is not in the normal pattern during engine running.</li> </ul>	<ul> <li>Harness or connectors [CMP sensor (PHASE) (bank 1) circuit is open or shorted.]</li> <li>Camshaft position sensor (PHASE) (bank 1)</li> <li>Camshaft (INT)</li> <li>Starter motor</li> <li>Starting system circuit</li> <li>Dead (Weak) battery</li> </ul>
P0345	Camshaft position sensor (PHASE) (bank 2) circuit		<ul> <li>Harness or connectors [CMP sensor (PHASE) (bank 2) circuit is open or shorted.]</li> <li>Camshaft position sensor (PHASE) (bank 2)</li> <li>Camshaft (INT)</li> <li>Starter motor</li> <li>Starting system circuit</li> <li>Dead (Weak) battery</li> </ul>

# 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:**



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# P0340, P0345 CMP SENSOR (PHASE)

[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON. А >> GO TO 2. EC 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-317, "Diagnosis Procedure". D NO >> GO TO 3. 3 .perform dtc confirmation procedure-II 1. Е Maintaining engine speed at more than 800 rpm for at least 5 seconds. Check 1st trip DTC. 2. Is 1st trip DTC detected? YES >> Go to EC-317, "Diagnosis Procedure". NO >> INSPECTION END Diagnosis Procedure INFOID:000000006352438 CHECK STARTING SYSTEM Turn ignition switch to START position. Н Does the engine turn over? Does the starter motor operate? YES >> GO TO 2. NO >> Check starting system. (Refer to EC-9, "Work Flow".) 2. CHECK GROUND CONNECTION 1. 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 3. Κ NO >> Repair or replace ground connection.  ${
m 3.}$  CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT 1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector. L 2. Turn ignition switch ON. Check the voltage between CMP sensor (PHASE) harness connector and ground. 3. M CMP sensor (PHASE) DTC Ground Voltage (V) Bank Connector Terminal Ν P0340 1 F5 1 Ground Approx. 5 P0345 2 F18 1 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 CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT Ρ 1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

# P0340, P0345 CMP SENSOR (PHASE)

### < DTC/CIRCUIT DIAGNOSIS >

DTC	CMP sensor (PHASE)		ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
P0340	1	F5	2	F102	96	Existed
P0345	2	F18	2	1102	92	LAISIEU

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 F107, F106 (bank 2)

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.

### 6.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	CMP sensor (PHASE)			ECM		Continuity	
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity	
P0340	1	F5	3	F102	59	Existed	
P0345	2	F18	3	F IUZ	63	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 F107, F106 (bank 2)
- 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.

### **8.**CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-319. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-55, "Exploded View".

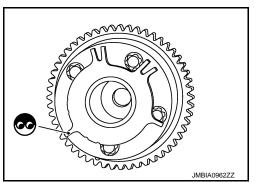
**9.**CHECK CAMSHAFT (INTAKE)

#### Check the following.

- Accumulation of debris to the signal plate of camshaft front end
- Chipping signal plate of camshaft front end

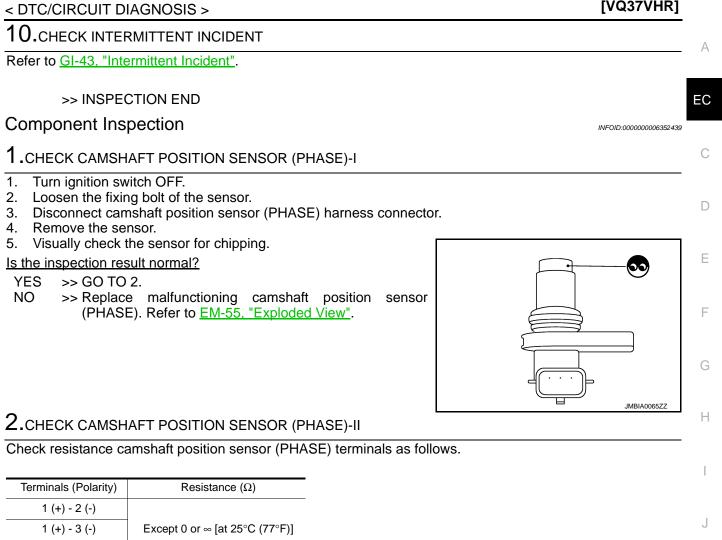
Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Remove debris and clean the signal plate of camshaft front end or replace camshaft. Refer to <u>EM-90,</u> <u>"Exploded View"</u>.



# P0340, P0345 CMP SENSOR (PHASE)

### [VQ37VHR]



Is the inspection result normal?

2 (+) - 3 (-)

YES >> INSPECTION END

NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-55, "Exploded View". Κ

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< DTC/CIRCUIT DIAGNOSIS >

# P0420, P0430 THREE WAY CATALYST FUNCTION

# **DTC Logic**

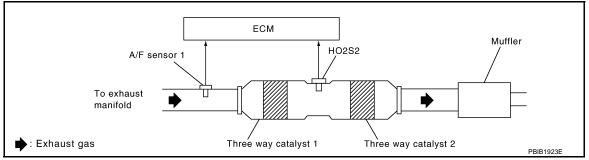
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[VQ37VHR]

### DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2. A three way catalyst 1 with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.

When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst 1 malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold (bank 1)		<ul><li>Three way catalyst (manifold)</li><li>Exhaust tube</li></ul>
P0430	Catalyst system efficiency below threshold (bank 2)	<ul><li>erate properly.</li><li>Three way catalyst (manifold) does not have enough oxygen storage capacity.</li></ul>	<ul> <li>Intake air leaks</li> <li>Fuel injector</li> <li>Fuel injector leaks</li> <li>Spark plug</li> <li>Improper ignition timing</li> </ul>

### DTC CONFIRMATION PROCEDURE

### **1.**INSPECTION START

### Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 7.

2. PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

**TESTING CONDITION:** 

Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

**3.**PERFORM DTC CONFIRMATION PROCEDURE-I

#### With CONSULT-III

- 1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
- 2. Start engine and warm it up to the normal operating temperature.
- 3. Turn ignition switch OFF and wait at least 10 seconds.
- 4. Turn ignition switch ON.
- 5. Turn ignition switch OFF and wait at least 10 seconds.
- 6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
- 7. Let engine idle for 1 minute.



[VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > 8. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F). If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F). А Open engine hood. 9. Select "DTC & SRT CONFIRMATION" then "SRT WORK SUPPORT" mode with CONSULT-III. 11. Rev engine up to about 2,000 rpm and hold it for 3 consecutive minutes then release the accelerator EC pedal completely. 12. Check the indication of "CATALYST". Which is displayed on CONSULT-III screen? CMPLT>> GO TO 6. INCMP >> GO TO 4. 4.PERFORM DTC CONFIRMATION PROCEDURE-II D 1. Wait 5 seconds at idle. 2. Rev engine up to about 2,000 rpm and maintain it until "INCMP" of "CATALYST" changes to "CMPLT" (It will take approximately 5 minutes). Е Does the indication change to "CMPLT"? YES >> GO TO 6. NO >> GO TO 5. F  ${f 5.}$ PERFORM DTC CONFIRMATION PROCEDURE AGAIN 1. Stop engine and cool it down to less than 70°C (158°F). Perform DTC CONFIRMATION PROCEDURE again. 2. >> GO TO 3. Н 6.PERFORM DTC CONFIRMATION PROCEDURE-III Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-322, "Diagnosis Procedure". NO >> INSPECTION END **I.**PERFORM COMPONENT FUNCTION CHECK Perform component function check. Refer to EC-321, "Component Function Check". NOTE: Κ 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? L YES >> INSPECTION END NO >> Go to EC-322, "Diagnosis Procedure". Component Function Check INFOID:00000006352441 M **1.**PERFORM COMPONENT FUNCTION CHECK Without CONSULT-III Ν 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. Open engine hood. Check the voltage between ECM harness connector terminals under the following condition. 6. Ρ

### < DTC/CIRCUIT DIAGNOSIS >

ECM DTC Condition Voltage + \_ Connector Terminal Terminal 76 P0420 [HO2S2 The voltage fluctuation cycle takes more (bank 1)] Keeping engine speed at 2,500 rpm F102 84 than 5 seconds. constant under no load 80 • 1 cycle: 0.6 - 1.0  $\rightarrow$  0 - 0.3  $\rightarrow$  0.6 - 1.0 P0430 [HO2S2 (bank 2)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-322, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:000000006352442

# **1.**CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dents.

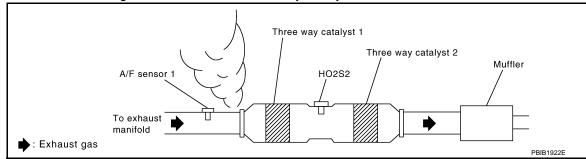
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

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.

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.

NO >> GO TO 4.

**4.**CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to <u>EC-14, "BASIC INSPECTION : Special Repair Requirement"</u>. For specification, refer to <u>EC-639, "Idle Speed"</u> and <u>EC-639, "Ignition Timing"</u>.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Follow the EC-14, "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.

### < DTC/CIRCUIT DIAGNOSIS >

ECM					
	+	-	-	Voltage	
Connector	Terminal	Connector	Terminal		
F102	81	M107			
	82		128	Battery voltage	
	85				
	86				
	89				
	90				

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform <u>EC-517</u>, "Diagnosis Procedure".

**6.**CHECK FUNCTION OF IGNITION COIL-I

### CAUTION:

#### Perform the following procedure in a place where with no combustible objects and good ventilation.

- 1. Turn ignition switch OFF.
- Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.

#### NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.
- 6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 7. Remove ignition coil and spark plug of the cylinder to be checked.
- 8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 9. Connect spark plug and harness connector to ignition coil.
- 10. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

#### CAUTION:

 During the operation, always stay 50 cm (19.7 in) or more away from the spark plug and the ignition coil. 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:

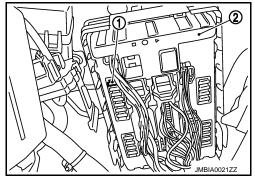
When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

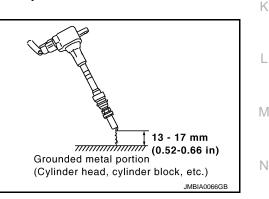
Is the inspection result normal?

YES >> GO TO 10. NO >> GO TO 7.

**7.**CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.





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### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 2. Disconnect spark plug and connect a non-malfunctioning spark plug.
- 3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

#### Is the inspection result normal?

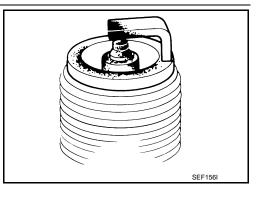
- YES >> GO TO 8.
- NO >> Check ignition coil, power transistor and their circuits. Refer to EC-523, "Diagnosis Procedure".

#### 8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

#### Is the inspection result normal?

- YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-22, "Inspection"</u>.
- 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 about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

#### Spark should be generated.

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to <u>EM-21, "Removal</u> and Installation".
- 10. CHECK FUEL INJECTOR
- 1. Turn ignition switch OFF.
- Remove fuel injector assembly. Refer to <u>EM-43, "Removal and Installation"</u>.
   Keep fuel hose and all fuel injectors connected to fuel
- 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-43, "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 EM-39, "Exploded View".
- NO >> Repair or replace harness or connector.

### < DTC/CIRCUIT DIAGNOSIS >

# P0441 EVAP CONTROL SYSTEM

### **DTC Logic**

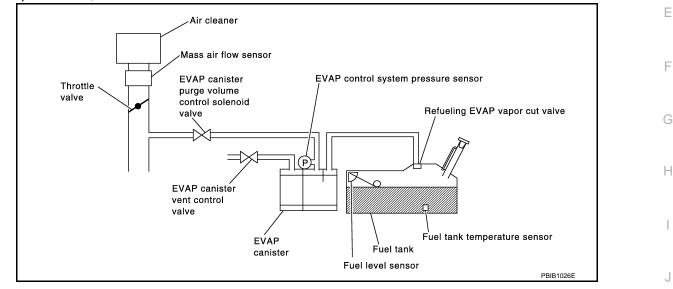
### DTC DETECTION LOGIC

#### NOTE:

# If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441	EVAP control system in- correct purge flow	EVAP control system does not operate proper- ly, EVAP control system has a leak between in- take manifold and EVAP control system pressure sensor.	<ul> <li>EVAP canister purge volume control solenoid valve stuck closed</li> <li>EVAP control system pressure sensor and the circuit</li> <li>Loose, disconnected or improper connection of rubber tube</li> <li>Blocked rubber tube</li> <li>Cracked EVAP canister</li> <li>EVAP canister purge volume control solenoid valve circuit</li> <li>Accelerator pedal position sensor</li> <li>Blocked purge port</li> <li>EVAP canister vent control valve</li> </ul>

### DTC CONFIRMATION PROCEDURE

### **1.**INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 6.

2. PRECONDITIONING

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

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

# EC-325

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#### < DTC/CIRCUIT DIAGNOSIS >

2. Turn ignition switch ON.

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

#### TESTING CONDITION:

#### Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 3.

**3.**PERFORM DTC CONFIRMATION PROCEDURE-I

#### With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and let it idle for at least 70 seconds.
- Select "PURG FLOW P0441" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CON-SULT-III.
- 7. Touch "START".

Is "COMPLETED" displayed on CONSULT-III 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-III 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-III 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-III screen?

OK >> INSPECTION END

NG >> Go to EC-327, "Diagnosis Procedure".

#### 6. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-326, "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-327, "Diagnosis Procedure".

Component Function Check

**1.**PERFORM COMPONENT FUNCTION CHECK

#### Without CONSULT-III

Lift up drive wheels.

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< DTC/CIF	RCUIT DIAGNO	SIS >	JUNIRUL ST	[VQ37VHR]	
<ol> <li>Start e</li> <li>Turn ig</li> <li>Turn ig</li> </ol>	ngine (VDC swit gnition switch OF gnition switch ON	ch OFF) and warm it up	econds.		А
6. Start e	ngine and wait a	t least 70 seconds. ECM harness connect		r the following.	EC
		ECM			C
Connector		+	-		С
Connector		Terminal	Terminal		
M107	(EVAP control sys	102 stem pressure sensor signal)	112		D
		/stem pressure sensor v the following conditions			E
Air condition	ner switch	ON			_
Headlamp s		ON			F
	w defogger switch	ON 0.000			
Engine spee Gear positio		Approx. 3,000 rpm Any position other than P, N	Lor P		G
10. Verify		ol system pressure sens		V less than the value at idle speed (mea-	Н
	ection result norr				
	> INSPECTION				
		"Diagnosis Procedure".			I
	is Procedure			INFOID:00000006352445	
<b>1.</b> CHECK	EVAP CANISTE	ER			J
2. Check	nition switch OF EVAP canister f	or cracks.			K
•	ection result norr				
	> With CONSUL > Without CONS	ULT-III: GO TO 2.			
•	•	canister. Refer to FL-13	3, "Exploded View		
2.CHECK	PURGE FLOW				
		se connected to EVAP	canister purge vol	ume control solenoid valve at EVAP ser-	Μ
<ol> <li>Start e</li> <li>Select</li> </ol>	ngine and let it in "PURG VOL CO	DNT/V" in "ACTIVE TES"		ISULT-III. S VOL C/V" opening and check vacuum	Ν
exister			,		0
		/oouum			0
PURG \ 100		Vacuum Existed			_
09		t existed			Ρ
	ection result norr				
YES >>	> GO TO 7. > GO TO 4.				
•					

3.CHECK PURGE FLOW

# **Without CONSULT-III**

### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

- 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 and install vacuum gauge. For the location of EVAP service port, refer to <u>EC-97</u>. "System Diagram".
- 4. Start engine and let it idle.
- Do not depress accelerator pedal even slightly.
- 5. Check vacuum gauge indication before 60 seconds passed after starting engine.

#### Vacuum should not exist.

6. 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

- 1. Turn ignition switch OFF.
- Check EVAP purge line for improper connection or disconnection. Refer to <u>EC-97, "System Diagram"</u>.

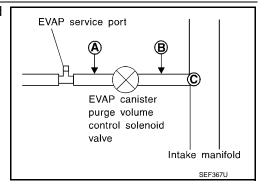
Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair it.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

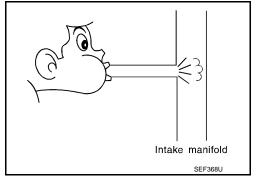
- 1. Disconnect purge hoses connected to EVAP service port **A** and EVAP service purge volume control selencid value **P**
- EVAP canister purge volume control solenoid valve **B**.
- 2. Blow air into each hose and EVAP purge port **C**.



3. Check that air flows freely.

Is the inspection result normal?

- YES-1 >> With CONSULT-III: GO TO 6.
- YES-2 >> Without CONSULT-III: GO TO 7.
- NO >> Repair or clean hoses and/or purge port.



6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### With CONSULT-III

#### 1. Start engine.

2. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 8.

# EC-328

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
NO >> GO TO 7.	
<b>7.</b> CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
Refer to EC-334, "Component Inspection".	
Is the inspection result normal?	E
<ul> <li>YES &gt;&gt; GO TO 8.</li> <li>NO &gt;&gt; Replace EVAP canister purge volume control solenoid valve. Refer to <u>EM-34, "Exp</u></li> </ul>	loded View"
8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR	<u>ioded view</u> .
1. Disconnect EVAP control system pressure sensor harness connector.	
<ol> <li>Check connectors for water.</li> </ol>	
Water should not exist.	I
Is the inspection result normal?	
YES >> GO TO 9.	l
NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-13, "Exploded View"</u> .	
<b>9.</b> CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION	
Refer to EC-349, "DTC Logic" for DTC P0452, EC-354, "DTC Logic" for DTC P0453.	
Is the inspection result normal?	
YES >> GO TO 10. NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-13</u> , "Exploded View".	(
10. CHECK RUBBER TUBE FOR CLOGGING	
1. Disconnect rubber tube connected to EVAP canister vent control valve.	
<ol> <li>Check the rubber tube for clogging.</li> </ol>	
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 <u>EC-340, "Component Inspection"</u> . <u>Is the inspection result normal?</u>	
YES $>>$ GO TO 12.	l
NO >> Replace EVAP canister vent control valve. Refer to <u>FL-13</u> , "Exploded View".	
12.CHECK EVAP PURGE LINE	
Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.	
Refer to EC-97, "System Diagram".	
<u>Is the inspection result normal?</u> YES >> GO TO 13.	ſ
NO >> Replace it.	
13.CLEAN EVAP PURGE LINE	1
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]

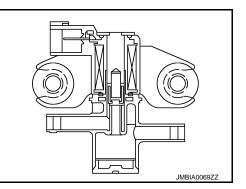
# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

# Description

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.

#### INFOID:000000006352446

INFOID:000000006352447



# DTC Logic

### DTC DETECTION LOGIC

DTC No. Possible cause Trouble diagnosis name DTC detecting condition The canister purge flow is detected during the vehicle is stopped while the engine is running, EVAP control system pressure sensor А even when EVAP canister purge volume control EVAP canister purge volume control solenoid valve is completely closed. solenoid valve EVAP canister purge (The valve is stuck open.) P0443 volume control solenoid EVAP canister vent control valve The canister purge flow is detected during the valve • EVAP canister specified driving conditions, even when EVAP В Hoses canister purge volume control solenoid valve is (Hoses are connected incorrectly or completely closed. clogged.)

### 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:**

- 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-III

YES >> GO TO 2. NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE A

#### With CONSULT-III

- 1. Turn ignition switch ON.
- Check that the following condition are met. FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
- 3. Start engine and wait at least 60 seconds.
- 4. Check 1st trip DTC.

#### IS 1st trip DTC detected?

- OK >> Go to EC-331, "Diagnosis Procedure".
- NG >> GO TO 3.

# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

3.PERFO	RM DTC CONFIRMATION PROC	CEDURE B			Δ
<ol> <li>Turn ig</li> <li>Turn ig</li> <li>Turn ig</li> <li>Turn ig</li> <li>Turn ig</li> </ol>	ngine and warm it up to normal o pnition switch OFF and wait at lea pnition switch ON. pnition switch OFF and wait at lea pnition switch ON.	st 10 seconds. st 10 seconds.		C WORK SUPPORT" mode with	EC
CONS 7. Touch 8. Start e approx If "TES	ULT-III. "START".	TING" on CON	SULT-III change	s to "COMPLETED". (It will take	D
<u>Which is di</u>	splayed on CONSULT-III screen?	<u>)</u>			Е
NG >>	> INSPECTION END > Go to EC-331, "Diagnosis Proce RM DTC CONFIRMATION PROCE				F
	<b>5T</b> gnition switch ON. Itmeter probes to ECM harness c	onnector termin	als.		G
	ECM				Н
Connector	+	_	Voltage (V)		
	Terminal	Terminal			I
M107	106 (Fuel tank temperature sensor signal)	128 (Sensor ground)	3.1 - 4.0		
4. Check <u>Is 1st trip E</u> YES >> NO >>	ngine and wait at least 60 second 1st trip DTC. <u>DTC detected?</u> > Go to <u>EC-331, "Diagnosis Proce</u> > GO TO 5.	edure".			J
<b>5.</b> PERFO	RM DTC CONFIRMATION PROC	CEDURE B			
<ol> <li>Turn ig</li> <li>Turn ig</li> <li>Turn ig</li> <li>Start e</li> </ol>	ST ngine and warm it up to normal op inition switch OFF and wait at lea inition switch ON. gnition switch OFF and wait at lea ngine and let it idle for at least 20 1st trip DTC.	st 10 seconds. st 10 seconds.	ature.		M
YES >>	<u>)TC displayed?</u> > Go to <u>EC-331, "Diagnosis Proce</u> > INSPECTION END	edure".			N
Diagnosi	is Procedure			INFOID:00000006352448	0
1.снеск	EVAP CANISTER PURGE VOLU	JME CONTRO	_ SOLENOID VA	LVE POWER SUPPLY CIRCUIT	Ρ

- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.

3. Turn ignition switch ON.

 Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### < DTC/CIRCUIT DIAGNOSIS >

EVAP canister purge volume control solenoid valve		Ground	Voltage	
Connector	Connector Terminal			
F7	1	Ground	Battery voltage	

Is the inspection result normal?

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

NO >> GO 10 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.

 $\mathbf{3}.$  CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. 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 volume control solenoid valve		E	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 >> GO TO 5. 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, short to ground or short to power in harness or connectors.

# **5.**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 6.

```
NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-13, "Exploded View"</u>.
```

**6.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-348. "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 7.

YES-2 >> Without CONSULT-III: GO TO 8.

NO >> Replace EVAP control system pressure sensor. Refer to E	L-13, "Exploded View".
7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENO	ID VALVE
<ul> <li>With CONSULT-III</li> <li>1. Turn ignition switch OFF.</li> <li>2. Reconnect harness connectors disconnected.</li> <li>3. Start engine.</li> <li>4. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CON ies according to the valve opening.</li> <li>Does engine speed vary according to the valve opening?</li> </ul>	ISULT-III. Check that engine speed va
YES >> GO TO 9.	
NO $\rightarrow$ GO TO 8. 8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENO	ID VALVE
Refer to EC-334, "Component Inspection".	
<u>Is the inspection result normal?</u> YES >> GO TO 9. NO >> Replace EVAP canister purge volume control solenoid valv	ve. Refer to <u>EM-34, "Exploded View"</u> .
9. CHECK RUBBER TUBE FOR CLOGGING	
<ol> <li>Disconnect rubber tube connected to EVAP canister vent control v</li> <li>Check the rubber tube for clogging.</li> </ol>	aive.
<u>Is the inspection result normal?</u> YES >> GO TO 10. NO >> Clean the rubber tube using an air blower. <b>10.</b> CHECK EVAP CANISTER VENT CONTROL VALVE	
Refer to EC-340, "Component Inspection".	
Is the inspection result normal?	
YES >> GO TO 11. NO >> Replace EVAP canister vent control valve. Refer to <u>FL-13</u> ,	"Exploded View".
<b>11.</b> CHECK IF EVAP CANISTER IS SATURATED WITH WATER	
<ol> <li>Remove EVAP canister with EVAP canister vent control valve and attached.</li> <li>Check if water will drain from EVAP canister (1).</li> </ol>	I EVAP control system pressure sense
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	<ul> <li>PBIB2731E</li> </ul>

Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following. • EVAP canister for damage

# P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### < DTC/CIRCUIT DIAGNOSIS >

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-15, "Removal and Installation".

# 14. CHECK INTERMITTENT INCIDENT

Refer to GI-43. "Intermittent Incident".

>> INSPECTION END

### Component Inspection

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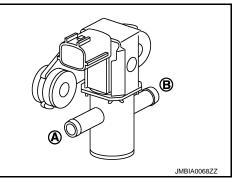
[VQ37VHR]

# 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

#### With CONSULT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Turn ignition switch ON.
- 5. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG VOL C/V" opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)	
100%	Existed	
0%	Not existed	



### **Without CONSULT-III**

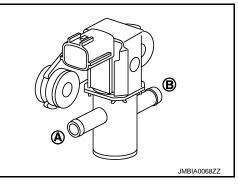
- 1. Turn ignition switch OFF.
- 2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- 4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between (A) and (B)	
12V 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>EM-34, "Exploded View"</u>.



### P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

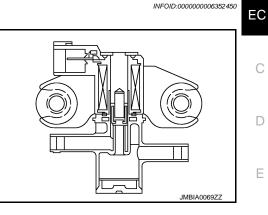
### [VQ37VHR]

А

# P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

# Description

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



INFOID:000000006352451

# 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	<ul> <li>Harness or connectors (The solenoid valve circuit is open or shorted.)</li> <li>EVAP canister purge volume control solenoid valve</li> </ul>
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	<ul> <li>Harness or connectors (The solenoid valve circuit is shorted.)</li> <li>EVAP canister purge volume control solenoid valve</li> </ul>
DTC CC	<b>NFIRMATION PROCE</b>	DURE	
1.CONE	DITIONING		
before co 1. Turn 2. Turn 3. Turn <b>TESTINO</b>	onducting the next test. i ignition switch OFF and v i ignition switch ON. i ignition switch OFF and v G CONDITION:	vait at least 10 seconds. vait at least 10 seconds.	d, always perform the following procedure
•	>> GO TO 2.		
Z.PERF	ORM DTC CONFIRMATI	ON PROCEDURE	
2. Che	t engine and let it idle for a ck 1st trip DTC. <u>o DTC detected?</u>	at least 13 seconds.	
<u>13 13t th</u>			

NO >> INSPECTION END

# **Diagnosis Procedure**

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Ρ

# 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect EVAP canister purge volume control solenoid valve harness connector.

3. Turn ignition switch ON.

4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

# EC-335

### P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### < DTC/CIRCUIT DIAGNOSIS >

EVAP canister purge volume<br/>control solenoid valveGroundVoltageConnectorTerminalGroundBattery voltageF71GroundBattery voltage

Is the inspection result normal?

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

 $\sim 30002$ .

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.

 $\mathbf{3}$ .CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. 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 volume 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-III: GO TO 5.

YES-2 >> Without CONSULT-III: 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, short to ground or short to power in harness or connectors.

**5.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

#### With CONSULT-III

- 1. Reconnect all harness connectors disconnected.
- 2. Start engine.
- 3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 7.

NO >> GO TO 6.

**6.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-337, "Component Inspection".

Is the inspection result normal?

[VQ37VHR]

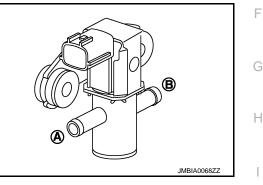
### P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 7. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-34, "Exploded View". А 7. CHECK INTERMITTENT INCIDENT Refer to GI-43, "Intermittent Incident". EC >> INSPECTION END Component Inspection INFOID:000000006352453 **1.**CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE D (P)With CONSULT-III 1. Turn ignition switch OFF. 2. Reconnect all harness connectors disconnected. Е 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.

- 4. Turn ignition switch ON.
- Select "PURG VOL CONT/V" in "ACTIVE TEST" mode with CONSULT-III. 5.
- Touch "Qd" and "Qu" on CONSULT-III screen to adjust "PURG 6. 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



[VQ37VHR]

### Without CONSULT-III

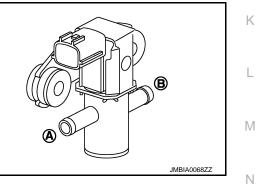
- Turn ignition switch OFF. 1.
- Disconnect EVAP canister purge volume control solenoid valve harness connector. 2.
- 3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
- Check air passage continuity of EVAP canister purge volume 4. control solenoid valve under 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-34, "Exploded View".



### < DTC/CIRCUIT DIAGNOSIS >

# P0447 EVAP CANISTER VENT CONTROL VALVE

# Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

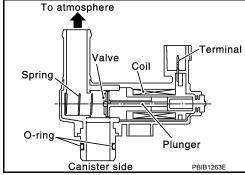
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid 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



INFOID:000000006352455

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent con- trol valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	<ul> <li>Harness or connectors (The valve circuit is open or shorted.)</li> <li>EVAP canister vent control valve</li> </ul>

### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

#### **TESTING CONDITION:**

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait at least 8 seconds.
- 2. Check 1st trip DTC.

### Is 1st trip DTC detected?

- YES >> Go to EC-338, "Diagnosis Procedure".
- NO >> INSPECTION END

### **Diagnosis** Procedure

### **1.**INSPECTION START

#### Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

# **2.**CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

### With CONSULT-III

1. Turn ignition switch OFF and then ON.

2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-III.

# EC-338

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[VQ37VHR]

< DTC/CIRCUIT DIAGNOSIS >		[VQ37VHR]	
3. Touch "ON/OFF" on CONSULT-III	creen.		
4. Check for operating sound of the v	alve.	A	
Olighing gound should be been			
Clicking sound should be hea	ra.		
Is the inspection result normal?		EC	
YES >> GO TO 7. NO >> GO TO 3.			
•		r C	
	ONTROL VALVE POWER SUPPLY CIRCUIT		
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect EVAP canister vent control</li> </ol>	tral valva harnaaa aannaatar		
<ol> <li>Disconnect EVAP canister vent con</li> <li>Turn ignition switch ON.</li> </ol>	and valve hamess connector.	D	
	anister vent control valve harness connecto	r and ground.	
		F	
EVAP canister vent con-		E	
trol valve Ground Volt	age		
Connector Terminal		F	
B31 1 Ground Battery	/oltage		
Is the inspection result normal?			
YES >> GO TO 5. NO >> GO TO 4.		G	
4. DETECT MALFUNCTIONING PART			
		——— Н	
Check the following. • Harness connectors E3, F1			
Harness connectors E3, 11     Harness connectors F103, M116			
<ul> <li>Harness connectors M7, B1</li> </ul>			
<ul> <li>Harness for open or short between E</li> </ul>	/AP canister vent control valve and IPDM E/	′R	
Dessis and size it should be		u a stans	
	ground or short to power in harness or con		
	NTROL VALVE OUTPUT SIGNAL CIRCUIT	FOR OPEN AND SHORT	
1. Turn ignition switch OFF.	-	K	
<ol> <li>Disconnect ECM harness connect</li> <li>Check the continuity between EVA</li> </ol>	ہ. P canister vent control valve harness connec	tor and ECM harness con-	
nector.			
		L	
EVAP canister vent ECM			
control valve	Continuity	Μ	
Connector Terminal Connector Termina		141	
B31 2 M107 121	Existed		
4. Also check harness for short to gro	und and short to power.	Ν	
Is the inspection result normal?			
YES >> GO TO 7. NO >> GO TO 6.			
6. DETECT MALFUNCTIONING PART		0	
Check the following. • Harness connectors B1, M7			
	/AP canister vent control valve and ECM		
>> Repair open circuit, short t	>> Repair open circuit, short to ground or short to power in harness or connectors.		
7. CHECK RUBBER TUBE FOR CLO			
	to EVAP canister vent control valve.		

Disconnect rubber tube connected to EVAP canister vent control valve.
 Check the rubber tube for clogging.

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Clean the rubber tube using an air blower.

**8.**CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-340. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-13, "Exploded View"</u>.

**9.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

### >> INSPECTION END

### Component Inspection

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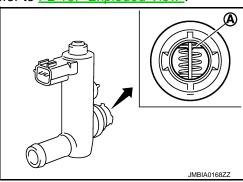
[VQ37VHR]

# 1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister. Refer to FL-13, "Exploded View".
- 3. Check portion (A) of EVAP canister vent control valve for rust.

#### Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-13, "Exploded View"</u>.
- NO >> GO TO 2.



# 2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

#### With CONSULT-III

- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

#### Operation takes less than 1 second.

#### Without CONSULT-III

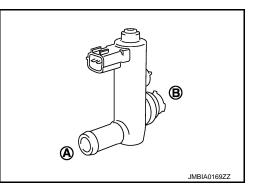
- T. Disconnect EVAP canister vent control valve harness connector.
- 2. Check air passage continuity and operation delay time under the following conditions.

#### Make sure that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed
Operation takes loss than 1 second	



Is the inspection result normal?



< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 3.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-13, "Exploded View"</u>.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

#### With CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 3. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

#### Operation takes less than 1 second.

#### Without CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

### Make sure that new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed
Operation takes less than 1 see	cond.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace EVAP canister vent control valve. Refer to <u>FL-13, "Exploded View"</u>.



B

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A

EC

D

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#### < DTC/CIRCUIT DIAGNOSIS >

# P0448 EVAP CANISTER VENT CONTROL VALVE

### Description

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

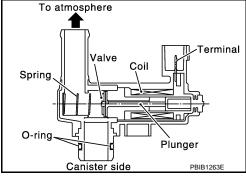
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.

This solenoid value is used only for diagnosis, and usually remains opened.

When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnosis.

# DTC Logic

### DTC DETECTION LOGIC



INFOID:000000006352459

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0448	EVAP canister vent con- trol valve close	EVAP canister vent control valve remains closed under specified driving conditions.	<ul> <li>EVAP canister vent control valve</li> <li>EVAP control system pressure sensor and the circuit</li> <li>Blocked rubber tube to EVAP canister vent control valve</li> <li>EVAP canister is saturated with water</li> </ul>

### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

### >> GO TO 2.

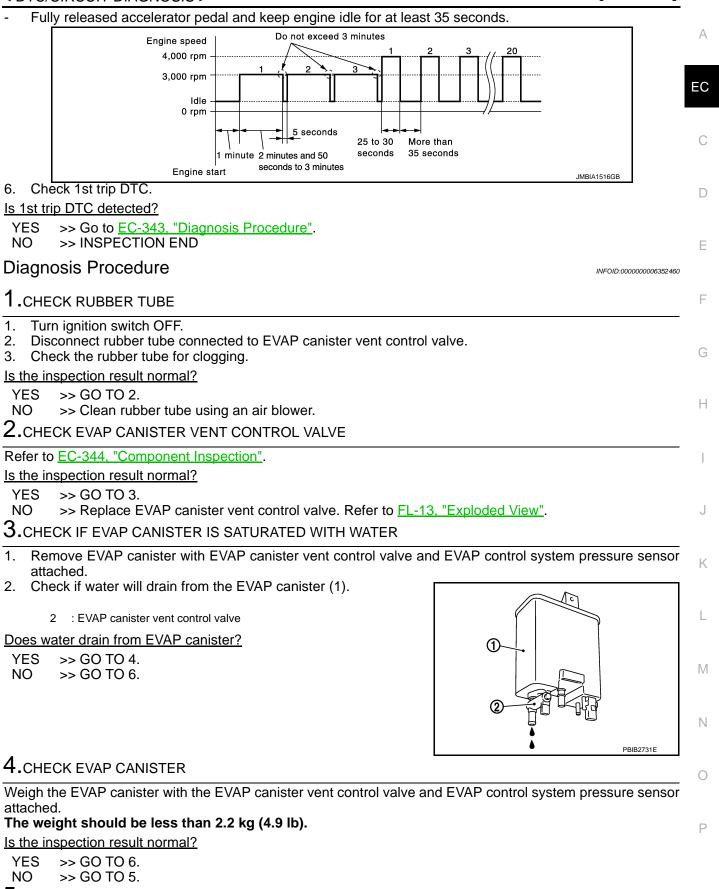
# 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON and wait at least 5 seconds.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Start engine and let it idle for at least 1 minute.
- 4. Repeat next procedures five times.
- Increase the engine speed up to between 3,000 and 3,500 rpm and maintain that speed for 2 minutes. **Do not exceed 2 minutes.**
- Fully released accelerator pedal and keep engine idle for about 5 seconds.
- 5. Repeat next procedure 27 times.
- Quickly increase the engine speed up to between 3,000 and 3,500 rpm and maintain that speed for 25 to 30 seconds.

INFOID:00000006352458

#### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]



**5.**DETECT MALFUNCTIONING PART

Check the following.EVAP canister for damage

### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

INFOID:00000006352461

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

### 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 <u>FL-13</u>, "Exploded View".

**1.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-348, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-13, "Exploded View"</u>.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

#### >> INSPECTION END

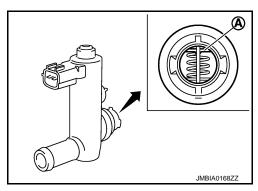
### Component Inspection

# 1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

- 1. Turn ignition switch OFF.
- 2. Remove EVAP canister vent control valve from EVAP canister.
- 3. Check portion (A) of EVAP canister vent control valve for being rusted.

#### Is it rusted?

- YES >> Replace EVAP canister vent control valve. Refer to <u>FL-</u> <u>13, "Exploded View"</u>.
- NO >> GO TO 2.



# 2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

### With CONSULT-III

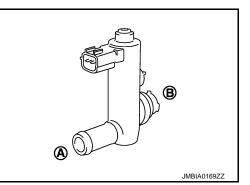
- 1. Reconnect harness connectors disconnected.
- 2. Turn ignition switch ON.
- 3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 4. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

### Without CONSULT-III

1. Disconnect EVAP canister vent control valve harness connector.





# F Existed Operation takes less than 1 second.

Check air passage continuity and operation delay time under the following conditions.

Air passage continuity between (A) and (B)

Not existed

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

Condition

12 V direct current supply between

2.

OFF

YES >> INSPECTION END

NO >> GO TO 3.

terminals 1 and 2

**3.**CHECK EVAP CANISTER VENT CONTROL VALVE-III

Make sure that new O-ring is installed properly.

### With CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 3. Check air passage continuity and operation delay time. Make sure that new O-ring is installed properly.

Condition VENT CONT/V	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

### Operation takes less than 1 second.

### Without CONSULT-III

- 1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
- 2. Check air passage continuity and operation delay time under the following conditions.

# Make sure that new O-ring is installed properly.

Operation takes less than 1 second.

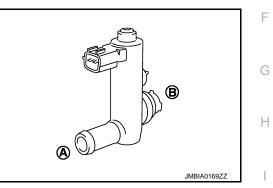
Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-13. "Exploded View"</u>.

# P0448 EVAP CANISTER VENT CONTROL VALVE

# Revision: 2011 October



[VQ37VHR]

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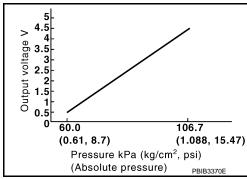
Ρ

### < DTC/CIRCUIT DIAGNOSIS >

# P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

### Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



# DTC Logic

### DTC DETECTION LOGIC

INFOID:000000006352463

[VQ37VHR]

INFOID:00000006352462

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451	EVAP control system pressure sensor perfor- mance	ECM detects a sloshing signal from the EVAP control system pressure sensor	<ul> <li>Harness or connectors (EVAP control system pressure sensor circuit is shorted.)</li> <li>[CKP sensor (POS) circuit is shorted.]</li> <li>(APP sensor 2 circuit is shorted.)</li> <li>(Refrigerant pressure sensor circuit is shorted.)</li> <li>(Brake booster pressure sensor circuit is shorted)</li> <li>(Gear lever position sensor circuit is shorted)</li> <li>EVAP control system pressure sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Accelerator pedal position sensor</li> <li>Refrigerant pressure sensor</li> <li>Brake booster pressure sensor</li> <li>Brake booster pressure sensor</li> <li>Gear lever position sensor</li> </ul>

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

### >> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch OFF and wait at least 10 seconds.
- 2. Start engine and wait at least 40 seconds. NOTE:

### Do not depress accelerator pedal even slightly.

3. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-347, "Diagnosis Procedure".
- NO >> INSPECTION END

# [VQ37VHR]

DTC/CIR		GNOSIS	>			[VQ37VHR	<b>!]</b>
iagnosi	s Proce	dure				INFOID:00000006352	464
.CHECK	GROUN		CTION				
. Turn ig . Check s the inspe YES >> NO >> .CHECK . Discon	nition swi ground co ection resu GO TO 2 Repair o EVAP CO nect EVA	tch OFF. onnection <u>ult normal?</u> 2. r replace ( ONTROL S P control s	M95. Refer to Ground Ir	ENSOR CO	NNECTOR		-
Wat	ter should	d not exis	t.				
s the inspe							
YES >> NO >>	→ GO TO 3 → Repair o	3. r replace ł	- narness connector. SYSTEM PRESSURE S	ENSOR PO	WER SUPF	PLY CIRCUIT	
. Turn ig	nition swi	tch ON.				s connector and ground.	_
	trol system e sensor	Ground	Voltage (V)				
Connector	Terminal						
B30	3	Ground	Approx. 5				
NO >> .CHECK	GO TO 8 GO TO 4 SENSOR	3. 4. 2 POWER	SUPPLY CIRCUIT				
Check harr	ness for sh	nort to pow	ver and short to ground,	between the	e following t	terminals.	
EC	М		Sensor				
Connector	Terminal		Name	Connector	Terminal		
F101	45	Brake boos	ster pressure sensor	E48	1		
1 101	46	CKP sense	or (POS)	F2	1		
F102	74	Gear lever	position sensor	57	3		
	103	APP senso	pr	E112	6		
M107	107	EVAP cont	rol system pressure sensor	B30	3		
	107	Refrigerant	pressure sensor	E172	3		
<u>s the inspe</u> YES >>	GO TO S	5.	_		connectors		

- Gear lever position sensor (Refer to <u>EC-404, "Component Inspection"</u>.)
  Brake booster pressure sensor (Refer to <u>EC-391, "Component Inspection"</u>.)
  Refrigerant pressure sensor (Refer to <u>EC-536, "Diagnosis Procedure"</u>.)

### Is the inspection result normal?

YES >> GO TO 6.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

INFOID:00000006352465

NO >> Replace malfunctioning component.

6.CHECK APP SENSOR

Refer to EC-486, "Component Inspection".

Is the inspection result normal?

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

**7.**REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly. Refer to <u>ACC-4, "Exploded View"</u>.

2. Go to EC-486. "Special Repair Requirement".

### >> INSPECTION END

**8.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-348, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-13, "Exploded View"</u>.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

### >> INSPECTION END

**Component Inspection** 

# 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	Voltage (V)	
Connector			[Applied vacuum kPa (kg/cm <sup>2</sup> , psi)]		
Connector	Terminal	Terminal			
M107	102	112	Not applied	1.8 - 4.8	
MIT07 T02		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/cm<sup>2</sup>, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm<sup>2</sup>, 14.69 psi).

### Is the inspection result normal?

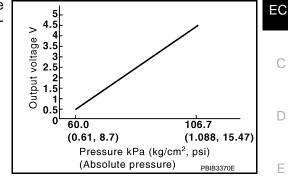
- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-13</u>, "Exploded View".

### < DTC/CIRCUIT DIAGNOSIS >

# P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

### Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



# **DTC Logic**

### DTC DETECTION LOGIC

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.) EVAP control system An excessively low voltage from the sensor is (Brake booster pressure sensor circuit is P0452 pressure sensor low insent to ECM. shorted) put (Gear lever position sensor) EVAP control system pressure sensor Crankshaft position sensor (POS) · Accelerator pedal position sensor · Refrigerant pressure sensor · Brake booster pressure sensor Κ · Gear lever 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.

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

2. Turn ignition switch ON.

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

#### **TESTING CONDITION:**

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

### With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT-III.
- 7. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).

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[VQ37VHR]

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### < DTC/CIRCUIT DIAGNOSIS >

- 8. Start engine and wait at least 20 seconds.
- 9. Check 1st trip DTC.

#### With GST

- 1. Start engine and warm it up to normal operating temperature.
- 2. Set voltmeter probes to ECM harness connector terminals as per the following.

ECM						
Connector -	+	_				
Connector	Terminal	Terminal				
M107	106 (Fuel tank temperature sensor signal)	128				

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-350, "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 CONNECTOR

- 1. Disconnect EVAP control system pressure sensor harness connector.
- 2. Check sensor harness connector for water.

#### Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness connector.

 ${\bf 3.}$  check evap control system pressure sensor power supply circuit-i

1. Turn ignition switch ON.

2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

	trol system e sensor	Ground	Voltage (V)
Connector	Terminal		
B30	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 4.

**4.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

# EC-350

[VQ37VHR]

INFOID:000000006352468

### < DTC/CIRCUIT DIAGNOSIS >

Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP cont pressure	-	EC	M	Continuity				
Connector	Terminal	Connector	Terminal	Continuity				
B30	3	M107	107	Existed				
s the insp	ection res	ult normal?	)					
	> GO TO							
_	> GO TO							
		NCTIONIN	IG PAR I					
Check the • Harness		rs M7. B1						
			CM and E	VAP control sy	stem press	ure sensor		
-	•	pen circuit						
		R POWER						
Check har	ness for s	hort to pow	ver and sh	ort to ground,	between the	e following	terminals.	
E	CM			Sensor			-	
Connector	Terminal		Name		Connector	Terminal	-	
0011100001	45	Brake boos	Brake booster pressure sensor		E48	1	-	
F101	46	CKP sensor (POS)		F2	1	-		
F102	74	Gear lever position sensor			F57	3	-	
	103	APP sensor		E112	6	-		
M107	107	EVAP cont	rol system p	ressure sensor	B30	3	-	
	111	Refrigerant	pressure se	ensor	E77	3	-	
Is the insp	ection res	ult normal?	)				-	
	> GO TO				h		_	
NO > 7.CHECK	•	-	una or sn	ort to power in	narness or	connectors	3.	
		NEN IS						
Check the • Cranksh		n sensor (F	POS) (Ref	er to <u>EC-315, '</u>	'Componen	Inspection	n" )	
<ul> <li>Gear lev</li> </ul>	er positior	n sensor (R	efer to EC	<u>C-404, "Compo</u>	onent Inspec	<u>tion"</u> .)		
				to <u>EC-391, "Co</u> EC-536, "Diagr			)	
-	•	ult normal?	•					
YES >	> GO TO	8.	-					
~	•	malfunctio	oning com	ponent.				
8.CHECK	APP SE	NSOR						
		omponent	-	<u>)"</u> .				
•		ult normal?	<u>-</u>					
	> GO TO > GO TO							
<b>•</b>				SSEMBLY				
				. Refer to <u>ACC</u>	-4 "Evolod	ad View"		
		Special Re						
			-					

Revision: 2011 October

>> INSPECTION END

[VQ37VHR]

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### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

# 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		EC	Continuity		
Connector	Terminal	Connector	Terminal	]	
B30	1	M107	112	Existed	

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

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B1, M7

• Harness for open or short between EVAP control system pressure sensor and ECM

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

12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP cont pressure		EC	Continuity	
Connector	Terminal	Connector Terminal		
B30	2	M107	102	Existed

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

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B1, M7

Harness for open or short between EVAP control system pressure sensor and ECM

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

**14.**CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-353, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-13, "Exploded View"</u>.

15. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

#### < DTC/CIRCUIT DIAGNOSIS >

### **Component Inspection**

1.

2.

Connector

M107

**CAUTION:** 

14.69 psi).

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#### INFOID:000000006352469 А 1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR Turn ignition switch OFF. EC 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 С following conditions. D Condition Voltage (V) \_ [Applied vacuum kPa (kg/cm<sup>2</sup>, psi)] Terminal Е Not applied 1.8 - 4.8 112 -26.7 (-0.272, -3.87) 2.1 to 2.5 lower than above value F · Always calibrate the vacuum pump gauge when using it. • Never apply below -93.3 kPa (-0.952 kg/cm<sup>2</sup>, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm<sup>2</sup>,

Is the inspection result normal?

ECM

+

Terminal

102

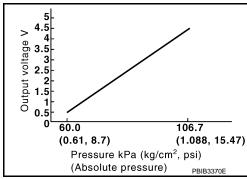
- YES >> INSPECTION END
- NO >> Replace EVAP control system pressure sensor. Refer to FL-13, "Exploded View".

### < DTC/CIRCUIT DIAGNOSIS >

# P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

### Description

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



# DTC Logic

### DTC DETECTION LOGIC

DTC No. Trouble diagnosis name DTC detecting condition Possible cause · 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 EVAP control system An excessively high voltage from the sensor is shorted) P0453 pressure sensor high in-· EVAP control system pressure sensor sent to ECM. put Crankshaft position sensor (POS) · Accelerator pedal position sensor · Refrigerant pressure sensor Brake booster pressure sensor · EVAP canister vent control valve • EVAP canister Rubber hose from EVAP canister vent control valve to vehicle frame

### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

**TESTING CONDITION:** 

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

#### With CONSULT-III

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON.
- 6. Select "DATA MONITOR" mode with CONSULT-III.

# EC-354

INFOID:000000006352470

INFOID:000000006352471

[VQ37VHR]

	P0453 EVA	P CON	TROL SYSTEM	PRESSURE SENSOR	
	RCUIT DIAGNOSIS >			[VQ37VHR]	
8. Start e	sure that "FUEL T/TM engine and wait at leas t 1st trip DTC.				А
G     With G					
	engine and warm it up Itmeter probes to ECM				EC
	E	СМ			С
Connector	+		-		0
Connector	Terminal		Terminal		
M107	106 (Fuel tank temperature se	nsor signa	l) 128		D
4. Turn ig 5. Turn ig 6. Turn ig	sure that the voltage is gnition switch OFF and gnition switch ON. gnition switch OFF and	l wait at ∣ I wait at ∣	least 10 seconds. least 10 seconds.		Е
8. Check	engine and wait at leas 1st trip DTC.	t 20 seco	onds.		F
YES >	<u>DTC detected?</u> > Go to <u>EC-355, "Diag</u> > INSPECTION END	<u>nosis Pr</u>	ocedure".		G
Diagnos	is Procedure			INFOID:00000006352472	
<b>1.</b> CHECK	GROUND CONNEC	TION			Η
	gnition switch OFF.	95. Refe	r to Ground Inspectior	in GI-46, "Circuit Inspection".	
	ection result normal?				
	> GO TO 2. > Repair or replace gro	ound con	inection.		J
2.CHECK	CONNECTOR				
	nnect EVAP control systems connect EVAP	•		connector.	Κ
\ <b>M</b> /2	ter should not exist.				
	ection result normal?				L
	> GO TO 3.				
•	> Repair or replace hat				M
3.CHECK	EVAP CONTROL SY	STEM P	RESSURE SENSOR	POWER SUPPLY CIRCUIT	
	gnition switch ON. the voltage between l	EVAP co	ntrol system pressure	sensor harness connector and ground.	Ν
EVAP cont	ol system pressure sensor	<b>a</b> .			0
Conne	ctor Terminal	Ground	Voltage (V)		0
B30	3	Ground	Approx. 5		
YES >	ection result normal? > GO TO 10. > GO TO 4.				Ρ

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

#### < DTC/CIRCUIT DIAGNOSIS >

 Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control syster	n pressure sensor	EC	Continuity	
Connector	Terminal	Connector Terminal		
B30	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 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		
1 101	46	CKP sensor (POS)	F2	1		
	103	APP sensor	E112	6		
M107	107	EVAP control system pressure sensor	B30	3		
	111	Refrigerant pressure sensor	E77	3		

Is the 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-315, "Component Inspection".)
- Brake booster pressure sensor (Refer to <u>EC-391, "Component Inspection"</u>.)
- Refrigerant pressure sensor (Refer to <u>EC-536. "Diagnosis Procedure".</u>)

#### Is the inspection result normal?

#### YES >> GO TO 8.

NO >> Replace malfunctioning component.

### **8.**CHECK APP SENSOR

Refer to EC-486, "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. Refer to ACC-4, "Exploded View".
- 2. Go to EC-486, "Special Repair Requirement".

#### >> INSPECTION END

10.check evap control system pressure sensor ground circuit for open and short

[VQ37VHR]

#### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system	n pressure sensor	EC	Continuity	
Connector	Terminal	Connector Terminal		Continuity
B30	1	M107	112	Existed

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

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B1, M7

Harness for open or short between EVAP control system pressure sensor and ECM

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

12.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND  $\ ^{\rm G}$  short

Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control syster	ECM		Continuity	
Connector	Terminal	Connector	Terminal	Continuity
B30	2	M107	102	Existed

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

Is the inspection result normal?

YES >> GO TO 14. NO >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors B1, M7

Harness for open or short between EVAP control system pressure sensor and ECM

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

# **14.**CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.

2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

15. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-340, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP canister vent control valve. Refer to <u>FL-13, "Exploded View"</u>.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-358, "Component Inspection".

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 17.

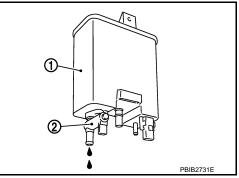
NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-13</u>, "Exploded View".

17. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

- Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 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.



[VQ37VHR]

# **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-13, "Exploded View".

# 20. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

### >> INSPECTION END

### **Component Inspection**

INFOID:000000006352473

# 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 <sup>2</sup> , psi)]	Voltage (V)
Connector	Terminal	Terminal		
M107 102	102	112	Not applied	1.8 - 4.8
	102		-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.

< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]	1
<ul> <li>Do not apply below -93.3 kPa (-0.952 kg/cm<sup>2</sup>, -13.53 psi) or pressure over 101.3 kPa (1.033 kg cm<sup>2</sup>, 14.69 psi).</li> <li><u>Is the inspection result normal?</u></li> </ul>	A
YES >> INSPECTION END NO >> Replace EVAP control system pressure sensor. Refer to <u>FL-13, "Exploded View"</u> .	EC
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### < DTC/CIRCUIT DIAGNOSIS >

# P0456 EVAP CONTROL SYSTEM

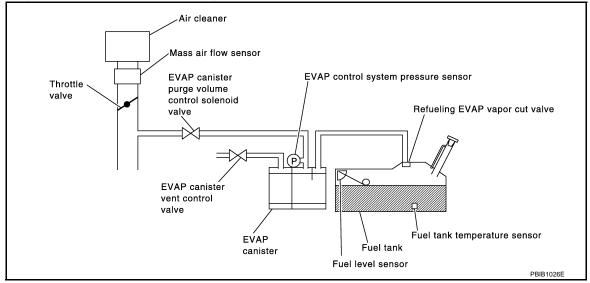
# **DTC Logic**

INFOID:000000006352474

### 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 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	<ul> <li>EVAP system has a leak.</li> <li>EVAP system does not operate properly.</li> </ul>	<ul> <li>Incorrect fuel tank vacuum relief valve</li> <li>Incorrect fuel filler cap used</li> <li>Fuel filler cap remains open or fails to close.</li> <li>Foreign matter caught in fuel filler cap.</li> <li>Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>Foreign matter caught in EVAP canister vent control valve.</li> <li>EVAP canister or fuel tank leaks</li> <li>EVAP purge line (pipe and rubber tube) leaks</li> <li>EVAP purge line rubber tube bent</li> <li>Loose or disconnected rubber tube</li> <li>EVAP canister purge volume control solenoid valve and the circuit</li> <li>Fuel tank temperature sensor</li> <li>O-ring of EVAP canister vent control valve is missing or damaged</li> <li>EVAP control system pressure sensor</li> <li>Refueling EVAP vapor cut valve</li> <li>ORVR system leaks</li> <li>Fuel level sensor and the circuit</li> <li>Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul>

#### 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

### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

< DIC/CIRCUIT DIAGNOSIS > [VG0 VIII]	
If DTC Confirmation Procedure has been previously conducted, always perform the following before conduct- ing the next test.	А
<ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> <li>Turn ignition switch ON.</li> </ol>	
<ol> <li>Turn ignition switch OFF and wait at least 10 seconds.</li> </ol>	EC
Do you have CONSULT-III?	
YES >> GO TO 2. NO >> GO TO 4.	0
2.PERFORM DTC CONFIRMATION PROCEDURE-I	С
With CONSULT-III	_
<ol> <li>Turn ignition switch ON and select "EVAP DIAG READY" in "DATA MONITOR" mode with CONSULT-III.</li> <li>Start engine and wait at idle until "OFF" of "EVAP DIAG READY" changes to "ON". NOTE:</li> </ol>	D
<ul> <li>It will take at most 2 hours until "OFF" of "EVAP DIAG READY" changes to "ON".</li> <li>3. Turn ignition switch OFF and wait at least 90 minutes.</li> <li>NOTE:</li> </ul>	Ε
<ul> <li>Never turn ignition switch ON during 90 minutes.</li> <li>4. Turn ignition switch ON and select "EVAP LEAK DIAG" in "DATA MONITOR" mode with CONSULT-III.</li> <li>5. Check that "EVAP LEAK DIAG" indication.</li> </ul>	F
Which is displayed on CONSULT-III?	G
CMPLT >> GO TO 3. YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.	0
3.PERFORM DTC CONFIRMATION PROCEDURE-II	Н
Check 1st trip DTC.	
<u>Is 1st trip DTC detected?</u> YES >> Go to <u>EC-361, "Diagnosis Procedure"</u> .	1
NO >> INSPECTION END.	I
4.PERFORM DTC CONFIRMATION PROCEDURE	
With GST <ol> <li>Start engine and wait engine idle for at least 2 hours.</li> </ol>	0
2. Turn ignition switch OFF and wait at least 90 minutes.	К
NOTE: Never turn ignition switch ON during 90 minutes.	Γ
<ol> <li>Turn ignition switch ON.</li> <li>Check 1st trip DTC.</li> </ol>	I
Is 1st trip DTC detected?	L
YES >> Go to <u>EC-361, "Diagnosis Procedure"</u> . NO >> INSPECTION END.	
Diagnosis Procedure	M
1.CHECK FUEL FILLER CAP DESIGN	Ν
<ol> <li>Turn ignition switch OFF.</li> <li>Check for genuine NISSAN fuel filler cap design.</li> </ol>	
Is the inspection result normal?	0
YES >> GO TO 2. NO >> Replace with genuine NISSAN fuel filler cap. Refer to <u>FL-10, "Exploded View"</u> .	Ρ

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

# 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?

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

**4.**CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-532, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel filler cap with a genuine one. Refer to <u>FL-10, "Exploded View"</u>.

**5.**CHECK FOR EVAP LEAK

Refer to EC-637, "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 <u>FL-15</u>, "<u>Removal and Installation</u>".

• EVAP canister vent control valve. Refer to <u>EC-340, "Component Inspection"</u>.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-13, "Exploded View".

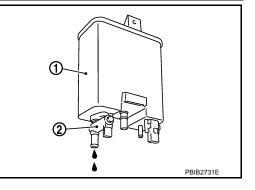
**7.**CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister (1) with EVAP canister vent control valve (2) and EVAP control system pressure sensor attached.

# 2. Check if water will drain from the EVAP canister.

### Does water drain from EVAP canister?

- YES >> GO TO 8.
- NO-1 >> With CONSULT-III: GO TO 10.
- NO-2 >> Without CONSULT-III: GO TO 11.



# 8. CHECK EVAP CANISTER

Weigh the EVAP canister 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-III: GO TO 10.

YES-2 >> Without CONSULT-III: GO TO 11.

NO >> GO TO 9.

< DTC/CIRCUIT DIAGNOSIS > 9. DETECT MALFUNCTIONING PART Check the following. EVAP canister for damage EVAP hose between EVAP canister and vehicle frame for clogging or poor connection EC >> Repair hose or replace EVAP canister. Refer to <u>FL-13, "Exploded View"</u>. 10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION (P)With CONSULT-III 1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port. D 2. Start engine and let it idle. Select "PURG VOL CONT/V" in "ACTIVE TEST" mode. 3. 4 Touch "Qu" on CONSULT-III screen to increase "PURG VOL CONT/V" opening to 100%. Check vacuum hose for vacuum. E Vacuum should exist. Is the inspection result normal? YES >> GO TO 13. NO >> GO TO 12. 11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION Without CONSULT-III 1. Start engine and warm it up to normal operating temperature. Н 2. Stop engine. 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 Κ Check vacuum hoses for clogging or disconnection. Refer to EC-97, "System Diagram". Is the inspection result normal? YFS >> GO TO 13. NO >> Repair or reconnect the hose. 13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE M Refer to EC-334, "Component Inspection". Is the inspection result normal? Ν YES >> GO TO 14. NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-34, "Exploded View". 14.CHECK FUEL TANK TEMPERATURE SENSOR Refer to EC-289, "Component Inspection". Is the inspection result normal? Ρ 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-348, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.

NO >> Replace EVAP control system pressure sensor. Refer to FL-13, "Exploded View".

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

# **16.**CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to <u>EC-97, "System Description"</u>.

Is the inspection result normal?

YES >> GO TO 17.

NO >> Repair or reconnect the hose.

**17.**CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 18.

**18.**CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to <u>EC-529, "Description"</u>.

Is the inspection result normal?

YES >> GO TO 19.

NO >> Repair or replace hoses and tubes.

**19.**CHECK RECIRCULATION LINE

Check recirculation line between 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.

20. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-532, "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-10, "Exploded View"</u>.

21. CHECK FUEL LEVEL SENSOR

Refer to MWI-49, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 22.

NO >> Replace fuel level sensor unit. Refer to <u>FL-5</u>, "Exploded View".

22. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

#### >> INSPECTION END

#### Component Inspection

INFOID:000000006352476

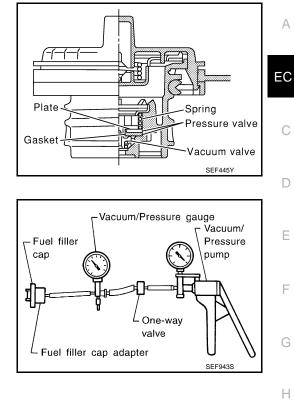
# 1.CHECK FUEL TANK VACUUM RELIEF VALVE

1. Turn ignition switch OFF.

2. Remove fuel filler cap.

#### < DTC/CIRCUIT DIAGNOSIS >

3. Wipe clean valve housing.



4. Check valve opening pressure and vacuum.

> Pressure: 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm<sup>2</sup>, 2.22 -2.90 psi)

> Vacuum: -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm<sup>2</sup>, -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-10, "Exploded View". **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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# P0460 FUEL LEVEL SENSOR

# Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter 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:000000006352478

### DTC DETECTION LOGIC

NOTE:

- If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-397, "DTC Logic"</u>.

When the vehicle is parked, the fuel level in the fuel tank is naturally stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal be- ing varied is sent from the fuel level sensor to ECM.	<ul> <li>Harness or connectors (The CAN communication line is open or shorted)</li> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Combination meter</li> <li>Fuel level sensor</li> </ul>

# DTC CONFIRMATION PROCEDURE

### **1**.PRECONDITIONING

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

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and wait maximum of 2 consecutive minutes.
- 2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

- YES >> Go to EC-366, "Diagnosis Procedure".
- NO >> INSPECTION END

### Diagnosis Procedure

**1.**CHECK DTC WITH COMBINATION METER

#### Refer to MWI-34, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-48</u>, "Component Function Check".

2. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

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>> INSPECTION END
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# P0461 FUEL LEVEL SENSOR

# Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter 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:000000006352481

### DTC DETECTION LOGIC

NOTE:

- If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-397, "DTC Logic"</u>.

Driving long distances naturally affect fuel gauge level.

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long dis- tance.	<ul> <li>Harness or connectors (The CAN communication line is open or shorted)</li> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Combination meter</li> <li>Fuel level sensor</li> </ul>

# DTC CONFIRMATION PROCEDURE

# **1.**PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-368</u>, "<u>Component Function Check</u>". Use component function check to check the overall function of the fuel level sensor. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-369</u>, "Diagnosis Procedure".

### **Component Function Check**

INFOID:000000006352482

1.PRECONDITIONING

#### WARNING:

When performing the following procedure, always observe the handling of the fuel. Refer to <u>FL-5</u>, <u>"Removal and Installation"</u>.

#### **TESTING CONDITION:**

Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT-III?

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

2. PERFORM COMPONENT FUNCTION CHECK

### With CONSULT-III

#### NOTE:

Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30  $\ell$  (7-7/8 US gal, 6-5/ 8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.

# P0461 FUEL LEVEL SENSOR

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
2. Release fuel pressure from fuel line, refer to EC-636, "Inspection".		
<ol> <li>Remove the fuel feed hose on the fuel level sensor unit.</li> <li>Connect a spare fuel hose where the fuel feed hose was removed.</li> </ol>		А
<ol> <li>Connect a spare fuel hose where the fuel feed hose was removed.</li> <li>Turn ignition switch OFF and wait at least 10 seconds then turn ON.</li> </ol>		
<ol><li>Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-III.</li></ol>		EC
7. Check "FUEL LEVEL SE" output voltage and note it.		EC
<ol> <li>Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.</li> <li>Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.</li> </ol>		
10. Check "FUEL LEVEL SE" output voltage and note it.		С
11. Fill fuel into the fuel tank for 30 $\ell$ (7-7/8 US gal, 6-5/8 Imp gal).		
<ol> <li>Check "FUEL LEVEL SE" output voltage and note it.</li> <li>Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12</li> </ol>		
Is the inspection result normal?	•	D
YES >> INSPECTION END		
NO >> Go to <u>EC-369</u> , "Diagnosis Procedure".		E
3. PERFORM COMPONENT FUNCTION CHECK		
🕅 Without CONSULT-III		
NOTE:		F
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 $\ell$ (7-	7/8 US gal, 6-5/8	
Imp gal) in advance. 1. Prepare a fuel container and a spare hose.		G
2. Release fuel pressure from fuel line. Refer to <u>EC-636, "Inspection"</u> .		G
3. Remove the fuel feed hose on the fuel level sensor unit.		
<ol> <li>Connect a spare fuel hose where the fuel feed hose was removed.</li> <li>Turn ignition switch ON.</li> </ol>		Н
6. Drain fuel by 30 $\ell$ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipme	nt.	
7. Confirm that the fuel gauge indication varies.		
8. Fill fuel into the fuel tank for 30 $\ell$ (7-7/8 US gal, 6-5/8 Imp gal).		
<ol><li>Confirm that the fuel gauge indication varies.</li></ol>		
YES >> INSPECTION END		J
NO >> Go to <u>EC-369</u> , "Diagnosis Procedure".		
Diagnosis Procedure	INFOID:000000006352483	
	INFOID:00000000332483	K
<b>1.</b> CHECK DTC WITH COMBINATION METER		
Refer to MWI-34, "CONSULT-III Function (METER/M&A)".		L
Is the inspection result normal?		
YES >> GO TO 2.		
NO >> Go to <u>MWI-48, "Component Function Check"</u> .		M
Refer to GI-43, "Intermittent Incident".		Ν
>> INSPECTION END		
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# P0462, P0463 FUEL LEVEL SENSOR

# Description

The fuel level sensor is mounted in the fuel level sensor unit.

The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter 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:000000006352485

### 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-397, "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.	<ul> <li>shorted)</li> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Combination meter</li> <li>Fuel level sensor</li> </ul>

### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

#### >> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

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

#### 2. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to EC-370, "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

### **1.**CHECK DTC WITH COMBINATION METER

### Refer to <u>MWI-34, "CONSULT-III Function (METER/M&A)"</u>.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>MWI-48</u>, "Component Function Check".

2. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

INFOID:00000006352486

# >> INSPECTION END

< DTC/CIRCUIT DIAGNOSIS >

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INFOID:000000006913420

# P0500 VSS A/T MODELS

# A/T MODELS : Description

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

# A/T MODELS : DTC Logic

INFOID:000000006913421

### 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-397, "DTC Logic"</u>.

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 follow- ing status continuously for 5 seconds or more: The difference between a vehicle speed cal- culated by a output speed sensor transmitted from TCM to ECM via CAN communication and the vehicle speed indicated on the com- bination meter exceeds 15km/h (10 MPH).	<ul> <li>Harness or connector (The CAN communication line is open or shorted.)</li> <li>Combination meter</li> <li>ABS actuator and electric unit (control unit)</li> <li>Wheel sensor</li> <li>TCM</li> <li>Output speed sensor</li> </ul>

# 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

- 1. 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-372, "A/T MODELS : Diagnosis Procedure"

NO >> INSPECTION END

# A/T MODELS : Diagnosis Procedure

INFOID:000000006913422

**1.**CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-205, "CONSULT-III Function (TRANSMISSION)".

# EC-372

< DTC/C	IRCUIT DIAGNOSIS	S>	[VQ37VHR]	I
YES NO		nooting relevant to DTC indicated		-
2.CHEC	K DTC WITH ABS A	CTUATOR AND ELECTRIC UNIT	(CONTROL UNIT)	_ [
<u>s the ins</u> YES NO	<u>pection result normal</u> >> GO TO 3.	? nooting relevant to DTC indicated	efer to <u>BRC-22, "CONSULT-III Function"</u> .	-
		meter. Refer to <u>MWI-34, "CONSL</u>	LT-III Function (METER/M&A)"	_
<u>s the ins</u> YES NO	<u>pection result normal</u> >> GO TO 4.	? nooting relevant to DTC indicated		
		efer to <u>TM-341, "Inspection"</u> .		_
<u>the ins</u> YES	pection result normal >> GO TO 5.	?		
	>> Replace or replace	e error-detected parts.		
<u>06, "RE</u>		<u>R : Removal and Installation</u> (Rea	<u>SOR : Removal and Installation"</u> (Front), <u>BRC</u> ar).	=
NO		t incident. Refer to <u>GI-43, "Interm</u> e error-detected parts.	ttent Incident".	
1/T M(	DDELS : Descrip	tion	INFOID:0000000635248	37
nit)" via			m the "ABS actuator and electric unit (contro then sends a signal to the ECM via the CAN	
1/T MQ	DDELS : DTC Lo	gic	INFOID:0000000635248	38
TC DE	TECTION LOGIC			
If DTC If DTC			the trouble diagnosis for DTC UXXXX. the trouble diagnosis for DTC P0607. Refe	r
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	-
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	<ul> <li>Harness or connectors (The CAN communication line is open or shorted)</li> <li>Harness or connectors (The vehicle speed signal circuit is open or shorted)</li> <li>Wheel sensor</li> <li>Combination meter</li> </ul>	
	1	1		

DTC CONFIRMATION PROCEDURE

# **1.**INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III? • ABS actuator and electric unit (control unit)

YES >> GO TO 2. NO >> GO TO 5.

2. PRECONDITIONING

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

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

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

>> GO TO 3.

3.CHECK VEHICLE SPEED SIGNAL

#### NOTE:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

#### With CONSULT-III

- 1. Start engine (VDC switch OFF).
- 2. Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-III. The vehicle speed on CON-SULT-III should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Go to EC-375, "M/T MODELS : Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Select "DATA MONITOR" mode with CONSULT-III.
- 2. Warm engine up to normal operating temperature.
- 3. Maintain the following conditions for at least 50 consecutive seconds. CAUTION:

#### 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

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-375, "M/T MODELS : Diagnosis Procedure".

NO >> INSPECTION END

**5.**PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to <u>EC-374, "M/T MODELS : Component Function Check"</u>. 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
- NO >> Go to EC-375, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Component Function Check

**1.**PERFORM COMPONENT FUNCTION CHECK

#### With GST

- 1. Lift up drive wheels.
- 2. Start engine.
- 3. Read vehicle speed signal in Service \$01 with GST.

# P0500 VSS

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when suitable gear position.	rotating wheels with
is the inspection result normal?	
YES >> INSPECTION END	
NO >> Go to EC-375, "M/T MODELS : Diagnosis Procedure".	
M/T MODELS : Diagnosis Procedure	INFOID:000000006352490
CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"	
efer to BRC-22, "CONSULT-III Function".	
the inspection result normal?	
YES >> GO TO 2. NO >> Repair or replace.	
CHECK DTC WITH COMBINATION METER	
efer to MWI-34, "CONSULT-III Function (METER/M&A)".	
>> INSPECTION END	

# P0506 ISC SYSTEM

# Description

INFOID:000000006352491

[VQ37VHR]

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.

The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

# DTC Logic

INFOID:000000006352492

# 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.	<ul><li>Electric throttle control actuator</li><li>Intake air leak</li></ul>

# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

If the idle speed is out of the specified value, perform <u>EC-20, "IDLE AIR VOLUME LEARNING : Special</u> <u>Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

**TESTING CONDITION:** 

- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above -10°C (14°F).

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Restart engine and run it for at least 1 minute at idle speed.
- 6. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to <u>EC-376, "Diagnosis Procedure"</u>. NO >> INSPECTION END

### Diagnosis Procedure

# **1.**CHECK INTAKE AIR LEAK

1. Start engine and let it idle.

2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

Revision: 2011 October

# **P0506 ISC SYSTEM**

#### [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > YES >> Discover air leak location and repair. NO >> GO TO 2. 2.REPLACE ECM 1. Stop engine. EC 2. Replace ECM. 3. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement". С >> INSPECTION END D

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# P0507 ISC SYSTEM

# Description

INFOID:000000006352494

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:000000006352495

# 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.	<ul><li>Electric throttle control actuator</li><li>Intake air leak</li><li>PCV system</li></ul>

# DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

If the idle speed is out of the specified value, perform <u>EC-20, "IDLE AIR VOLUME LEARNING : Special</u> <u>Repair Requirement"</u>, before conducting DTC Confirmation Procedure.

**TESTING CONDITION:** 

• Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

• Always perform the test at a temperature above -10°C (14°F).

>> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Start engine and run it for at least 1 minute at idle speed.
- 6. Check 1st trip DTC.

#### Is 1st trip DTC detected?

YES >> Go to <u>EC-378, "Diagnosis Procedure"</u>. NO >> INSPECTION END

# Diagnosis Procedure

**1.**CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.

P0507 ISC SYSTEM			
< DTC/CIRCUIT DIAGNOSIS > [VQ37VHR]			
NO >> Repair or replace.	٨		
2.CHECK INTAKE AIR LEAK	А		
<ol> <li>Start engine and let it idle.</li> <li>Listen for an intake air leak after the mass air flow sensor.</li> </ol>	EC		
<u>Is intake air leak detected?</u> YES >> Discover air leak location and repair.			
NO >> GO TO 3.	С		
<b>3.</b> REPLACE ECM			
<ol> <li>Stop engine.</li> <li>Replace ECM.</li> <li>Go to <u>EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement"</u>.</li> </ol>	D		
>> INSPECTION END	Е		
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# P050A, 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.

# DTC Logic

NOTE:

# DTC DETECTION LOGIC

### 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.	Fuel injection system
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.	<ul><li>ECM</li><li>Lack of intake air volume</li></ul>

#### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING

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

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

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

#### TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

#### With CONSULT-III

- Turn ignition switch OFF and wait at least 10 seconds.
- 2. Turn ignition switch ON.
- 3. Select "DATA MONITOR" mode with CONSULT-III.
- Check the indication of "COOLAN TEMP/S".

#### With GST

Follow the procedure "With CONSULT-III" above.

Is the value of "COOLAN TEMP/S" between 4°C (39°F) and 36°C (97°F)?

YES >> GO TO 3.

NO-1 [If it is below 4°C (39°F)]>>Warm up the engine until the value of "COOLAN TEMP/S" reaches 4°C (39°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

#### With CONSULT-III

- 1. Set the select lever in N range.
- 2. 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.

#### With GST

Follow the procedure "With CONSULT-III" above.

Is 1st trip DTC detected?

- YES >> Go to EC-381, "Diagnosis Procedure".
- NO >> INSPECTION END

# EC-380

INFOID:000000006914918

# P050A, P050E COLD START CONTROL

#### [VQ37VHR] < DTC/CIRCUIT DIAGNOSIS > **Diagnosis** Procedure INFOID:000000006914920 А **1.**PERFORM IDLE AIR VOLUME LEARNING Perform EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement". EC 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 D Intake air passage clogging Clogging of throttle body Is the inspection result normal? Е YES >> GO TO 3. NO >> Repair or replace malfunctioning part $\mathbf{3}.$ check fuel injection system function F Perform DTC Confirmation Procedure for DTC P0171, P0174. Refer to EC-278, "DTC Logic". Is the inspection result normal? YES >> GO TO 4. NO >> Go to EC-279, "Diagnosis Procedure" for DTC P0171, P0174. **4.** PERFORM DTC CONFIRMATION PROCEDURE Н 1. Turn ignition switch ON. Erase DTC. 2. Perform DTC Confirmation Procedure. See EC-380, "DTC Logic". Is the 1st trip DTC P050A or P050E displayed again? YES >> GO TO 5. NO >> INSPECTION END **5.**REPLACE ECM Κ Replace ECM. 1 2. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement". L >> INSPECTION END Μ Ν

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# **P0524 ENGINE OIL PRESSURE**

### < DTC/CIRCUIT DIAGNOSIS >

# P0524 ENGINE OIL PRESSURE

### DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

If DTC P0524 is displayed with DTC P0075 or P0081, first perform the trouble diagnosis for DTC P0075, P0081. Refer to <u>EC-201, "DTC Logic"</u>

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0524	Engine oil pressure too low	Engine oil pressure is low because there is a gap between angle of target and phase-control angle.	<ul> <li>Engine oil pressure or level too low</li> <li>Crankshaft position sensor (POS)</li> <li>Camshaft position sensor (PHASE)</li> <li>Intake valve control solenoid valve</li> <li>Accumulation of debris to the signal pick-up portion of the camshaft</li> <li>Timing chain installation</li> <li>Foreign matter caught in the oil groove for intake valve timing control</li> </ul>

### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING-I

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

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

2. Turn ignition switch ON.

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

2. PRECONDITIONING-II

Check oil level and oil pressure. Refer to LU-6, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to <u>LU-6, "Inspection"</u>.

# **3.**PERFORM DTC CONFIRMATION PROCEDURE

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

2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	More than 1,700 rpm
COOLAN TEMP/S	More than 70°C (158°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.)

#### **CAUTION:**

#### Always drive at a safe speed.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to <u>EC-383, "Diagnosis Procedure"</u> NO >> INSPECTION END

1.CHECK OIL PRESSURE WARNING LAMP

Check oil pressure warning lamp and confirm it is not illumi-

# Diagnosis Procedure

Start engine.

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#### nated. Is oil pressure warning lamp illuminated? YES >> Go to LU-6, "Inspection". NO >> GO TO 2. PBIA8559J 2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE Refer to EC-186, "Component Inspection". Is the inspection result normal? YES >> GO TO 3. NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-55, "Exploded View". **3.**CHECK CRANKSHAFT POSITION SENSOR (POS) Refer to EC-315, "Component Inspection". Is the inspection result normal? YES >> GO TO 4. NO >> Replace crankshaft position sensor (POS). Refer to EM-117, "Exploded View". **4.**CHECK CAMSHAFT POSITION SENSOR (PHASE) Refer to EC-319, "Component Inspection". Is the inspection result normal? YES >> GO TO 5. NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-55, "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 debris and clean the signal plate of camshaft front end or replace camshaft. Refer to EM-90, "Exploded View". 00 manne JMBIA0962ZZ 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-56, "Removal and Installation". NO >> GO TO 7. **7.**CHECK LUBRICATION CIRCUIT

Perform "Inspection of Camshaft Sprocket (INT) Oil Groove". Refer to EM-100, "Inspection".

# EC-383

# **P0524 ENGINE OIL PRESSURE**

< DTC/CIRCUIT DIAGNOSIS >

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:000000006352499

[VQ37VHR]

### 1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Terminals	Resistance ( $\Omega$ )
1 and 2	7.0 - 7.7 [at 20°C (68°F)]
1 or 2 and ground	$_\infty^\infty$ (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.

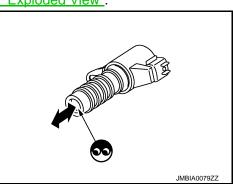
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to <u>EM-55</u>, "<u>Exploded</u> <u>View</u>".

**2.**CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

- 1. Remove intake valve timing control solenoid valve. Refer to EM-55, "Exploded View".
- Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.
   CAUTION: Never apply 12 V DC continuously for 5 seconds or more.

Doing so may result in damage to the coil in intake valve timing control solenoid valve. NOTE:

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



Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to <u>EM-55</u>, "<u>Exploded</u> <u>View</u>".

# P0550 PSP SENSOR

### < DTC/CIRCUIT DIAGNOSIS >

# P0550 PSP SENSOR

# Description

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load.

This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

# DTC Logic

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# DTC DETECTION LOGIC

#### NOTE: If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-398, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	F
P0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	<ul> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Power steering pressure sensor</li> </ul>	
DTC CONFIRMATION PROCEDURE 1. PRECONDITIONING				G
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.				Н
2. Turn ig	nition switch ON.	l wait at least 10 seconds. I wait at least 10 seconds.		I

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

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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	Connector Terminal		voltage (v)
F35	3	Ground	Approx. 5

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А

Is the inspection result normal?

YES >> GO TO 3.

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

 $\mathbf{3}$ .check PSP sensor ground circuit for open and short

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between PSP sensor harness connector and ECM harness connector.

PSP sensor		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, 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-386, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace PSP sensor. Refer to <u>ST-34, "Exploded View"</u>.

**6.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

#### >> INSPECTION END

### Component Inspection

1.CHECK POWER STEERING PRESSURE SENSOR

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

- 3. Start engine and let it idle.
- 4. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM		Condition		
Connector	+	-			Voltage (V)
Connector	Terminal	Terminal			
F102	87	96	Being turned		0.5 - 4.5
1102	07	90	Steering wheel Not being turned		0.4 - 0.8

Is the inspection result normal?

# **P0550 PSP SENSOR**

### < DTC/CIRCUIT DIAGNOSIS > YES >> INSPECTION END

NO >> Replace power steering pressure sensor. Refer to <u>ST-34, "Exploded View"</u>.

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#### < DTC/CIRCUIT DIAGNOSIS >

# P0555 BRAKE BOOSTER PRESSURE SENSOR

### Description

Brake booster pressure sensor is connected to brake booster by a hose. It detects brake booster pressure and sends the voltage signal to the ECM. The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.

# DTC Logic

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0555	Brake booster pressure sensor circuit	<ul> <li>An excessively low voltage from the sensor is sent to ECM.</li> <li>An excessively high voltage from the sensor is sent to ECM.</li> </ul>	<ul> <li>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.) (Gear lever position sensor circuit is shorted.)</li> <li>Brake booster pressure sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Accelerator pedal position sensor</li> <li>EVAP control system pressure sensor</li> <li>Refrigerant pressure sensor</li> <li>Gear lever position sensor</li> <li>EVAP control system pressure sensor</li> <li>Refrigerant pressure sensor</li> <li>Gear lever position sensor</li> </ul>

# DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

#### >> GO TO 2.

# 2.PERFORM DTC CONFIRMATION PROCEDURE

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

### Is DTC detected?

YES >> Go to EC-388, "Diagnosis Procedure". >> INSPECTION END NO

### **Diagnosis** Procedure

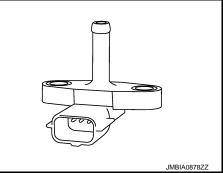
1. CHECK GROUND CONNECTION

Turn ignition switch OFF. 1.



[VQ37VHR]

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				EBOOSTE	RPRES	SURE SI	ENSOR [VQ37VHR]	
< DTC/CI				ar to Cround I	on option in			
2. Check Is the insp	-				ispection in	<u>GI-40, CIII</u>	cuit Inspection".	А
	> GO TO 2		<u> </u>					
		or replace (	ground co	nnection.				
2.CHECK	K BRAKE E	BOOSTER	PRESSL	IRE SENSOR	POWER SU	JPPLY CIR	CUIT	EC
1. Disco	nnect brak	e booster	pressure	sensor harnes	s connector.			
2. Turn i	gnition swi	tch ON.						С
3. Check	the voltag	je betweei	n brake bo	oster pressur	e sensor ha	rness conn	ector and ground.	
Brake	booster pres	sure sensor						
Conne	-	Terminal		Ground	Voltage (V)			D
E48		1		Ground	Approx. 5			
Is the insp		ult normal?	2					Е
-	> GO TO 9		-					
	> GO TO 3							
<b>3.</b> CHECK	K BRAKE E	BOOSTER	PRESSL	IRE SENSOR	POWER SU	JPPLY CIR	CUIT-II	F
1. Turn i	gnition swi	tch OFF.						
		1 harness						G
3. Check nector		nuity betwe	een Brake	booster pres	sure sensor	narness co	onnector and ECM harness con-	
10000	•							
Brake boo	oster pres-	F	214					Н
	sensor	EC	CM	Continuity				
Connector	Terminal	Connector	Terminal					I
E48	1	F101	45	Existed				
Is the insp			<u>?</u>					
	> GO TO { > GO TO {							J
4.DETEC								
			IG PART					K
<ul><li>Check the</li><li>Harness</li></ul>		rs F1 F3						
			CM and b	rake booster p	oressure ser	isor		
								L
_	-	pen circuit						
5.CHECK	K SENSOF	R POWER	SUPPLY	CIRCUIT				Μ
Check har	ness for sl	hort to pow	ver and sh	ort to ground,	between the	e following	terminals.	
						-		
E	СМ			Sensor				Ν
Connector	Terminal		Name	)	Connector	Terminal		
F101	45	Brake boos	ster pressure	e sensor	E48	1		0
	46	CKP sense	or (POS)		F2	1		~
F102	74	Gear lever	position ser	isor	F57	3		
	103	APP sense	or		E112	6		Ρ
M107	107			ressure sensor	B30	3		
		Refrigerant	t pressure se	ensor	E172	3		

Is the inspection result normal?

YES >> GO TO 6.

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

< DTC/CIRCUIT DIAGNOSIS >

### **6.**CHECK COMPONENTS

#### Check the following.

- Crankshaft position sensor (POS) (Refer to EC-315, "Component Inspection".)
- Gear lever position sensor (Refer to EC-404, "Component Inspection")
- EVAP control system pressure sensor (Refer to EC-348. "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>ÈC-536, "Component Function Check"</u>.)

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace malfunctioning component.

**I**.CHECK APP SENSOR

Refer to EC-486, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 8.

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly. Refer to <u>ACC-4, "Exploded View"</u>.

2. Go to EC-486, "Special Repair Requirement".

#### >> INSPECTION END

# 9.CHECK BRAKE BOOSTER PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- Check the continuity between brake booster pressure sensor harness connector and ECM harness connector.

Brake booster	pressure sensor	E	Continuity	
Connector Terminal		Connector	Terminal	Continuity
E48	3	F101	36	Existed

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

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

#### Check the following.

Harness connectors F1, E3

• Harness for open or short between brake booster pressure sensor and ECM

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

# **11.**CHECK BRAKE BOOSTER PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

 Check the continuity between brake booster pressure sensor harness connector and ECM harness connector.

Brake booster	pressure sensor	E	Continuity	
Connector Terminal		Connector	Terminal	Continuity
E48	2	F101	39	Existed

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

Is the inspection result normal?

YES	>> GO TO 13.
NO	>> GO TO 12.

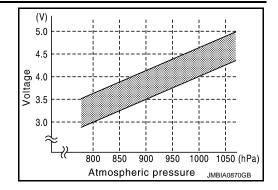
	P	0555 BRAKE	BOOSIER	RESSURE S	DENSOR	
< D1	C/CIRCUIT DIAGI	NOSIS >				[VQ37VHR]
12	DETECT MALFUN	CTIONING PART				
• Ha	ck the following. arness connectors F arness for open or sl		e booster pressu	re sensor and EC	M	
		n circuit, short to g		power in harness	or connectors.	
13	CHECK BRAKE B	DOSTER PRESSI	URE SENSOR			
	er to <u>EC-391, "Comp</u>					
	e inspection result r	ormal?				
YE NO		ike booster pressu	ure sensor. Refer	to BR-36, "Explo	ded View".	
	.CHECK INTERMIT			<u></u>	<u> </u>	
	er to <u>GI-43, "Intermit</u>					
1.010	o <u>or -o, momm</u>	terre moldorit.				
	>> INSPECTIC	N END				
Cor	nponent Inspec	tion				INFOID:000000006352507
1.0	HECK BRAKE BOO	DSTER PRESSUR	RE SENSOR-I			
	Turn ignition switch		operating tompo	roturo		
2.	Start engine and wa	rm it up to normal	operating tempe 5 seconds and th	erature. hen turn ON.		
2. 3.		rm it up to normal OFF, wait at least	5 seconds and the	hen turn ON.	e following.	
2. 3.	Start engine and wa Turn ignition switch	rm it up to normal OFF, wait at least etween ECM harn	5 seconds and the	hen turn ON.	e following.	
2. 3.	Start engine and wa Turn ignition switch	rm it up to normal OFF, wait at least etween ECM harn ECM	5 seconds and the	hen turn ON.	e following.	
2. 3.	Start engine and wa Turn ignition switch	rm it up to normal OFF, wait at least etween ECM harn ECM +	5 seconds and thess connector te	hen turn ON.	e following.	
2. 3.	Start engine and wa Turn ignition switch Check the voltage b Connector	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal	5 seconds and the second secon	hen turn ON.	e following.	
2. 3. 4.	Start engine and wa Turn ignition switch Check the voltage b Connector F101	rm it up to normal OFF, wait at least etween ECM harn ECM +	5 seconds and thess connector te	hen turn ON.	e following.	
2. 3. 4.	Start engine and wa Turn ignition switch Check the voltage b Connector	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39	5 seconds and the second secon	hen turn ON. erminals as per the 	-	past after engine
2. 3. 4.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped.	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man	5 seconds and the second secon	hen turn ON. erminals as per the 	or more minutes	
2. 3. 4. 	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man	5 seconds and the second secon	hen turn ON. erminals as per the 	or more minutes	
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmos	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man or is absolute pres	5 seconds and the second secon	hen turn ON. erminals as per the 	or more minutes	
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmosp NOTE:	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man or is absolute pres	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmos	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man or is absolute pres bheric pressure. pressure describe	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmosp NOTE: As the atmospheric pressure with the fo	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man or is absolute pres oheric pressure. pressure describe llowing chart.	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmosp NOTE: As the atmospheric pressure with the fo	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man or is absolute pres oheric pressure. pressure describe llowing chart.	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmosp NOTE: As the atmospheric pressure with the fo	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man or is absolute pres oheric pressure. pressure describe llowing chart. Compensated pres 0	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmosp NOTE: As the atmospheric pressure with the fo Altitude (m) 0 200	rm it up to normal OFF, wait at least etween ECM harm ECM + Terminal 39 nce of intake man or is absolute press oheric pressure. pressure describe llowing chart. Compensated press 0 -24	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmosp NOTE: As the atmospheric pressure with the fo Altitude (m) 0 200 400	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man or is absolute pres oheric pressure. pressure describe llowing chart. Compensated pres 0 -24 -47	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmosp NOTE: As the atmospheric pressure with the fo Altitude (m) 0 200 400 600	rm it up to normal OFF, wait at least etween ECM harm ECM + Terminal 39 nce of intake man or is absolute press oheric pressure. pressure describe llowing chart. Compensated press 0 -24 -47 -70	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmosp NOTE: As the atmospheric pressure with the fo Altitude (m) 0 200 400 600 800	rm it up to normal OFF, wait at least etween ECM harn ECM + Terminal 39 nce of intake man or is absolute pres oheric pressure. pressure describe llowing chart. Compensated pres 0 -24 -47 -70 -92	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-
2. 3. 4.  5.	Start engine and wa Turn ignition switch Check the voltage b Connector F101 NOTE: • To avoid the influe is stopped. • Because the sens sure and altitude. Measure the atmosp NOTE: As the atmospheric pressure with the fo Altitude (m) 0 200 400 600	rm it up to normal OFF, wait at least etween ECM harm ECM + Terminal 39 nce of intake man or is absolute press oheric pressure. pressure describe llowing chart. Compensated press 0 -24 -47 -70	5 seconds and the second secon	hen turn ON. erminals as per the   eck the voltage 1 put value may diff	or more minutes fer depends on a	tmospheric pres-

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

#### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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?

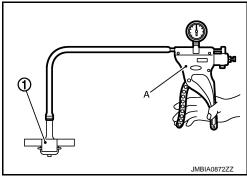
YES >> GO TO 2.

NO >> Replace brake booster pressure sensor. Refer to <u>BR-36, "Exploded View"</u>.

# 2.CHECK BRAKE BOOSTER PRESSURE SENSOR-II

- 1. Turn ignition switch OFF.
- 2. Remove brake booster pressure sensor with its harness connected.
- 3. Connect the hose of vacuum pump (A) to brake booster pressure sensor (1).
- 4. Turn ignition switch ON.
- 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 [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 brake booster pressure sensor. Refer to <u>BR-36, "Exploded View"</u>.

# P0603 ECM POWER SUPPLY

### Description

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.

# DTC Logic

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	G
P0603	ECM power supply circuit	ECM back up RAM system does not function properly.	<ul> <li>Harness or connectors [ECM power supply (back up) circuit is open or shorted.]</li> <li>ECM</li> </ul>	Н
DTC CON	NFIRMATION PROCE	DURE		

### 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

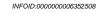
- 1. Turn ignition switch ON, wait at least 10 seconds.
- 2. Turn ignition switch OFF and wait at least 5 minutes.
- 3. Turn ignition switch ON, wait at least 10 seconds.
- 4. Repeat steps 2 and 3 for five times.
- 5. Check 1st trip DTC.
- Is 1st trip DTC detected?
- YES >> Go to <u>EC-393, "Diagnosis Procedure"</u>. NO >> INSPECTION END

# Diagnosis Procedure

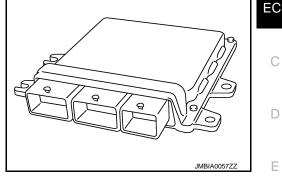
# 1.CHECK ECM POWER SUPPLY

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.
- 3. Check the voltage between ECM harness connector terminals as per the following.

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# P0603 ECM POWER SUPPLY

### < DTC/CIRCUIT DIAGNOSIS >

	E			
	+	-	_	Voltage
Connector	Terminal	Connector	Terminal	
F102	93	M107	128	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

# 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E3, F1
- 15 A fuse (No. 50)
- IPDM E/R harness connector E7
- · Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

# 3. CHECK INTERMITTENT INCIDENT

Refer to GI-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-393, "DTC Logic"</u>.
- Is the 1st trip DTC P0603 displayed again?
- YES >> GO TO 5.
- NO >> INSPECTION END

# **5.**REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> INSPECTION END

# P0605 ECM

# Description

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.

# DTC Logic

# DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	G
		A)	ECM calculation function is malfunctioning.		_ 0
P0605	Engine control module	B)	ECM EEP-ROM system is malfunctioning.	• ECM	
		C)	ECM self shut-off function is malfunctioning.		H

### DTC CONFIRMATION PROCEDURE

# 1.PRECONDITIONING

If DTC Confirmation Procedure has be	an nreviously conducted	alwave nerform the f	allowing procedure
I DIC Commation i locedure has be	sen previously conducted,	, always periorin the r	onowing procedure
before conducting the next test.			
1 Turn ignition switch OFE and wait at	looot 10 cocondo		

Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON.

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

### >> GO TO 2.

- 2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A Turn ignition switch ON. 1. Check 1st trip DTC. 2. Is 1st trip DTC detected? YES >> Go to EC-396, "Diagnosis Procedure". NO >> GO TO 3. **3.** PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B 1. Turn ignition switch ON and wait at least 1 second. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON. 2. 3. Check 1st trip DTC. Is 1st trip DTC detected? YES >> Go to EC-396, "Diagnosis Procedure". NO >> GO TO 4. 4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C 1. Turn ignition switch ON and wait at least 1 second.
- 2. Turn ignition switch OFF, wait at least 10 seconds, and then turn it ON.
- Repeat step 2 for 32 times. 3.
- Check 1st trip DTC. 4.

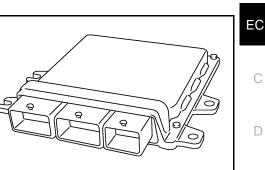
Is 1st trip DTC detected?

# EC-395

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[VQ37VHR]



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### YES >> Go to EC-396, "Diagnosis Procedure".

NO >> INSPECTION END

# **Diagnosis Procedure**

# **1.**INSPECTION START

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-395, "DTC Logic"</u>.

Is the 1st trip DTC P0605 displayed again?

YES >> GO TO 2.

NO >> INSPECTION END

# 2.REPLACE ECM

- 1. Replace ECM.
- 2. Go to EC-17, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (ECM) : Special Repair Requirement".

>> INSPECTION END

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[VQ37VHR]

# P0607 ECM

# Description

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

# DTC Logic

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[VQ37VHR]

INFOID:000000006352514

### 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 CON	FIRMATION PROCED	URE	
<b>1.</b> PERFOR	RM DTC CONFIRMATIO	N PROCEDURE	
	nition switch ON.		
2. Check Is DTC dete			
	Go to <u>EC-397, "Diagnos Go to EC-397, "Diagnos </u>	sis Procedure".	
NO >>	INSPECTION END		
Diagnosi	s Procedure		INFOID:00000006352516
- 1 INCDEC	TION START		
1. Turn ig 2. Erase [	nition switch ON.		
3. Perforn	n DTC Confirmation Proc	cedure.	
See <u>EC</u> 4. Check	<u>C-397, "DTC Logic"</u> .		
	P0607 displayed again?		
	• GO TO 2.		
<b>-</b>	INSPECTION END		
2.REPLAC	CEECM		
1. Replac			
2. Go to <u>Require</u>		ERVICE WHEN REPLACING CONTR	<u>OL UNIT (ECM) : Special Repair</u>
require	<u>smont</u> .		
>>	INSPECTION END		

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# P0643 SENSOR POWER SUPPLY

# DTC Logic

INFOID:000000006352517

[VQ37VHR]

## DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects that the voltage of power source for sensor is excessively low or high.	<ul> <li>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.]</li> <li>Accelerator pedal position sensor</li> <li>Throttle position sensor</li> <li>Camshaft position sensor (PHASE) (bank 1)</li> <li>Manifold absolute pressure (MAP) sensor</li> <li>Power steering pressure sensor</li> <li>Camshaft position sensor (PHASE) (bank 2)</li> </ul>

### 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-398, "Diagnosis Procedure".
- NO >> INSPECTION END

### Diagnosis Procedure

INFOID:000000006352518

### **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.

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

# P0643 SENSOR POWER SUPPLY

### < DTC/CIRCUIT DIAGNOSIS >

APP	sensor	Ground	Voltage (V)
Connector	Terminal	Giouna	voltage (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.

EC	M	Sensor				
Connector	Terminal	Name	Connector	Terminal		
E101	43	Electric throttle control actuator (bank 2)	F27	1		
F101 -	44	Electric throttle control actuator (bank 1)	F6	6		
		CMP sensor (PHASE) (bank 1)	F5	1		
F102	60	Manifold absolute pressure (MAP) sen- sor	F50	1		
		PSP sensor	F35	3		
	64	CMP sensor (PHASE) (bank 2)	F18	1		
M107	99	APP sensor	E112	5		
s the inspe	ection res	<u>ult normal?</u>				
1.снеск	COMPO	short to ground or short to power in NENTS				
	t position	sensor (PHASE) (bank 1) (Refer to pressure (MAP) sensor (Refer to E				
Power st	eering pre	essure sensor (Refer to <u>ÈC-386, "C</u>	omponent l	nspection".)	,	
	•	sensor (PHASE) (bank 2) (Refer to	<u>EC-319, "(</u>	component Ins	<u>pection"</u> .)	
	> GO TO :	ult normal?				
		e malfunctioning component.				
5.снеск	TP SENS	SOR				
Refer to E	C-232, "C	omponent Inspection".				
s the inspe	ection res	ult normal?				
	> GO TO					
~	> GO TO					
		TRIC THROTTLE CONTROL ACTU				
		throttle control actuator. Refer to <u>E</u> Special Repair Requirement".	<u>M-34, "Exp</u>	<u>oded View"</u> .		
_		TION END				
7.снеск	APP SE	NSOR				
Refer to E	C-486, "C	omponent Inspection".				
a .	<i></i>	ult normal?				

Is the inspection result normal?

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

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8.Replace accelerator pedal assembly

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# P0643 SENSOR POWER SUPPLY

#### < DTC/CIRCUIT DIAGNOSIS >

- Replace accelerator pedal assembly. Refer to <u>ACC-4, "Exploded View"</u>. Go to <u>EC-486, "Special Repair Requirement"</u>. 1.
- 2.

### >> INSPECTION END

# 9. CHECK INTERMITTENT INCIDENT

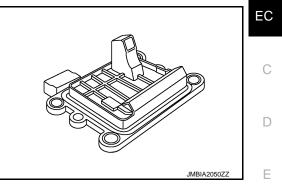
Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

# P0820 GEAR LEVER POSITION SENSOR

### Description

Gear lever position sensor is installed in transmission and detects the gear position. When shift lever is shifted, position sensor magnet on striking rod in transmission moves and changes magnetic field of the coil in gear lever position sensor. Gear lever position sensor converts the changes in magnetic field to voltage signals and transmits them to ECM. ECM detects the gear position by these voltage signal changes.



DTC Logic

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#### DTC DETECTION LOGIC NOTE:

- If DTC P0820 is displayed with DTC P0335, P0340 or P0345, first perform the trouble diagnosis for DTC P0335, P0340 or P0345. Refer to <u>EC-312, "DTC Logic"</u> or <u>EC-316, "DTC Logic"</u>.
- If DTC P0820 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-373, "M/T MODELS : DTC Logic".

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
		A	<ul> <li>An excessively low voltage from the sensor is sent to ECM.</li> <li>An excessively high voltage from the sensor is sent to ECM.</li> </ul>	<ul> <li>Harness or connectors (Gear lever position sensor circuit is open or short- ed.)</li> <li>[CKP sensor (POS) circuit is shorted.]</li> </ul>
P0820	Gear lever position sen- sor circuit	В	<ul> <li>There is a difference between target engine speed calculated by ECM and actual engine speed.</li> </ul>	<ul> <li>(APP sensor 2 circuit is shorted.)</li> <li>(EVAP control system pressure sensor circuit is shorted.)</li> <li>(Refrigerant pressure sensor circuit is shorted.)</li> <li>(Brake booster pressure sensor circuit is shorted.)</li> <li>Gear lever position sensor</li> <li>Crankshaft position sensor (POS)</li> <li>Accelerator pedal position sensor</li> <li>EVAP control system pressure</li> <li>Refrigerant pressure sensor</li> <li>Brake booster pressure sensor</li> <li>Transmission</li> </ul>

# DTC CONFIRMATION PROCEDURE

## **1.**PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure N 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 FOR MALFUNCTION A

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

2. Check DTC.

Is DTC detected?

[VQ37VHR]

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YES >> Go to <u>EC-402</u> , " <u>Diagnosis Procedure</u> ". NO >> GO TO 3.	
<b>3.</b> PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B	
<ol> <li>Start engine.</li> <li>Drive the vehicle in every gear position from 1st to 6th gear for 10 seconds each at 20 km NOTE: Fully depress clutch pedal when shifting and fully release clutch pedal after gear s plete. CAUTION: Always drive vehicle at a safe speed.</li> </ol>	
3. Check DTC.	
I <u>s DTC detected?</u> YES >> Go to <u>EC-402, "Diagnosis Procedure"</u> . NO >> INSPECTION END	
Diagnosis Procedure	INFOID:000000006352521
1. CHECK GROUND CONNECTION	
<ol> <li>Turn ignition switch OFF.</li> <li>Check ground connection M95. Refer to Ground Inspection in <u>GI-46. "Circuit Inspection"</u>. <u>Is the inspection result normal?</u> YES &gt;&gt; GO TO 2. NO &gt;&gt; Repair or replace ground connection. 2.CHECK GEAR LEVER POSITION SENSOR POWER SUPPLY CIRCUIT-I</li> </ol>	
<ol> <li>Disconnect gear lever position sensor harness connector.</li> <li>Turn ignition switch ON.</li> </ol>	

3. Check the voltage between gear lever position sensor harness connector and ground.

Gear lever p	osition sensor	Ground	Voltage (V)	
Connector	Terminal	Cround	voltage (v)	
F57	3	Ground	Approx. 5	

Is the inspection result normal?

< DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 8.

NO >> GO TO 3.

**3.**CHECK GEAR LEVER POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Check the continuity between gear lever position sensor harness connector and ECM harness connector.

Gear lever p	osition sensor	E	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
F57	3	F102	74	Existed

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair open circuit.

# **4.**CHECK GEAR LEVER POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

[VQ37VHR]

### < DTC/CIRCUIT DIAGNOSIS >

А ECM Sensor Connector Terminal Name Connector Terminal 45 E48 Brake booster pressure sensor EC F101 1 46 CKP sensor (POS) F2 F102 74 Gear lever position sensor F57 3 103 APP sensor E112 6 M107 EVAP control system pressure sensor B30 3 107 E172 Refrigerant pressure sensor 3 D Is the inspection result normal? YES >> GO TO 5. NO >> Repair short to ground or short to power in harness or connectors. Е 5.CHECK COMPONENTS Check the following. Crankshaft position sensor (POS) (Refer to EC-315, "Component Inspection".) F Brake booster pressure sensor (Refer to <u>EC-391, "Component Inspection"</u>.) • EVAP control system pressure sensor (Refer to EC-348. "Component Inspection".) Refrigerant pressure sensor (Refer to <u>HAC-56, "Diagnosis Procedure"</u>.) Is the inspection result normal? YES >> GO TO 6. NO >> Replace malfunctioning component. Н **6.**CHECK APP SENSOR Refer to EC-486, "Component Inspection". Is the inspection result normal? YES >> GO TO 13. NO >> GO TO 7. 7.REPLACE ACCELERATOR PEDAL ASSEMBLY 1. Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View". Go to EC-486, "Special Repair Requirement". 2. Κ >> INSPECTION END 8.CHECK GEAR LEVER POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT L 1. Turn ignition switch OFF. 2. Disconnect ECM harness connector. Μ 3. Check the continuity between gear lever position sensor harness connector and ECM harness connector. ECM Gear lever position sensor Ν Continuity Connector Terminal Connector Terminal F57 F102 88 Existed 1 Also check harness for short to ground and short to power. 4. Is the inspection result normal? YES >> GO TO 9. Ρ NO >> Repair open circuit, short to ground or short to power in harness or connectors.  ${f 9.}$  CHECK GEAR LEVER POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT Check the continuity between gear lever position sensor harness connector and ECM harness connector.

### < DTC/CIRCUIT DIAGNOSIS >

Gear lever p	osition sensor	E	СМ	Continuity
Connector Terminal		Connector	Terminal	Continuity
F57	2		26	Existed
1.57	4	F101	27	LXISIEU

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, short to ground or short to power in harness or connectors.

10. CHECK GEAR LEVER POSITION SENSOR

Refer to EC-404, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11.REPLACE GEAR LEVER POSITION SENSOR

1. Replace gear lever position sensor. Refer to TM-48, "Exploded View".

2. Go to EC-405, "Special Repair Requirement".

#### >> INSPECTION END

12. CHECK TRANSMISSION SHIFT CONTROL

Refer to TM-28, "Inspection".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace.

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

Component Inspection

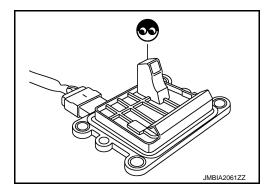
INFOID:000000006352522

# 1.CHECK GEAR LEVER POSITION SENSOR-I

- 1. Turn ignition switch OFF.
- 2. Disconnect gear lever position sensor harness connector.
- 3. Remove the sensor. Refer to TM-48, "Exploded View".
- 4. Visually check the sensor for chipping.

Is the inspection result normal?

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



2.CHECK GEAR LEVER POSITION SENSOR-II

Check resistance between gear lever position sensor terminals as per the following items.

< DTC/CIRCUIT DIAGNOSIS >

Terminals (Polarity)	Resistance ( $\Omega$ )		А
1 (+) - 2 (-)			
1 (+) - 3 (-)			EC
1 (+) - 4 (-)			EC
2 (+) - 3 (-)	Except 0 or $\infty$ [at 25°C (77°F)]		
2 (+) - 4 (-)			С
3 (+) - 4 (-)			
Is the inspection resu			D
YES >> INSPEC			D
NO >> GO TO 3			
	LEVER POSITION SENSOR		Е
	rer position sensor. Refer to <u>TM-48</u> Special Repair Requirement"	3, "Exploded View".	
2. 00 to <u>Lo 400, c</u>			F
>> INSPEC	TION END		
Special Repair R	equirement	INF0ID:00000006352523	G
1.PERFORM M/T N	EUTRAL POSITION LEARNING		
Refer to EC-24, "M/T	NEUTRAL POSITION LEARNING	G : Special Repair Requirement".	Н
>> END			
			I
			J
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# P0830 CLUTCH INTERLOCK SWITCH

### Description

When the clutch pedal is depressed, clutch interlock switch turns ON and clutch pedal position switch turns OFF. ECM detects the state of the clutch pedal by those two types of input (ON/OFF signal).

# DTC Logic

INFOID:000000006352525

## DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
P0830	Clutch interlock switch	A)	ON signals from the clutch interlock switch and the clutch pedal position switch are sent to the ECM at the same time.	<ul> <li>Harness or connectors (Clutch interlock switch circuit is open or shorted.) (Clutch pedal position switch circuit is open or shorted.)</li> </ul>
	circuit	B)	Clutch interlock switch ON signal is not sent to ECM for extremely long time.	<ul> <li>Clutch interlock switch</li> <li>Clutch pedal position switch</li> <li>Incorrect clutch interlock switch installation</li> <li>Incorrect clutch pedal position switch installation</li> </ul>

### 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 FOR MALFUNCTION A

- 1. Turn ignition switch ON.
- 2. Fully depress clutch pedal.
- 3. Fully release clutch pedal.
- 4. Repeat steps 2 and 3 for five times.
- 5. Check DTC.

Is DTC detected?

YES >> Go to EC-407, "Diagnosis Procedure".

NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

Perform component function check. Refer to <u>EC-406, "Component Function Check"</u>.

#### NOTE:

# Use component function check to check the overall function of the clutch switch circuit. During this check, a DTC might not be confirmed.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Go to EC-407, "Diagnosis Procedure".

### Component Function Check

INFOID:000000006352526

### **1.**PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

#### With CONSULT-III

1. Turn ignition switch ON.

2. Select "CPP SW" and "CLUTCH INTLCK SW" in "DATA MONITOR" mode with CONSULT-III.

### EC-406

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#### < DTC/CIRCUIT DIAGNOSIS >

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#### 3. Check "CPP SW" and "CLUTCH INTLCK SW" indication under the following conditions.

Monitor item	Condition		Indication
CPP SW		Fully released	ON
CFF SW	Clutch pedal	Fully depressed	OFF
CLUTCH INTLCK SW		Fully released	OFF
CLOTOIT INTLOR SW		Fully depressed	ON

#### **Without CONSULT-III**

- 1. Turn ignition switch ON.
- 2. Check the voltage between ECM harness connector terminals under the following conditions.

	ECM					
	+	-	_	c	ondition	Voltage (V)
Connector	Terminal	Connector	Terminal			
	41				Fully released	Approx. 0
F101	(Clutch pedal position switch signal)		signal)	Clutch pedal	Fully depressed	Battery voltage
1 101	42	in tot	120	oluton pouul	Fully released	Approx. 0
	(Clutch interlock switch signal)				Fully depressed	Battery voltage

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-407, "Diagnosis Procedure".

### **Diagnosis Procedure**

### 1.CHECK OVERALL FUNCTION-I

#### (I) With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "CPP SW" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "CPP SW" indication under the following conditions.

Monitor item	Co	ndition	Indication
CPP SW	Clutch pedal	Fully released	ON
CFF SW	Clutch pedal	Fully depressed	OFF

### **Without CONSULT-III**

1. Turn ignition switch ON.

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

	ECM						1
	+	-	-	Co	ndition	Voltage (V)	
Connector	Terminal	Connector	Terminal				
_	41				Fully released	Approx. 0	(
F101	(Clutch pedal position switch signal)	M107	128	Clutch pedal	Fully depressed	Battery voltage	-
ls the insp	ection result normal	?		1			-

is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

#### With CONSULT-III

Select "CLUTCH INTLCK SW" and check indication under the following conditions.

# EC-407

### < DTC/CIRCUIT DIAGNOSIS >

Monitor item	Coi	ndition	Indication
CLUTCH INTLCK SW	Clutch pedal	Fully released	OFF
	Clutch pedal	Fully depressed	ON

#### **Without CONSULT-III**

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

	ECM					
	+	-	_	Condition		Voltage (V)
Connector	Terminal	Connector	Terminal			
	42			Clutch pedal Fully released Fully depressed		Approx. 0
F101	(Clutch interlock switch signal)	M107	128			Battery voltage

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 7.

# ${f 3.}$ CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch pedal position switch harness connector.
- 3. Check the continuity between clutch pedal position switch harness connector and ground.

Clutch pedal	position switch	Ground	Continuity
Connector	Terminal	Ground	Continuity
E108	2	Ground	Existed

4. 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 CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect ECM harness connector.
- Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

Clutch pedal position switch		E	Continuity	
Connector	Terminal	Connector	Terminal	Continuity
E108	1	F101	41	Existed

3. 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 E3, F1

Harness for open or short between clutch pedal position switch and ECM

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

#### **6.**CHECK CLUTCH PEDAL POSITION SWITCH

Refer to <u>EC-410</u>, "Component Inspection (Clutch Pedal Position Switch)". Is the inspection result normal?

### EC-408

DTC/CIRCUIT		SIS >			[VQ37VH	R]
YES >> GO		n a dal	a awitch D			
•		•			"Exploded View".	
.CHECK CLUT	ICHINTE	RLOCK SWIT	CH POWEF	R SUPPLY CIF	RCUIT	
. Turn ignition						
<ul> <li>Disconnect of Turn ignition</li> </ul>		lock switch ha I.	imess conn	ector.		
0			terlock swite	ch harness coi	nnector and ground.	
					_	
Clutch inte	rlock switch	G	round	Voltage (V)		
Connector	Termi			10112ge (1)	_	
E111	1	G	round	Battery voltage	_	
the inspection	result nori	<u>mal?</u>				
YES >> GO						
NO >> GO						
.DETECT MAL		NING PART				
neck the follow		- M0				
Harness conne Fuse block (J/E						
10 A fuse (No.						
Harness for op		t between clut	ch interlock	switch and fu	se	
>> Repa	air open ci	rcuit, short to a	around or sl	hart to nower i	in harness or connectors.	
			9.00.00			
CHECK CLUT			-	•		
		RLOCK SWIT	-	•	UIT FOR OPEN AND SHORT	
. Turn ignition	TCH INTE	RLOCK SWIT	CH INPUT S	•		
Turn ignition	TCH INTE switch OF ECM harne	RLOCK SWIT	CH INPUT S	SIGNAL CIRC		
Turn ignition Disconnect E	TCH INTE switch OF ECM harne	RLOCK SWIT	CH INPUT S	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition Disconnect E	FCH INTE switch OF ECM harne ontinuity be	RLOCK SWIT	CH INPUT S	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition Disconnect E Check the co	FCH INTE switch OF ECM harne ontinuity be	RLOCK SWIT F. ess connector. etween clutch	CH INPUT S	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition Disconnect E Check the co Clutch interlock	TCH INTE switch OF ECM harne ontinuity be	RLOCK SWITC F. ess connector. etween clutch EC	CH INPUT S	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111	TCH INTE switch OF ECM harne ontinuity be k switch Terminal 2	RLOCK SWITC F. ess connector. etween clutch EC Connector	CH INPUT S interlock sw CM Terminal 42	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h	TCH INTE switch OF ECM harne ontinuity be k switch Terminal 2 narness for	RLOCK SWITC F. ess connector. etween clutch EC Connector F101	CH INPUT S interlock sw CM Terminal 42	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection (ES >> GO	TCH INTE switch OF ECM harne ontinuity be switch Terminal 2 narness for result norr TO 11.	RLOCK SWITC F. ess connector. etween clutch EC Connector F101	CH INPUT S interlock sw CM Terminal 42	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition         Disconnect E         Check the co         Clutch interlock         Connector         E111         Also check h         the inspection         YES       >> GO         IO       >> GO	CCH INTE switch OF ECM harne ontinuity be k switch Terminal 2 harness for result norr TO 11. TO 10.	RLOCK SWITC F. ess connector. etween clutch Connector F101 short to grour mal?	CH INPUT S interlock sw CM Terminal 42 nd and shor	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection (ES >> GO NO >> GO	CCH INTE switch OF ECM harne ontinuity be k switch Terminal 2 harness for result norr TO 11. TO 10.	RLOCK SWITC F. ess connector. etween clutch Connector F101 short to grour mal?	CH INPUT S interlock sw CM Terminal 42 nd and shor	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection (ES >> GO VO >> GO O.DETECT M	CH INTE switch OF ECM harne ontinuity be k switch Terminal 2 harness for result norr TO 11. TO 10. ALFUNCT	RLOCK SWITC F. ess connector. etween clutch Connector F101 short to grour mal?	CH INPUT S interlock sw CM Terminal 42 nd and shor	SIGNAL CIRC	UIT FOR OPEN AND SHORT	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection (ES >> GO O.DETECT M Deck the follow Harness conne	CCH INTE switch OF ECM harne ontinuity be switch Terminal 2 harness for result norr TO 11. TO 11. TO 10. ALFUNCT ing. ectors E3,	RLOCK SWITC F. ess connector. etween clutch Connector F101 • short to grour mal? F10NING PART	CH INPUT S interlock sw CM Terminal 42 nd and shor	SIGNAL CIRC	CONNECTOR OPEN AND SHORT	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection (ES >> GO O.DETECT M Deck the follow Harness conne	CCH INTE switch OF ECM harne ontinuity be switch Terminal 2 harness for result norr TO 11. TO 11. TO 10. ALFUNCT ing. ectors E3,	RLOCK SWITC F. ess connector. etween clutch Connector F101 • short to grour mal? F10NING PART	CH INPUT S interlock sw CM Terminal 42 nd and shor	SIGNAL CIRC	CONNECTOR OPEN AND SHORT	
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Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection (ES >> GO VO >> GO O.DETECT M heck the follow Harness conne Harness for op	TCH INTE switch OF ECM harne ontinuity be switch Terminal 2 harness for result norr TO 11. TO 11. TO 10. ALFUNCT ing. ectors E3, I en or shor air open ci	RLOCK SWITC F. ess connector. etween clutch Connector F101 short to grour mal? F1 t between clutch	CH INPUT S interlock sw CM Terminal 42 nd and shor T ch interlock ground or sl	SIGNAL CIRC	CM	
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Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection YES >> GO NO >> GO O.DETECT M heck the follow Harness conne Harness for op >> Repa	TCH INTE switch OF ECM harne ontinuity be switch Terminal 2 narness for result norr TO 11. TO 10. ALFUNCT ing. ectors E3, I en or shor air open ci UTCH INT , "Compon	RLOCK SWITC F. ess connector. etween clutch Connector F101 short to grour mal? TONING PART t between clut rcuit, short to g ERLOCK SWI ent Inspection	CH INPUT S interlock sw CM Terminal 42 nd and shor T ch interlock ground or sl ITCH	SIGNAL CIRC	CM connector sor connectors.	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection YES >> GO NO >> GO O.DETECT M heck the follow Harness for op >> Repa 1.CHECK CLU efer to EC-410, the inspection	TCH INTE switch OF ECM harne ontinuity be switch Terminal 2 harness for result norr TO 11. TO 10. ALFUNCT ing. ectors E3, I en or shor air open ci UTCH INT . "Compon result norr	RLOCK SWITC F. ess connector. etween clutch Connector F101 short to grour mal? TONING PART t between clut rcuit, short to g ERLOCK SWI ent Inspection	CH INPUT S interlock sw CM Terminal 42 nd and shor T ch interlock ground or sl ITCH	SIGNAL CIRC	CM connector sor connectors.	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection YES >> GO O.DETECT M heck the follow Harness conne Harness for op >> Repa 1.CHECK CLU efer to EC-410, the inspection YES >> GO	TCH INTEI switch OF ECM harne ontinuity be assuitch Terminal 2 harness for result norr TO 11. TO 10. ALFUNCT ing. ectors E3, I en or shor air open ci UTCH INT . "Compon result norr TO 12.	RLOCK SWITC F. ess connector. etween clutch Connector F101 short to grour mal? TONING PART t between clut rcuit, short to g ERLOCK SWI ent Inspection	CH INPUT S interlock sw CM Terminal 42 nd and shor T ch interlock ground or sl ITCH (Clutch Interlock	SIGNAL CIRC vitch harness of Continuity Existed t to power. switch and E0 hort to power in erlock Switch)	CM CM in harness or connectors.	
Turn ignition Disconnect E Check the co Clutch interlock Connector E111 Also check h the inspection YES >> GO O.DETECT M heck the follow Harness conne Harness for op >> Repa 1.CHECK CLU efer to EC-410, the inspection YES >> GO	TCH INTE switch OF CM harne ontinuity be aswitch Terminal 2 narness for result norr TO 11. TO 10. ALFUNCT ing. ectors E3, I en or shor air open ci UTCH INT ."Compon result norr TO 12. lace clutch	RLOCK SWITC F. ess connector. etween clutch Connector F101 short to grour mal? TONING PART F1 t between clut rcuit, short to g ERLOCK SWI ent Inspection mal?	CH INPUT S interlock sw Terminal 42 nd and shor T ch interlock ground or sl ITCH (Clutch Inter ch. Refer to	SIGNAL CIRC vitch harness of Continuity Existed t to power. switch and E0 hort to power in erlock Switch)	CM CM in harness or connectors.	

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

### < DTC/CIRCUIT DIAGNOSIS >

# Component Inspection (Clutch Pedal Position Switch)

[VQ37VHR]

INFOID:000000006352528

# 1. CHECK CLUTCH PEDAL POSITION SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch pedal position switch harness connector.
- 3. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Clutch pedal	Fully released	Existed
1 and 2	Clutch pedal	Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK CLUTCH PEDAL POSITION SWITCH-II

- 1. Adjust clutch pedal position switch installation. Refer to CL-9, "Inspection and Adjustment".
- 2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
	Clutch pedal	Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch pedal position switch. Refer to <u>CL-12, "Exploded View"</u>.

# Component Inspection (Clutch Interlock Switch)

INFOID:000000006352529

# 1. CHECK CLUTCH INTERLOCK SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch interlock switch harness connector.
- 3. Check the continuity between clutch interlock switch terminals under the following conditions.

Terminals	С	Continuity		
1 and 2	Clutch podal	nd 2 Clutch pedal		Not existed
	Oluteri pedar	Fully depressed	Existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

### 2. CHECK CLUTCH INTERLOCK SWITCH-II

- 1. Adjust clutch interlock switch installation. Refer to <u>CL-9</u>, "Inspection and Adjustment".
- 2. Check the continuity between clutch interlock switch terminals under the following conditions.

Terminals	C	Continuity		
1 and 2	Clutch pedal	Clutch padal Fully released		Not existed
T and Z	Cluten pedal	Fully depressed	Existed	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch interlock switch. Refer to <u>CL-12, "Exploded View"</u>.

# P0833 CPP SWITCH

### Description

When the clutch pedal is depressed, clutch interlock switch turns ON and clutch pedal position switch turns OFF. ECM detects the state of the clutch pedal by those two types of input (ON/OFF signal).

# DTC Logic

INFOID:000000006352531

INFOID:000000006352530

# DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause	
P0833	Clutch pedal position	A)	ON signals from the clutch pedal po- sition switch and the clutch interlock switch are sent to the ECM at the same time.	<ul> <li>Harness or connectors</li> <li>(Clutch pedal position switch circuit is open shorted.)</li> <li>(Clutch interlock switch circuit is open or sho</li> </ul>	
	switch circuit	B)	Clutch pedal position switch ON sig- nal is not sent to ECM for extremely long time.	<ul> <li>Clutch pedal position switch</li> <li>Clutch interlock switch</li> <li>Incorrect clutch pedal position switch install</li> <li>Incorrect clutch interlock switch installation</li> </ul>	lation
	NFIRMATION PROC	CED	DURE		
_		<u> </u>	h		
before cor 1. Turn i	nducting the next test. gnition switch OFF ar		as been previously conducted rait at least 10 seconds.	always perform the following proce	eaure
	gnition switch ON.	d w	ait at least 10 seconds.		
TESTING	CONDITION:				
Before pe	erforming the followi	ng	procedure, confirm that batte	y voltage is more than 10 V at idle.	
	•> GO TO 2.				
~			ON PROCEDURE FOR MALFU	CTION A	
	gnition switch ON.				
2. Fully	depress clutch pedal.				
	release clutch pedal. at steps 2 and 3 for fiv	/e ti	mes.		
5. Checl	KDTĆ.				
Is DTC de			sia Dua as duus II		
	→ Go to <u>EC-412, "Dia</u> → GO TO 3.	<u>gno</u>	<u>sis Procedure"</u> .		
3.PERFC	ORM DTC CONFIRM	ATIC	ON PROCEDURE FOR MALFU	CTION B	
	omponent function ch	eck	. Refer to EC-411, "Component	unction Check".	
NOTE: Use com	ponent function che	ck f	to check the overall function	of the clutch switch circuit. During	ı this
	DTC might not be co				,
	ection result normal?				
	INSPECTION END Go to EC-412, "Dia"		sis Procedure".		
_	nent Function Ch			AUT (15	0000505050
				INF01D:0000000	006352532
1.PERFC	ORM COMPONENT F	UN	CTION CHECK FOR MALFUN	TION B	

### With CONSULT-III

1. Turn ignition switch ON.

2. Select "CPP SW" and "CLUTCH INTLCK SW" in "DATA MONITOR" mode with CONSULT-III.

# EC-411

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### < DTC/CIRCUIT DIAGNOSIS >

#### 3. Check "CPP SW" and "CLUTCH INTLCK SW" indication under the following conditions.

Monitor item	Condition		Indication
CPP SW		Fully released	ON
CFF SW	Clutch podal	Fully depressed	OFF
CLUTCH INTLCK SW	Clutch pedal	Fully released	OFF
CEOTOR INTEGR SW		Fully depressed	ON

#### **Without CONSULT-III**

1. Turn ignition switch ON.

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

	ECM					
+		-		Condition		Voltage (V)
Connector	Terminal Connector Terminal					
F101	41		128		Fully released	Approx. 0
	(Clutch pedal position switch signal)	M107		Clutch pedal	Fully depressed	Battery voltage
	42				Fully released	Approx. 0
	(Clutch interlock switch signal)				Fully depressed	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-412, "Diagnosis Procedure".

### **Diagnosis** Procedure

INFOID:000000006352533

### **1.**CHECK OVERALL FUNCTION-I

#### (I) With CONSULT-III

1. Turn ignition switch ON.

2. Select "CPP SW" in "DATA MONITOR" mode with CONSULT-III.

3. Check "CPP SW" indication under the following conditions.

Monitor item	Co	ndition	Indication
CPP SW	Clutch pedal	Fully released	ON
CFF SW	Clutch pedal	Fully depressed	OFF

#### **Without CONSULT-III**

1. Turn ignition switch ON.

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

	ECM						
+		-		Condition		Voltage (V)	
Connector	Terminal	Connector	Terminal				
=	41			<b>.</b>	Fully released	Approx. 0	
F101	(Clutch pedal position switch signal)			Fully depressed	Battery voltage		

Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

#### With CONSULT-III

Select "CLUTCH INTLCK SW" and check indication under the following conditions.

### < DTC/CIRCUIT DIAGNOSIS >

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Monitor item	Condition		Indication
CLUTCH INTLCK SW	Clutch pedal	Fully released	OFF
CLUTCHTINTLOR SW		Fully depressed	ON

# **Without CONSULT-III**

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

	ECM						
	+	-	_	Con	dition	Voltage (V)	
Connector	Terminal	Connector	Terminal	-			
_	42				Fully released	Approx. 0	
F101	(Clutch interlock switch signal)	M107	128	Clutch pedal	Fully depressed	Battery voltage	
the insp	ection result nor	mal?					
-	> GO TO 12.						
	> GO TO 7.						ODT
	CLUTCH PED		ON SWIT	CH GROUND C	IRCUIT FOR O	PEN AND SH	JRI
	nition switch Ol nect clutch ped		switch har	ness connector			
	the continuity b					tor and groun	d.
Clutch	n pedal position swit	tch	Ground	Continuit	v		
Connec							
E108	3 2		Ground	Existed			
	heck harness fo	•	ower.				
s the inspe	ection result nor	<u>mal?</u>					
	> GO TO 4.						
NO >:	> Repair open c		•				
NO >:			•			OR OPEN AN	D SHORT
NO >: CHECK	> Repair open c CLUTCH PED	AL POSITI	ON SWIT(	CH INPUT SIGN	NAL CIRCUIT F		
NO >: CHECK . Discor . Check	> Repair open c CLUTCH PED	AL POSITI	ON SWIT(	CH INPUT SIGN	NAL CIRCUIT F		D SHORT harness connec-
NO >: CHECK	> Repair open c CLUTCH PED	AL POSITI	ON SWIT(	CH INPUT SIGN	NAL CIRCUIT F		
NO >: CHECK Discor Check tor.	> Repair open c CLUTCH PED	AL POSITI	ON SWIT(	CH INPUT SIGN	NAL CIRCUIT F		
NO >: CHECK Discor Check tor.	Repair open c CLUTCH PED nect ECM harn the continuity b dal position switch	AL POSITI	ON SWITC ctor. utch pedal ECM	CH INPUT SIGN	NAL CIRCUIT F		
NO >: CHECK Discor Check tor. Clutch peo	Repair open c CLUTCH PED nect ECM harn the continuity b dal position switch	AL POSITI ess conner petween clu	ON SWITC ctor. utch pedal ECM or Terr	CH INPUT SIGN position switch	NAL CIRCUIT F harness conne		
NO >: CHECK Discor Check tor. Clutch peo Connecto E108	Repair open c CLUTCH PED nect ECM harn the continuity b dal position switch r Terminal 1	AL POSITI ess conner between clu Connecto F101	ON SWITC ctor. utch pedal ECM or Terr 4	CH INPUT SIGN position switch ninal Continu	NAL CIRCUIT F harness conne uity		
NO >: CHECK Discor Check tor. Clutch peo Connecto E108 Also cl	Repair open c CLUTCH PED anect ECM harn the continuity b dal position switch r Terminal 1 heck harness fo	AL POSITI ess connection between clu Connection F101 r short to g	ON SWITC ctor. utch pedal ECM or Terr 4	CH INPUT SIGN position switch ninal Continu	NAL CIRCUIT F harness conne uity		
NO >: CHECK Discor Check tor. Clutch per Connecto E108 Also cl s the inspe	Repair open c CLUTCH PED nect ECM harn the continuity b dal position switch r Terminal 1	AL POSITI ess connection between clu Connection F101 r short to g	ON SWITC ctor. utch pedal ECM or Terr 4	CH INPUT SIGN position switch ninal Continu	NAL CIRCUIT F harness conne uity		
NO >: CHECK Discor Check tor. Clutch pec Connecto E108 Also cl the inspec YES >:	Repair open c CLUTCH PED nect ECM harn the continuity b dal position switch r Terminal 1 heck harness fo ection result nor	AL POSITI ess connection between clu Connection F101 r short to g	ON SWITC ctor. utch pedal ECM or Terr 4	CH INPUT SIGN position switch ninal Continu	NAL CIRCUIT F harness conne uity		
NO >: CHECK Discor Check tor. Clutch peo Connecto E108 Also cl the inspec YES >: NO >:	<ul> <li>Repair open c</li> <li>CLUTCH PED</li> <li>Innect ECM harm</li> <li>the continuity b</li> <li>dal position switch</li> <li>r Terminal</li> <li>1</li> <li>heck harness fo</li> <li>ection result nor</li> <li>&gt; GO TO 6.</li> <li>&gt; GO TO 5.</li> </ul>	AL POSITI ess connecto between clu Connecto F101 r short to g mal?	ON SWITC ctor. utch pedal ECM or Terr 4 pround and	CH INPUT SIGN position switch ninal Continu	NAL CIRCUIT F harness conne uity		
NO >: .CHECK . Discor . Check tor. Clutch per Connecto E108 . Also cl s the insper YES >: NO >: D.DETEC	<ul> <li>Repair open c</li> <li>CLUTCH PED,</li> <li>CLUTCH PED,</li> <li>Innect ECM harn</li> <li>the continuity b</li> <li>dal position switch</li> <li>r Terminal</li> <li>1</li> <li>heck harness fo</li> <li>ection result nor</li> <li>&gt; GO TO 6.</li> <li>&gt; GO TO 5.</li> <li>T MALFUNCTION</li> </ul>	AL POSITI ess connecto between clu Connecto F101 r short to g mal?	ON SWITC ctor. utch pedal ECM or Terr 4 pround and	CH INPUT SIGN position switch ninal Continu	NAL CIRCUIT F harness conne uity		
NO >: .CHECK . Discor . Check tor. Clutch per Connecto E108 . Also cl s the insper YES >: NO >: DETEC Check the	<ul> <li>Repair open c</li> <li>CLUTCH PED,</li> <li>CLUTCH PED,</li> <li>Innect ECM harn</li> <li>the continuity b</li> <li>dal position switch</li> <li>r Terminal</li> <li>1</li> <li>heck harness fo</li> <li>ection result nor</li> <li>&gt; GO TO 6.</li> <li>&gt; GO TO 5.</li> <li>T MALFUNCTION</li> </ul>	AL POSITI ess connecto between clu Connecto F101 r short to g mal?	ON SWITC ctor. utch pedal ECM or Terr 4 pround and	CH INPUT SIGN position switch ninal Continu	NAL CIRCUIT F harness conne uity		
NO >: .CHECK . Discor . Check tor. Clutch per Connecto E108 . Also cl s the insper YES >: NO >: D.DETEC Check the Harness	Repair open c CLUTCH PED anect ECM harn the continuity b dal position switch r Terminal 1 heck harness fo ection result nor > GO TO 6. > GO TO 5. T MALFUNCTIC following.	AL POSITI ess connecto petween clu Connecto F101 r short to g mal? DNING PAI	ON SWITC ctor. utch pedal ECM or Terr 4 ground and RT	CH INPUT SIGN position switch ninal Continu Continu Continu Short to power.	NAL CIRCUIT F harness conne		
NO >: CHECK Discor Check tor. Clutch per Connecto E108 Also cl s the insper YES >: NO >: D.DETEC Check the Harness	Repair open c CLUTCH PED anect ECM harn the continuity b dal position switch r Terminal 1 heck harness fo ection result nor > GO TO 6. > GO TO 5. T MALFUNCTIO following. connectors E3,	AL POSITI ess connecto petween clu Connecto F101 r short to g mal? DNING PAI	ON SWITC ctor. utch pedal ECM or Terr 4 ground and RT	CH INPUT SIGN position switch ninal Continu Continu Continu Short to power.	NAL CIRCUIT F harness conne		
NO >: .CHECK . Discor . Check tor. Clutch per Connecto E108 . Also cl s the insper YES >: NO >: D.DETEC Check the Harness Harness	Repair open c CLUTCH PED anect ECM harn the continuity b dal position switch r Terminal 1 heck harness fo ection result nor > GO TO 6. > GO TO 5. T MALFUNCTIO following. connectors E3,	AL POSITI ess connecto between clu Connecto F101 r short to g mal? DNING PAI F1 rt between	ON SWITC ctor. utch pedal ECM or Terr 4 pround and RT	CH INPUT SIGN position switch ninal Continu Continu Continu Continu I Existe I short to power.	NAL CIRCUIT F harness conne uity ed	ctor and ECM	

Refer to <u>EC-410.</u> "Component Inspection (Clutch Pedal Position Switch)". Is the inspection result normal?

### < DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 12.

NO >> Replace clutch pedal position switch. Refer to <u>CL-12, "Exploded View"</u>.

7. CHECK CLUTCH INTERLOCK SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect clutch interlock switch harness connector.

3. Turn ignition switch ON.

4. Check the voltage between clutch interlock switch harness connector and ground.

Clutch inte	rlock switch	Ground	Voltage (V)
Connector	Terminal	Ground	voltage (v)
E111	1	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 E106, M6
- Fuse block (J/B) connector M1
- 10 A fuse (No. 9)

• Harness for open or short between clutch interlock switch and fuse

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

# 9. Check clutch interlock switch input signal circuit for open and short

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

3. Check the continuity between clutch interlock switch harness connector and ECM harness connector.

Clutch interlock switch		E	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
E111	2	F101	42	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 E3, F1

• Harness for open or short between clutch interlock switch and ECM

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

# **11.**CHECK CLUTCH INTERLOCK SWITCH

Refer to EC-415. "Component Inspection (Clutch Interlock Switch)".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace clutch interlock switch. Refer to <u>CL-12</u>, "Exploded View".

12. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

# Component Inspection (Clutch Pedal Position Switch)

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# 1.CHECK CLUTCH PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.

< DTC/CIRCUIT DIAGNOSIS >

- 2. Disconnect clutch pedal position switch harness connector.
- 3. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Clutch pedal	Fully released	Existed
T anu z	Cluten pedal	Fully depressed	Not existed

Is the inspection result normal?

	YES	>> INSPECTION END
--	-----	-------------------

NO >> GO TO 2.

# 2. CHECK CLUTCH PEDAL POSITION SWITCH-II

- 1. Adjust clutch pedal position switch installation. Refer to CL-9, "Inspection and Adjustment".
- 2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals		Condition	Continuity		0
	Olystala a si	Fully released	Existed		G
1 and 2	Clutch ped	Fully depressed	Not existed		
Is the insp	ection result	normal?			Н
· — • ·	> INSPECT > Replace c	••••	on switch. Refe	r to <u>CL-12, "Exploded View"</u> .	
Compor	ent Inspe	ction (Clutch	Interlock Sv	vitch) INFOID:000000006352535	
<b>1.</b> CHECK	CLUTCH II	NTERLOCK SWI	ТСН-І		I
1. Turn i	gnition switc	h OFF.			J
		interlock switch h			
3. Check	the continu	ity between clutci	n Interiock Swite	h terminals under the following conditions.	Κ
Terminals	C	ondition	Continuity		
	-		· · · · · · · · · · · · · · · · · ·		
1 and 2	Clutch pedal	Fully released	Not existed		I

Is the inspection result normal?

YES >> INSPECTION EN	ID
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# 2. CHECK CLUTCH INTERLOCK SWITCH-II

- 1. Adjust clutch interlock switch installation. Refer to <u>CL-9, "Inspection and Adjustment"</u>.
- 2. Check the continuity between clutch interlock switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Clutch pedal	Fully released	Not existed
T and Z	Clutch pedal	Fully depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch interlock switch. Refer to <u>CL-12, "Exploded View"</u>.

### < DTC/CIRCUIT DIAGNOSIS >

# P0850 PNP SWITCH

### Description

When the selector lever position is P or N, park/neutral position (PNP) signal from the TCM is sent to ECM.(A/ T models)

When the selector lever position is Neutral position, park/neutral position (PNP) switch is ON.(M/T models) ECM detects the position because the continuity of the line (the ON signal) exists.

# DTC Logic

INFOID:000000006352537

# 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.	<ul> <li>Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.]</li> <li>Park/neutral position (PNP) switch (M/T models)</li> <li>TCM (A/T models)</li> </ul>

### DTC CONFIRMATION PROCEDURE

# **1.**INSPECTION START

Do you have CONSULT-III? Do you have CONSULT-III?

YES >> GO TO 2. NO >> GO TO 5.

2. PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

>> GO TO 3.

3.CHECK PNP SWITCH SIGNAL

### With CONSULT-III

- Turn ignition switch ON.
- 2. Select "P/N POSI SW" in "DATA MONITOR" mode with CONSULT-III. 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?

NO >> Go to EC-417, "Diagnosis Procedure".

**4.**PERFORM DTC CONFIRMATION PROCEDURE

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

- 2. Start engine and warm it up to normal operating temperature.
- 3. Maintain the following conditions for at least 50 consecutive seconds. CAUTION:

Always drive vehicle at a safe speed.

INFOID:00000006352536

ENG SPEE	D		1,400 - 6,375 rp	m			А
COOLAN T	EMP/S		More than 70°C	(158°F)			
B/FUEL SC	HDL		2.0 - 31.8 msec				EC
VHCL SPE	ED SE		More than 64 km	n/h (40 mph)			
Selector lev	/er		Suitable position	1			
4. Check	: 1st trip [	DTC.					С
ls 1st trip I							
		<u>C-417, "I</u> CTION EI	Diagnosis Pro	<u>cedure"</u> .			D
				CHECK			L
	omponent	t function	check. Refer	to <u>EC-417, "(</u>	Component Fu	nction Check".	E
NOTE: Use comp	onent fun	ction che	ck the overall	function of th	e park/neutral	position (PNP) signal circuit. During this	
			not be confirm				г
ls the insp							F
-	-		ND Diagnosis Pro	eoduro"			
-				<u>iceduie</u> .			G
Compor	ient Fui	nction (	леск			INFOID:00000006352538	
1.PERFC	RM CON	PONEN	T FUNCTION	CHECK			F
1. Turn i	gnition sw	vitch ON.					
			en ECM harr	ness connecto	or terminals und	der the following conditions.	
						-	
	ECM						
Connector	+	-	Con	dition	Voltage (V)		J
	Terminal	Terminal		P or N (A/T)		-	
M107	109	128	Selector lever	Neutral (M/T)	Battery voltage		
-		-		Except above	Approx. 0	-	k
ls the insp	ection res	sult norm	al?			-	
		CTION EI					L
NO >	> Go to E	<u>:C-417, "I</u>	Diagnosis Pro	<u>cedure"</u> .			
Diagnos	is Proc	edure				INF01D:00000006352539	N
1.INSPE	CTION ST	TART					IV
Check whi	ch type o	f transmis	ssion the veh	icle is equippe	ed with.		
Which type	••						Ν
A/T >	> GO TO	2.					
-	> GO TO						C
2.CHECK	CDTC WI	ТН ТСМ					
Refer to <u>T</u>	M-204, "C	Diagnosis	Description".				
ls the insp			<u>al?</u>				F
	> GO TO		-				
NO > 3.CHECP	•	or replace					
				A D T			
rannanid	วา จพแบก	огг, ше	n turn it to ST				

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 4.
- NO >> Check DTC with BCM. Refer to <u>BCS-19</u>, "COMMON ITEM : CONSULT-III Function (BCM COM-MON ITEM)".

### **4.**CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. 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	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.

**5.**DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F1, E3
- 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		voltage	
F55	F55 2		Battery voltage	

Is the inspection result normal?

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

# 8. DETECT MALFUNCTIONING PART

#### Check the following.

- Harness connectors E3, F1
- 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.

 ${f 9.}$  CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect ECM harness connector.

### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

3. Check the continuity between PNP switch harness connector and ECM harness connector.

Connector	witch	EC	CM			
Connector	Terminal	Connector	Terminal	Continuity		
F55	1	M107	109	Existed		EC
I. Also cl	neck harn	ess for sho	ort to grou	nd and shor	to power.	
s the inspe	ection res	ult normal?	<u>?</u>			С
	GO TO					
	> GO TO			_		_
IU.DETE	CT MALF	UNCTION	IING PAR	Γ		
Check the		<b>E</b> 400 M	110			
<ul><li>Harness</li><li>Harness</li></ul>				P switch and	FCM	E
i la li lo co					20	
>>	Repair c	pen circuit	t, short to	ground or sl	ort to power in harness or connectors.	
11.снес		•		0		F
		mponent Ir	nspection"			
		ult normal?	-	•		(
•	> GO TO		-			
					xploded View".	
12.снес	K INTER					
Refer to G	-43 "Inte	MITTENT	INCIDEN	Г		⊢
	10, 1110	mittent Ind		Г		ŀ
		rmittent Ind	<u>cident"</u> .	Г		ŀ
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		kploded View".	ŀ
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal?	<u>cident"</u> . <u>2</u>		<u>kploded View"</u> .	ŀ
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u> «ploded View"</u> .	ŀ
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u>xploded View"</u> .	F
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u>«ploded View"</u> .	
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u>«ploded View"</u> .	H I V
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u>xploded View"</u> .	
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u>«ploded View"</u> .	
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u>xploded View"</u> .	
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u>«ploded View"</u> .	ŀ
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u>xploded View"</u> .	,
<u>s the inspe</u> YES >>	ection res > Replace	rmittent Ind ult normal? IPDM E/R	<u>cident"</u> . <u>2</u>		<u>«ploded View"</u> .	

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# P100A, P100B VVEL SYSTEM

# DTC Logic

[VQ37VHR]

### 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-433, "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
P100B	VVEL response malfunction (bank 2)	Actual event response to target is poor.	<ul> <li>(VVEL actuator motor circuit is open or shorted.)</li> <li>VVEL actuator motor</li> <li>VVEL actuator sub assembly</li> <li>VVEL ladder assembly</li> <li>VVEL control module</li> </ul>

### 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.
- 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.
- 5. Check 1st trip DTC.

#### Is DTC detected?

YES >> Go to EC-420. "Diagnosis Procedure".

NO >> INSPECTION END

### Diagnosis Procedure

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# 1.CHECK GROUND CONNECTION

- 1. Turn ignition switch OFF.
- Check ground connection M95. Refer to Ground Inspection in <u>GI-46, "Circuit Inspection"</u>.
- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Repair or replace ground connection.

# 2. VVEL ACTUATOR MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

- 1. Disconnect VVEL control module harness connector.
- 2. Disconnect VVEL actuator motor harness connector.
- 3. Check the continuity between VVEL control module harness connector and VVEL actuator motor harness connector.

# P100A, P100B VVEL SYSTEM

# < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

	١	/VEL control modu	le	VVEL actu	ator motor		
DTC No.	Bank	Connector	Terminal	Connector	Terminal	- Continuity	
					1	Existed	
<b>D</b> / a a A	_		12	12		Not existed	E
P100A	1	-		- F48 -	1	Not existed	
			25	-	2	Existed	
		– E15 –			1	Existed	
-	-		2	2	2	Not existed	
P100B	2			- F49 -	1	Not existed	
			15		2	Existed	
s the inspect YES $>> G$ NO $>> G$ DETECT M Check the foll Harness con Harness for >> R CHECK V Refer to <u>EC-4</u> Sthe inspect YES $>> G$ NO $>> G$ D.REPLACE	ion result no GO TO 4. GO TO 3. MALFUNCTION Innectors F1, open or sho Cepair open of VEL ACTUA CO TO 6. GO TO 6. GO TO 5. VVEL ACTUA VVEL ACTUA	ONING PART E3 rt between VVE circuit, short to g TOR MOTOR	EL actuator n ground or sho (VVEL ACT SSEMBLY y.	notor and VVE ort to power in	harness or o		
CHECK IN Refer to <u>GI-43</u> s the inspect YES >> G	3, "Intermitte	NT INCIDENT nt Incident". rmal?					
7.REPLACE	VVEL CON		Ē				
2. Go to EC		I module. IONAL SERVIO Requirement".	CE WHEN R	EPLACING C	ONTROL U	NIT (VVEL CONTROL MOE	<u>)-</u>
- -	GO TO 8.						
<b>5.</b> PERFORM	I DTC CONF	FIRMATION PR	OCEDURE				
2. Erase DT 3. Perform I	OTC Confirm	ation Procedure	9.				_
See <u>EC-</u>	<u>120, "DTC Lo</u>	<u>ogic"</u> .					

NO >> INSPECTION END

**9.**CHECK VVEL ACTUATOR SUB ASSEMBLY

Refer to EC-422. "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-423, "Special Repair Requirement".

>> INSPECTION END

11.CHECK VVEL LADDER ASSEMBLY

Refer to EM-100, "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-423, "Special Repair Requirement".

#### >> INSPECTION END

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

#### >> INSPECTION END

### Component Inspection (VVEL ACTUATOR MOTOR)

**1.**CHECK VVEL ACTUATOR MOTOR

- 1. Turn ignition switch OFF.
- 2. Disconnect VVEL actuator motor harness connector.
- 3. Check resistance between VVEL actuator motor terminals as follows.

VVEL actuator motor	Resistance
Terminal	Resistance
1 and 2	16 $\Omega$ 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-423, "Special Repair Requirement".

#### >> INSPECTION END

### Component Inspection (VVEL ACTUATOR SUB ASSEMBLY)

**1.**CHECK VVEL ACTUATOR SUB ASSEMBLY

1.	Turn	ignition	switch	OFF.
----	------	----------	--------	------

### EC-422

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# P100A, P100B VVEL SYSTEM

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
<ol> <li>Remove VVEL actuator sub assembly. Refer to <u>EM-91, "Disassembly and Assembly"</u>.</li> <li>Turn the ball screw shaft to check that it works smoothly.</li> </ol>	Ą	4
Is the inspection result normal?		
YES >> INSPECTION END NO >> GO TO 2.	EC	С
<b>2.</b> REPLACE VVEL ACTUATOR SUB ASSEMBLY		
<ol> <li>Replace VVEL actuator sub assembly.</li> <li>Go to <u>EC-423, "Special Repair Requirement"</u>.</li> </ol>	C	2
>> INSPECTION END	-	
Special Repair Requirement	INFOID:000000006352544	J
1.PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT	E	_
Refer to EC-22, "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Re	pair Require-	
<u>ment"</u> .	F	_
>> GO TO 2.	I	
2. PERFORM IDLE AIR VOLUME LEARNING		
Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".		ò
>> END	F	-
	I	[
	J	J
		/
	k	
	L	-
	N	/
	Ν	J
	C	)
	C	/
	F	)

# 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 <u>EC-429, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1087	VVEL small event angle malfunction (bank 1)		Harness or connectors     (VVEL actuator motor circuit is
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

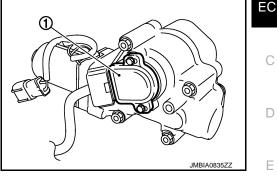
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### < DTC/CIRCUIT DIAGNOSIS >

# P1089, P1092 VVEL CONTROL SHAFT POSITION SENSOR

### Description

VVEL control shaft position sensor (1) is placed on VVEL actuator sub assembly and detects the control shaft position angle. A magnet is pressed into the arm on the edge of control shaft. The magnetic field changes as the magnet rotates together with the arm resulting in the output voltage change of the sensor. VVEL control module detects the actual position angle through the voltage change and sends the signal to ECM.



**DTC Logic** 

# DTC DETECTION LOGIC

#### NOTE:

If DTC P1089 or P1092 is displayed with DTC P1608, first perform the trouble diagnosis for DTC P1608. Refer to <u>EC-478, "DTC Logic"</u>.

DTC No. Trouble diagnosis name DTC detecting condition Possible cause VVEL control shaft position sensor An excessively low voltage from the Н P1089 (bank 1) circuit sensor is sent to VVEL control module. An excessively high voltage from the Harness or connectors sensor is sent to VVEL control module. (VVEL control shaft position sensor Rationally incorrect voltage is sent to circuit is open or shorted.) VVEL control shaft position sensor · VVEL control shaft position sensor VVEL control module compared with P1092 (bank 2) circuit • VVEL control module the signals from VVEL control shaft position sensor 1 and VVEL control shaft position sensor 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-425, "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 <u>GI-46, "Circuit Inspection"</u>.

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[VQ37VHR]

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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 co	ontrol shaft position	on sensor	Ground	Voltage (V)
DIC NO.	Bank	Connector	Terminal	Ground	Voltage (V)
P1089	1	F46	3		
F1009		F40	6	Ground	Approx E
P1092	2	F47	3	Ground	Approx. 5
F1092	2	Г47	6		

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

# 3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors F1, E3

• Harness for open or short between VVEL 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.

	DTC No.		on sensor	VVEL con	trol module	Continuity
DICINO.	Bank	Connector	Terminal	Connector	Terminal	Continuity
P1089	4	F46	2		4	
F 1069	I	F40	5	E15	17	Existed
P1092	2	F47	2	E13	6	Existed
F 1092	2	147	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 F1, E3

Harness for open or short between VVEL control shaft position sensor and VVEL control module

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

### $\mathbf{6}.$ 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]

DTC No.	VVEL o	control shaft position	n sensor	VVEL cont	rol module		
	Bank	Connector	Terminal	Connector	Terminal	Continuity	_
			1		3		
P1089	1	F46	4	-	16	<b>-</b> • • •	
			1	E15 -	5	Existed	_
P1092	2	F47	4	18			
2. Also chec	k harness for	r short to groun	d and power.	<u> </u>			
<u>s the inspecti</u>	ion result nor	mal?	·				
	60 TO 8. 60 TO 7.						
7.DETECT N	<b>ALFUNCTIC</b>	DNING PART					
Check the foll	owing.						
	nnectors F1,			<b>6</b>			
Harness for	open or snor	t between VVE	L control sha	π position sens	sor and VVEL	control module	
~~ P	enair open ci	rcuit, short to g	round or sho	rt to nower in h	arness or cor	nectors	
3.CHECK IN	· ·						
	3. "Intermitter						
	ion result nor iO TO 9.	<u>mar :</u>					
	epair or repla	ace.					
	•	ROL MODULE					
							<u> </u>
	VVEL control		E WHEN RE			(VVEL CONTR	OL MOD-
		Requirement".					
· -	60 TO 10.						
0.PERFOR	RM DTC CON	NFIRMATION P	ROCEDURE				
	ion switch Of						
<ol> <li>Turn ignit</li> </ol>	ION SWITCH OF	۷.					
2. Erase DT	C.						
2. Erase DT 3. Perform [	C. DTC Confirma	ation Procedure					
<ol> <li>Erase DT</li> <li>Perform I</li> <li>See <u>EC-4</u></li> </ol>	C. DTC Confirma 25, "DTC Lo	ation Procedure <u>gic"</u> .					
2. Erase DT 3. Perform I See <u>EC-4</u> s the DTC P1	C. DTC Confirma 25, "DTC Lo 1089 or P109	ation Procedure					
2. Erase DT 3. Perform I See <u>EC-4</u> <u>s the DTC P1</u> YES >> G NO >> IN	C. DTC Confirma 1 <u>25, "DTC Lo</u> 1089 or P109 10 TO 11. NSPECTION	ation Procedure <u>gic"</u> . 2 displayed aga END	<u>in?</u>				
<ol> <li>Erase DT</li> <li>Perform I</li> <li>See <u>EC-4</u></li> <li><u>s the DTC P1</u></li> <li>YES &gt;&gt; G</li> <li>NO &gt;&gt; IN</li> </ol>	C. DTC Confirma 1 <u>25, "DTC Lo</u> 1089 or P109 10 TO 11. NSPECTION	ation Procedure <u>gic"</u> . 2 displayed aga END	<u>in?</u>				
2. Erase DT 3. Perform I See <u>EC-4</u> <u>s the DTC P1</u> YES >> G NO >> IN 11.REPLAC	C. DTC Confirma 125, "DTC Lo 1089 or P109 10 TO 11. NSPECTION E VVEL ACT	ation Procedure <u>gic"</u> . 2 displayed aga	in? SSEMBLY				
2. Erase DT 3. Perform I See <u>EC-4</u> <u>s the DTC P1</u> YES >> G NO >> IN <b>I1.</b> REPLAC . Replace V	C. DTC Confirma 25. "DTC Lo 089 or P109 0 TO 11. SPECTION E VVEL ACT	ation Procedure <u>gic"</u> . 2 displayed aga END WATOR SUB A	in? SSEMBLY				
<ol> <li>Erase DT</li> <li>Perform I</li> <li>See <u>EC-4</u></li> <li><u>s the DTC P1</u></li> <li>YES &gt;&gt; G</li> <li>NO &gt;&gt; IN</li> <li><b>11.</b>REPLAC</li> <li>Replace N</li> <li>Go to <u>EC</u></li> </ol>	C. DTC Confirma (25, "DTC Lo (089 or P109 GO TO 11. NSPECTION E VVEL ACT VVEL actuato -427, "Specia	ation Procedure <u>gic"</u> . 2 displayed aga END UATOR SUB A or sub assembly Il Repair Requir	in? SSEMBLY				
<ol> <li>Erase DT</li> <li>Perform I</li> <li>See <u>EC-4</u></li> <li><u>s the DTC P1</u></li> <li>YES &gt;&gt; G</li> <li>NO &gt;&gt; IN</li> <li><b>11.</b>REPLAC</li> <li>Replace N</li> <li>Go to <u>EC</u></li> </ol>	C. DTC Confirma 25. "DTC Lo 089 or P109 0 TO 11. SPECTION E VVEL ACT	ation Procedure <u>gic"</u> . 2 displayed aga END UATOR SUB A or sub assembly Il Repair Requir	in? SSEMBLY				
<ol> <li>Erase DT</li> <li>Perform I</li> <li>See <u>EC-4</u></li> <li><u>s the DTC P1</u></li> <li>YES &gt;&gt; G</li> <li>NO &gt;&gt; IN</li> <li><b>11.</b>REPLAC</li> <li>Replace N</li> <li>Go to <u>EC</u></li> </ol>	C. DTC Confirma 125, "DTC Lo 1089 or P109 0 TO 11. NSPECTION E VVEL ACT VVEL actuato -427, "Specia	ation Procedure gic". 2 displayed aga END UATOR SUB A or sub assembly I Repair Requir END	in? SSEMBLY			INFOIL	D:000000006352549
2. Erase DT 3. Perform I See <u>EC-4</u> <u>s the DTC P1</u> YES >> G NO >> IN <b>11.</b> REPLAC . Replace N 2. Go to <u>EC</u> >> IN Special Re	C. DTC Confirma (25, "DTC Lo (089 or P109 GO TO 11. SPECTION E VVEL ACT VVEL actuato -427, "Special SPECTION pair Requi	ation Procedure gic". 2 displayed aga END UATOR SUB A or sub assembly I Repair Requir END	<u>iin?</u> SSEMBLY ement".			INFOIL	0:000000006352549
<ul> <li>Erase DT</li> <li>Perform I</li> <li>See <u>EC-4</u></li> <li>Sthe DTC P1</li> <li>YES &gt;&gt; G</li> <li>NO &gt;&gt; IN</li> <li><b>1</b>.REPLAC</li> <li>Replace N</li> <li>Go to <u>EC</u></li> <li>&gt;&gt; IN</li> <li>Special Re</li> <li>.PERFORM</li> </ul>	C. DTC Confirma (25, "DTC Lo (089 or P109 GO TO 11. SPECTION E VVEL ACT VVEL actuato -427, "Specia SPECTION pair Requi	ation Procedure gic". 2 displayed aga END UATOR SUB A or sub assembly I Repair Requir END FROL SHAFT F	in? SSEMBLY ement". POSITION SE	ENSOR ADJUS		INFOIL	

>> GO TO 2.

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

 $2. {\tt perform idle air volume learning}$ 

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

### < DTC/CIRCUIT DIAGNOSIS >

# P1090, P1093 VVEL ACTUATOR MOTOR

### Description

The VVEL actuator motor rotates the control shaft according to the control signal from the VVEL control module. The VVEL control module judges whether the VVEL actuator motor controls the angle properly by the VVEL control shaft position sensor signal.

### **DTC Logic**

# DTC DETECTION LOGIC

#### NOTE:

If DTC P1090 or P1093 is displayed with DTC P1091, first perform the trouble diagnosis for DTC P1091. Refer to <u>EC-433, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	
P1090	VVEL system performance (bank 1)		Harness or connectors	
P1093	VVEL system performance (bank 2)	<ul> <li>Event angle difference between the actual and the target is detected.</li> <li>Abnormal current is sent to VVEL actuator motor.</li> </ul>	<ul> <li>(VVEL actuator motor circuit is open or shorted.)</li> <li>VVEL actuator motor</li> <li>VVEL actuator sub assembly</li> <li>VVEL ladder assembly</li> <li>VVEL control module</li> </ul>	

### DTC CONFIRMATION PROCEDURE

### 1.PRECONDITIONING

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

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

2. Turn ignition switch ON.

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

#### **TESTING CONDITION:**

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

>> GO TO 2.

# 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 10 second.

- 2. Keep the engine speed at about 3,500 rpm for at least 10 seconds under no load.
- 3. Check DTC.

#### Is DTC detected?

YES >> Go to <u>EC-429, "Diagnosis Procedure"</u>. NO >> INSPECTION END

# Diagnosis Procedure

**1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.VVEL ACTUATOR MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect VVEL control module harness connector.

- 2. Disconnect VVEL actuator motor harness connector.
- 3. Check the continuity between VVEL control module harness connector and VVEL actuator motor harness connector.

# EC-429

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### < DTC/CIRCUIT DIAGNOSIS >

DTC No.	V	VEL control mode	ule	VVEL actu	lator motor	Continuity
DIC NO.	Bank	Connector	Terminal	Connector	Terminal	Continuity
			12		1	Existed
P1090	1		12	F48	2	Not existed
F 1090		- E15 -	25	140	1	Not existed
					2	Existed
	2		2		1	Existed
P1093				F49	2	Not existed
F 1093				Г49	1	Not existed
			15		2	Existed

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

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F1, E3

• Harness for open or short between VVEL actuator motor and VVEL control module

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

### **4.**CHECK VVEL ACTUATOR MOTOR

Refer to EC-431, "Component Inspection (VVEL ACTUATOR MOTOR)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

**5.**REPLACE VVEL ACTUATOR SUB ASSEMBLY

1. Replace VVEL actuator sub assembly.

2. Go to EC-432, "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.
- 2. Go to EC-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

### >> GO TO 8.

# **8.**PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-429, "DTC Logic"</u>.

Is the DTC P1090 or P1093 displayed again?

< DTC/CIRCUIT DIAGNO	)SIS >	[VQ37VHR]
YES >> GO TO 9. NO >> INSPECTION	END	
9.CHECK VVEL ACTUAT		
	nent Inspection (VVEL ACTUATOR SUB ASSEM	ABLY)".
Is the inspection result nor		E
YES >> GO TO 11.		
NO >> GO TO 10. $10$		
	TUATOR SUB ASSEMBLY	
<ol> <li>Replace VVEL actuate</li> <li>Go to <u>EC-432</u>, "Special</li> </ol>	al Repair Requirement".	
>> INSPECTION		
11.CHECK VVEL LADD		
Refer to <u>EM-100, "Inspect</u>		
Is the inspection result nor YES >> GO TO 13.	<u>mar</u>	
NO >> GO TO 12.		
12.REPLACE CYLINDE	R HEAD, VVEL LADDER ASSEMBLY AND VVE	EL ACTUATOR SUB ASSEMBLY
	I, VVEL ladder assembly and VVEL actuator sul	o assembly.
2. Go to <u>EC-432, "Specia</u>	al Repair Requirement".	
>> INSPECTION	END	
13. CHECK INTERMITT	ENT INCIDENT	
Refer to GI-43, "Intermitter	nt Incident".	
>> INSPECTION		
Component Inspection	on (VVEL ACTUATOR MOTOR)	INF01D:00000006352553
1.CHECK VVEL ACTUAT	OR MOTOR	
1. Turn ignition switch O		
	lator motor harness connector. veen VVEL actuator motor terminals as follows.	
5. Check resistance betw	veen vvel actuator motor terminals as follows.	
VVEL actuator motor		
Terminal	Resistance (Ω)	
1 and 2	16 or less	
Is the inspection result nor		
YES >> INSPECTION NO >> GO TO 2.	END	
2.REPLACE VVEL ACTU	JATOR SUB ASSEMBLY	(
<ol> <li>Replace VVEL actuate</li> <li>Go to <u>EC-432</u>, "Special</li> </ol>	or sub assembly. al Repair Requirement".	
>> INSPECTION	END	
Component Inspection	on (VVEL ACTUATOR SUB ASSEME	BLY)
1. CHECK VVEL ACTUAT	OR SUB ASSEMBLY	
1. Turn ignition switch O		

< DTC/CIRCUIT DIAGNOSIS >

- 2. Remove VVEL actuator sub assembly. Refer to EM-91, "Disassembly and Assembly".
- 3. Turn the ball screw shaft to check that it works smoothly.

#### Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE VVEL ACTUATOR SUB ASSEMBLY

- 1. Replace VVEL actuator sub assembly.
- 2. Go to EC-432, "Special Repair Requirement".

### >> INSPECTION END

Special Repair Requirement

INFOID:000000006352555

[VQ37VHR]

 $1. {\tt perform vvel control shaft position sensor adjustment}$ 

Refer to EC-22, "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Repair Requirement".

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

### P1091 VVEL ACTUATOR MOTOR RELAY

#### < DTC/CIRCUIT DIAGNOSIS >

### P1091 VVEL ACTUATOR MOTOR RELAY

### Description

Power supply for the VVEL actuator motor is provided to the VVEL control module via VVEL actuator motor relay. VVEL actuator motor relay is ON/OFF controlled by the VVEL control module. In addition, when the VVEL actuator motor relay cannot be controlled by the VVEL control module for some reason, it ON/OFF controlled by ECM.

### DTC Logic

INFOID:000000006352557

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
P1091	VVEL actuator motor relay circuit	<ul> <li>VVEL control module detects the VVEL actuator motor relay is stuck OFF.</li> <li>VVEL control module detects the VVEL actuator motor relay is stuck ON.</li> </ul>	<ul> <li>Harness or connectors (VVEL actuator motor relay circuit is open or shorted.) (Abort circuit is open or shorted.)</li> <li>VVEL actuator motor relay</li> <li>VVEL control module</li> <li>ECM</li> </ul>	E	

### DTC CONFIRMATION PROCEDURE

#### 1.PRECONDITIONING

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

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

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

**TESTING CONDITION:** 

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

## 2. PERFORM DTC CONFIRMATION PROCEDURE

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

#### Is DTC detected?

YES >> Go to <u>EC-433, "Diagnosis Procedure"</u>. NO >> INSPECTION END

### Diagnosis Procedure

### **1.**VVEL ACTUATOR MOTOR RELAY POWER SUPPLY CIRCUIT-I

- 1. Turn ignition switch OFF.
- 2. Disconnect VVEL actuator motor relay.
- 3. Check the voltage between VVEL actuator motor relay harness connector and ground.

VVEL actuator motor relay		Ground	Voltage	
Connector	Terminal	Ground	voltage	
E16	1	Ground	Battery voltage	
LIU	5	Ground	Ballery vollage	

#### Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 2. INFOID:000000006352558

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### P1091 VVEL ACTUATOR MOTOR RELAY

#### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

## 2. DETECT MALFUNCTIONING PART

Check the following.

• 50 A fusible link (letter M)

• 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.
- 2. Disconnect VVEL actuator motor relay harness connector.
- 3. 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	Connector Terminal		Terminal	Continuity
E15	23	E16	2	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

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

#### **4.**VVEL ACTUATOR MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between VVEL actuator motor relay harness connector and VVEL control module harness connector.

VVEL control module			VVEL actuate	VVEL actuator motor relay	
Bank	Connector	Terminal	Connector	Terminal	Continuity
1	E15	13	E16	2	Existed
2		1		5	LXISIGU

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-435. "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace VVEL actuator motor relay.

 $\mathbf{6}.$ CHECK ABORT CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.

2. 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

Revision: 2011 October

#### ACTUATOD MOTOD DELAV

	P1091 VVEL A	ACTUATOR MOTO	DR RELAY		
< DTC/CIRC	CUIT DIAGNOSIS >			[VQ37VHR]	
Check the fo	ollowing. Nector E3, F1				^
	or open or short between ECM an	d VVEL control module			А
	•				
>>	Repair open circuit, short to grou	nd or short to power in h	narness or connectors.		EC
8.CHECK I	NTERMITTENT INCIDENT				
Refer to GI-4	43, "Intermittent Incident".				С
•	ction result normal?				C
	GO TO 9.				
•	Repair or replace. E VVEL CONTROL MODULE				D
<ol> <li>Replace</li> <li>Go to E</li> </ol>	VVEL control module. C-18, "ADDITIONAL SERVICE \	WHEN REPLACING CO	NTROL UNIT (V/VEL CO	ONTROL MOD-	Е
	Special Repair Requirement".				
4.0	GO TO 10.				F
10.PERFC	ORM DTC CONFIRMATION PRO	CEDURE			
	ition switch ON.				G
<ol> <li>Erase D</li> <li>Perform</li> </ol>	TC. DTC Confirmation Procedure.				
	-433, "DTC Logic".				
Is the DTC F	21091 displayed again?				Н
-	GO TO 11.				
	INSPECTION END				
<b>11.</b> REPLA					
1. Replace 2. Go to E	ECM.			Spacial Papair	
Z. Go to <u>E</u> Require		WHEN REPLACING C	<u>ONTROL ONT (ECM) .</u>	<u>Special Repair</u>	J
>>	INSPECTION END				Κ
Compone	nt Inspection			INFOID:000000006352559	
	•				I
	/VEL ACTUATOR MOTOR RELA	Y			L
	ition switch OFF. VVEL actuator motor relay.				
	he continuity between VVEL actu	ator motor relay termi-			M
nals und	ler the following conditions.				
			2 5		Ν
Terminal	Condition	Continuity			
3 and 5	12 V direct current supply between terminals 1 and 2	Existed		5	
5 810 5	No current supply	Not existed		2 1	0
Is the inspec	tion result normal?			■ 3	
	INSPECTION END				Р
	Replace VVEL actuator motor rel	av.		JMBIA0876ZZ	

NO >> Replace VVEL actuator motor relay.

### P1148, P1168 CLOSED LOOP CONTROL

### < DTC/CIRCUIT DIAGNOSIS >

## 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. 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.	<ul> <li>Harness or connectors (The A/F sensor 1 circuit is open or shorted.)</li> </ul>
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.	<ul> <li>A/F sensor 1</li> <li>A/F sensor 1 heater</li> </ul>

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[VQ37VHR]

# DTC CONFIRMATION PROCEDURE

Trouble diagnosis name

TCS control unit

(control unit)" but also for ECM after TCS related repair.

Freeze frame data is not stored in the ECM for this self-diagnosis.

# 1.PRECONDITIONING

DTC DETECTION LOGIC

< DTC/CIRCUIT DIAGNOSIS >

Description

DTC Logic

DTC No.

P1211

P1211 TCS CONTROL UNIT

and electric unit (control unit)" to ECM.

#### TESTING CONDITION: Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

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### P1211 TCS CONTROL UNIT

The malfunction information related to TCS is transferred via the CAN communication line from "ABS actuator

Be sure to erase the malfunction information such as DTC not only for "ABS actuator and electric unit

DTC detecting condition

ECM receives malfunction information from

"ABS actuator and electric unit (control unit)".

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Possible cause

· ABS actuator and electric unit (control

unit)

· TCS related parts

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### 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

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#### 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-397, "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.	<ul> <li>Harness or connectors (The CAN communication line is open or short- ed.)</li> <li>ABS actuator and electric unit (control unit)</li> <li>Dead (Weak) battery</li> </ul>

#### 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-438, "Diagnosis Procedure".

NO >> INSPECTION END

#### **Diagnosis** Procedure

Go to BRC-4, "Work Flow".

INFOID:00000006352564

### P1217 ENGINE OVER TEMPERATURE

#### < DTC/CIRCUIT DIAGNOSIS >

### P1217 ENGINE OVER TEMPERATURE

### DTC Logic

#### DTC DETECTION LOGIC

#### NOTE:

- If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P1217 is displayed with DTC P0607. first perform the trouble diagnosis for DTC P0607. Refer to EC-397, "DTC Logic".

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause		
P1217	Engine over tempera- ture (Overheat)	<ul> <li>Cooling fan does not operate properly (Overheat).</li> <li>Cooling fan system does not operate properly (Overheat).</li> <li>Engine coolant was not added to the system using the proper filling method.</li> <li>Engine coolant is not within the specified range.</li> </ul>	<ul> <li>Harness or connectors (The cooling fan circuit is open or short- ed.)</li> <li>IPDM E/R</li> <li>Cooling fan control module</li> <li>Cooling fan motor</li> <li>Radiator hose</li> <li>Radiator</li> <li>Radiator cap</li> <li>Water pump</li> <li>Thermostat</li> </ul>		
"Refilling" 1. Fill rac coolar	alfunction is indicat . Also, replace the end diator with coolant up nt with the proper mi	ted, always replace the coolant. Refe ngine oil. Refer to <u>LU-7, "Draining"</u> ar p to specified level with a filling speed xture ratio. Refer to <u>MA-16, "FOR NO</u>	nd <u>LU-8, "Refilling"</u> . d of 2 liters per minute. Always use		
	<u>xture Ratio"</u> . efilling coolant, run	engine to ensure that no water-flow n	oise is emitted.		
4	FIRMATION PROC				
1.PERFO	.PERFORM COMPONENT FUNCTION CHECK				
NOTE:	onent function check to	ck. Refer to <u>EC-439, "Component Funct</u> o check the overall function of the cooling			
YES >>	ection result normal? > INSPECTION END > Go to <u>EC-440, "Diag</u>	nosis Procedure".			
Compon	ent Function Che	ck	INFOID:00000006352568		
<b>1.</b> PERFO	RM COMPONENT FL	JNCTION 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 P pressure to escape. Then turn the cap all the way off.

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INFOID:000000006352567

[VQ37VHR]

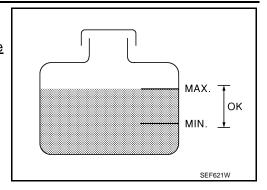
### P1217 ENGINE OVER TEMPERATURE

#### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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</u> <u>proper range?</u>

YES >> Go to <u>EC-440, "Diagnosis Procedure"</u>. 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-440, "Diagnosis Procedure".

NO >> GO TO 3.

**3.**PERFORM COMPONENT FUNCTION CHECK-III

#### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan speed varies according to the percentage.

#### **Without CONSULT-III**

Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-11, "Diagnosis</u> <u>Description"</u>.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-440, "Diagnosis Procedure".

### **Diagnosis Procedure**

INFOID:000000006352569

**1.**CHECK COOLING FAN OPERATION

### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that cooling fan speed varies according to the percentage.

#### **Without CONSULT-III**

- Perform IPDM E/R auto active test and check cooling fan motors operation, refer to <u>PCS-11, "Diagnosis</u> <u>Description"</u>.
- 2. Make sure that cooling fan operates.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Go to <u>EC-511</u>, "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

### **P1217 ENGINE OVER TEMPERATURE**

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
>> Repair or replace malfunctioning part.		
4.CHECK RADIATOR CAP		А
Check radiator cap. Refer to CO-13, "RADIATOR CAP : Inspection".	,	
Is the inspection result normal?		EC
YES >> GO TO 5.		
NO >> Replace radiator cap. Refer to <u>FL-10, "Exploded View"</u> .		
5. CHECK THERMOSTAT		С
Check thermostat. Refer to CO-25. "Inspection".		
Is the inspection result normal?		
YES >> GO TO 6.		D
NO >> Replace thermostat. Refer to <u>CO-24, "Exploded View"</u> .		
<b>6.</b> CHECK ENGINE COOLANT TEMPERATURE SENSOR		Е
Refer to EC-229, "Component Inspection".		
Is the inspection result normal?		
YES >> GO TO 7.		F
NO >> Replace engine coolant temperature sensor. Refer to <u>CO-26, "Exploded View"</u> .		

**1**.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	<ul> <li>Blocked radiator</li> <li>Blocked condenser</li> <li>Blocked radiator grille</li> <li>Blocked bumper</li> </ul>	• Visual	No blocking	_
	2	Coolant mixture	Coolant tester	MA-16, "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 <sup>2</sup> , 16 psi) (Limit)	CO-13, "RADIATOR CAP : Inspection"
ON* <sup>2</sup>	5	Coolant leaks	Visual	No leaks	CO-9, "Inspection"
ON* <sup>2</sup>	6	Thermostat	Touch the upper and lower radiator hoses	Both hoses should be hot	CO-25, "Inspection"
ON* <sup>1</sup>	7	Cooling fan	CONSULT-III	Operating	EC-511, "Component Function Check"
OFF	8	Combustion gas leak	Color checker chemical tester 4 Gas analyzer	Negative	_
ON* <sup>3</sup>	9	Coolant temperature     gauge	• Visual	Gauge less than 3/4 when driving	_
		Coolant overflow to res- ervoir tank	• Visual	No overflow during driving and idling	CO-9, "Inspection"
OFF* <sup>4</sup>	10	Coolant return from res- ervoir 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) Maxi- mum distortion (warping)	EM-113, "Inspection"
F	12	Cylinder block and pis- tons	• Visual	No scuffing on cylinder walls or piston	EM-127, "Inspection"

\*1: Turn the ignition switch ON.

\*2: Engine running at 3,000 rpm for 10 minutes.

\*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

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\*4: After 60 minutes of cool down time. For more information, refer to <u>CO-4, "Troubleshooting Chart"</u>.

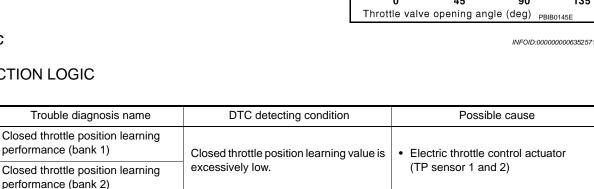
>> INSPECTION END

### P1225, P1234 TP SENSOR

### Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



### DTC Logic

DTC No.

P1225

P1234

### DTC DETECTION LOGIC

### 1.PRECONDITIONING

DTC CONFIRMATION PROCEDURE

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

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

Turn ignition switch ON. 2.

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

#### **TESTING CONDITION:**

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

#### >> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Turn ignition switch OFF and wait at least 10 seconds.
- 3. Turn ignition switch ON.
- Check 1st trip DTC. 4.

#### Is 1st trip DTC detected?

YES	>> Go to EC-443, "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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INFOID:000000006352570

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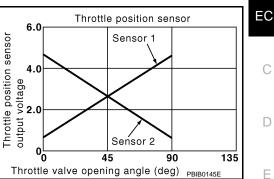
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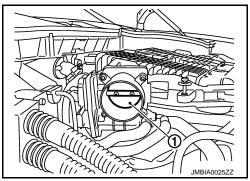
### P1225, P1234 TP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to <u>EC-20</u>, "<u>THROTTLE</u> <u>VALVE CLOSED POSITION LEARNING</u> : <u>Special</u> <u>Repair Requirement</u>".



### 2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator. Refer to EM-34, "Exploded View".
- 2. Go to EC-444, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000006352573

[VQ37VHR]

**1.**PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

**2.** PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

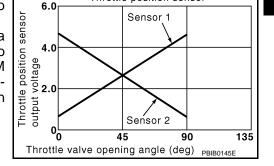
>> END

### P1226, P1235 TP SENSOR

### Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



Throttle position sensor

### **DTC Logic**

#### DTC DETECTION LOGIC

P1226 per P1235 Clo per DTC CONFI 1.PRECONI 1.PRECONI 1. PRECONI 1. PRECONI 2. Turn igni 3. Turn igni 3. Turn igni 2.PERFORI 1. Turn igni 2. Turn igni 2. Turn igni 2. Turn igni	firmation Procedure has ucting the next test. hition switch OFF and wa hition switch ON. hition switch OFF and wa CONDITION: forming the following put GO TO 2.	s been previously conducted, always per iit at least 10 seconds. iit at least 10 seconds. <b>rocedure, confirm that battery voltage is</b>	
DTC CONFI DTC CONFI 1.PRECONFI If DTC Confibution official content official content officia	FIRMATION PROCEDUNDITIONING firmation Procedure has ucting the next test. nition switch OFF and wa nition switch OFF and wa ONDITION: forming the following public GO TO 2.	JRE s been previously conducted, always per ait at least 10 seconds. ait at least 10 seconds. <b>rocedure, confirm that battery voltage is</b>	rform the following procedure
1. PRECON If DTC Confi- before condu 1. Turn igni 2. Turn igni 3. Turn igni TESTING CC Before perfo >> C 2. PERFORI 1. Turn igni 2. Turn igni	NDITIONING firmation Procedure has ucting the next test. hition switch OFF and wa hition switch OFF and wa <b>CONDITION:</b> forming the following put GO TO 2.	s been previously conducted, always per iit at least 10 seconds. iit at least 10 seconds. <b>rocedure, confirm that battery voltage is</b>	
If DTC Conf before condu 1. Turn igni 2. Turn igni 3. Turn igni TESTING CC Before perfo >> C 2.PERFORI 1. Turn igni 2. Turn igni	firmation Procedure has ucting the next test. hition switch OFF and wa hition switch ON. hition switch OFF and wa CONDITION: forming the following put GO TO 2.	it at least 10 seconds. it at least 10 seconds. <b>rocedure, confirm that battery voltage is</b>	
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>> ( 2.PERFORI 1. Turn igni 2. Turn igni	GO TO 2.		s more than 10 v at luie.
2.PERFORI 1. Turn igni 2. Turn igni			
<ol> <li>Turn igni</li> <li>Turn igni</li> </ol>			
2. Turn igni	M DTC CONFIRMATION	NPROCEDURE	
0	nition switch ON. nition switch OFF and wa nition switch ON.		
	steps 2 and 3 for 32 time 1st trip DTC.	es.	
Is 1st trip DT			
	Go to <u>EC-445, "Diagnosi</u> INSPECTION END	<u>is Procedure"</u> .	
Diagnosis	s Procedure		INFOID:0000000635257
1.снеск е		CONTROL ACTUATOR VISUALLY	

2. Remove the intake air duct.

[VQ37VHR]

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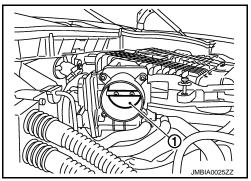
### P1226, P1235 TP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

3. Check if foreign matter is caught between the throttle valve (1) and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to <u>EC-20</u>, "<u>THROTTLE</u> <u>VALVE CLOSED POSITION LEARNING</u> : <u>Special</u> <u>Repair Requirement</u>".



### 2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

- 1. Replace malfunctioning electric throttle control actuator. Refer to EM-34, "Exploded View".
- 2. Go to EC-446, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:000000006352577

[VQ37VHR]

**1.**PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

**2.** PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

#### < DTC/CIRCUIT DIAGNOSIS >

### 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, P2100 or 2119, first perform the trouble diagnosis for DTC P1238, P2119 or P1290, P2100. Refer to <u>EC-454, "DTC Logic"</u> or <u>EC-459, "DTC</u> <u>Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1233	Electric throttle control performance (bank 2)	Electric throttle control function does not	Harness or connectors     (Throttle control motor circuit is open or shorted)
P2101	Electric throttle control performance (bank 1)	operate properly.	Electric throttle control actuator
DTC CC	NFIRMATION PRO	CEDURE	
1.PREC	ONDITIONING		
before co 1. Turn 2. Turn 3. Turn	onducting the next tes ignition switch OFF a ignition switch ON.		l, always perform the following procedure
Before p		wing procedure, confirm that ba	attery voltage is more than 11 V when
	>> GO TO 2.		
2.PERF	ORM DTC CONFIRM	IATION PROCEDURE	
2. Start	engine and let it idle ck DTC.	nd wait at least 2 seconds. for 5 seconds.	
	>> Go to <u>EC-447, "Di</u> >> INSPECTION ENI		
Diagno	sis Procedure		INFOID:00000006352580
<b>1.</b> CHEC	K GROUND CONNE	CTION	
2. Cheo Is the ins	ignition switch OFF. ck ground connection pection result normal >> GO TO 2.	M95. Refer to Ground Inspection in <u>?</u>	GI-46, "Circuit Inspection".
	>> Repair or replace	ground connection.	
2.CHEC	K THROTTLE CONT	ROL MOTOR RELAY INPUT SIGN	AL CIRCUIT-I

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

### EC-447

[VQ37VHR]

INFOID:00000006352579

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### < DTC/CIRCUIT DIAGNOSIS >

DTC		EC	CM	Condition																	
	+		_			Voltage (V)															
	Connector	Terminal	Connector	Terminal																	
P1233	F102	52				OFF	Approx. 0														
1 1200	1102	02	02	52	52	52	52	52	52	02	02	52	52	-	M107	129 Ignition	128 Ignition switch	128	Ignition switch	ON	Battery voltage
P2101	F101	3	IVI I U7	120	Ignition switch	OFF	Approx. 0														
P2101	1 101	5				ON	Battery voltage														

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 3.

### $\mathbf{3.}$ Check throttle control motor relay power supply circuit

1. 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.

IPDN	M E/R	E	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.

**4.**DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

Harness connectors F104, F105

Harness for open or short between ECM and IPDM E/R

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

### 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	EC	Continuity	
DIC	Connector	Terminal	Connector	Terminal	Continuity
P1233	F7	54	F102	52	Existed
P2101		54	F101	3	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.

Harness connectors E3, F1

• Harness for open or short between ECM and IPDM E/R

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

### EC-448

< DTC/CIRCUIT DIAGNOSIS > [VQ37]	/HR]
7.check fuse	
<ol> <li>Disconnect 15 A fuse (No. 51) from IPDM E/R.</li> <li>Check 15 A fuse for blown.</li> </ol>	A
<u>Is the inspection result normal?</u> YES >> GO TO 8.	EC
NO >> Replace 15A fuse. 8.CHECK INTERMITTENT INCIDENT	С
Refer to <u>GI-43, "Intermittent Incident"</u> . Is the inspection result normal?	
YES >> Replace IPDM E/R. Refer to <u>PCS-35, "Exploded View"</u> . NO >> Repair or replace harness or connectors.	D
9. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT	E
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect electric throttle control actuator harness connector.</li> </ol>	

- 3. Disconnect ECM harness connector.
- Check the continuity between electric throttle control actuator harness connector and ECM harness con-4. nector.

DTC	Electr	ic throttle con	trol actuator	EC	М	Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
			5		49	Existed
P1233	2	F27	5	F102	50	Not existed
F1233	F1233 2	FZ1	6	F 102	49	Not existed
					50	Existed
			1		2	Existed
P2101 1	1 56	FG	F6	– F101 –	4	Not existed
	1	10			2	Not existed
			2		4	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace.

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

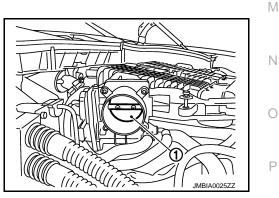
1. Remove the intake air duct.

2. Check if foreign matter is caught between the throttle valve (1) and the housing.

### Is the inspection result normal?

YES >> GO TO 11.

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, and then perform throttle valve closed position learning. Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".



### 11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-450, "Component Inspection".

Is the inspection result normal?

```
YES
      >> GO TO 12.
NO
      >> GO TO 13.
```

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< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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-34, "Exploded View".

2. Go to EC-450. "Special Repair Requirement".

>> INSPECTION END

Component Inspection

INFOID:000000006352581

INFOID:00000006352582

### 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	Resistance (22)
1	1 and 2	Approx. 1 - 15 [at 25°C (77°F)]
2	5 and 6	Approx. $1 - 13 [at 25 C (77 F)]$

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-450, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

**1.**PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

#### >> GO TO 2.

**2.** PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

### P1236, P2118 THROTTLE CONTROL MOTOR

#### < DTC/CIRCUIT DIAGNOSIS >

### P1236, P2118 THROTTLE CONTROL MOTOR

### Description

The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

### DTC Logic

INFOID:000000006352584

### 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)
	FIRMATION PROCI	EDURE	
1.PRECO	NDITIONING		
		has been previously conducted, always	ays perform the following procedure
	ducting the next test. Inition switch OFF and	wait at least 10 seconds.	
	nition switch ON.	wait at least 10 seconds.	
o. Tunng			
-	GO TO 2.		
2.PERFO	RM DTC CONFIRMAT	TION PROCEDURE	
		wait at least 2 seconds.	
<ol> <li>Start ei</li> <li>Check</li> </ol>	ngine and let it idle for DTC.	5 Seconds.	
Is DTC det			
YES >> NO >>	Go to <u>EC-451, "Diag</u> INSPECTION END	nosis Procedure".	
	s Procedure		
			INFOID:00000006352585
1.CHECK	GROUND CONNECT	ION	
	nition switch OFF.	95. Refer to Ground Inspection in <u>GI-46</u> ,	"Circuit Inspection"
	ection result normal?	So Refer to Ground inspection in $\underline{OP+O}$ .	<u>oreal inspection</u> .
	• GO TO 2.		
•	<ul> <li>Repair or replace gro</li> </ul>		
		DL MOTOR OUTPUT SIGNAL CIRCUIT	FOR OPEN AND SHORT
	nect electric throttle connect ECM harness co	ontrol actuator harness connector. nnector.	
		n electric throttle control actuator harne	ss connector and ECM harness con-

INFOID:000000006352583

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### P1236, P2118 THROTTLE CONTROL MOTOR

#### < DTC/CIRCUIT DIAGNOSIS >

DTC	Electric throttle control actuator			ECM		Continuity
DIC	Bank	Connector	Terminal	Connector	Terminal	Continuity
			5		49	Existed
P1236	2	F27	5	F102	50	Not existed
1 1250			6	1102	49	Not existed
					50	Existed
					2	Existed
P2118		F6		F101	4	Not existed
P2118	I	1 F6	2	FIUI	2	Not existed
			Z		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-452, "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.

**5.**REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunctioning electric throttle control actuator. Refer to EM-34. "Exploded View".

2. Go to EC-453. "Special Repair Requirement".

>> INSPECTION END

**Component Inspection** 

INFOID:000000006352586

## 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		
1	1 and 2	Approx. 1 - 15 [at 25°C (77°F)]	
2	5 and 6	Applox. $1 - 15 [at 25 C (77 F)]$	

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-34, "Exploded View".

2. Go to EC-453, "Special Repair Requirement".

### EC-452

### P1236, P2118 THROTTLE CONTROL MOTOR

### [VQ37VHR]

>> INSPECTION END	A
Special Repair Requirement	INFOID:000000006352587
1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	EC
Refer to EC-20. "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirer	nent"
>> GO TO 2.	С
2. PERFORM IDLE AIR VOLUME LEARNING	
Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"	D
>> END	E
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< DTC/CIRCUIT DIAGNOSIS >

### P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

< DTC/CIRCUIT DIAGNOSIS >

### P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

### Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.

### DTC Logic

INFOID:000000006352589

[VQ37VHR]

INFOID:00000006352588

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
		A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	
P1238	1238 Electric throttle control actuator (bank 2)		Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	Electric throttle control actuator
		A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	
P2119	Electric throttle control actuator (bank 1)	B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
			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. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

- 1. Turn ignition switch ON and wait at least 1 second.
- 2. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
- 3. Shift selector lever to P position (A/T) or Neutral position (M/T).
- 4. Turn ignition switch OFF and wait at least 10 seconds.
- 5. Turn ignition switch ON and wait at least 1 second.
- 6. Shift selector lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
- 7. Shift selector lever to P position (A/T) or Neutral position (M/T).
- 8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
- 9. Check DTC.

#### Is DTC detected?

YES >> Go to EC-455, "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.
- 5. Check DTC.
- Is DTC detected?

### P1238, P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

#### < DTC/CIRCUIT DIAGNOSIS >

YES >> Go to EC-455, "Diagnosis Procedure". NO >> INSPECTION END

#### Diagnosis Procedure

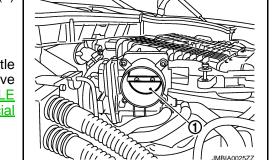
### 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

- 1. Turn ignition switch OFF.
- Remove the intake air duct. 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.

>> Remove the foreign matter and clean the electric throttle NO control actuator inside, and then perform throttle valve closed position learning. Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR 1. Replace malfunctioning electric throttle control actuator. Refer to EM-34, "Exploded View". Go to EC-455, "Special Repair Requirement". 2. >> INSPECTION END Н Special Repair Requirement INFOID:000000006352591 1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement" >> GO TO 2. 2.PERFORM IDLE AIR VOLUME LEARNING Κ Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement" >> END L Μ Ν

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P1239, P2135 TP SENSOR

### Description

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.

The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle properly in response to driving condition via the throttle control motor.



### DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

If DTC P1239 or P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-398, "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	<ul> <li>Harness or connector (TP sensor 1 and 2 circuit is open or shorted.)</li> <li>Electric throttle control actuator (TP sensor 1 and 2)</li> </ul>	
P2135	Throttle position sensor (bank 1) circuit range/ performance	and TP sensor 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 <u>EC-456, "Diagnosis Procedure"</u>.

NO >> INSPECTION END

### Diagnosis Procedure

**1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

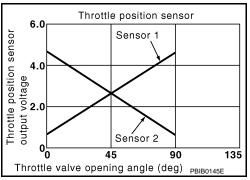
2. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.

### EC-456

IVQ37VHR



INFOID:000000006352594

### P1239, P2135 TP SENSOR

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         Bank       Connector         Terminal       Ground         P1238       2         P2135       1         F6       6         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 THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT         1. Turn ignition switch OFF.         2. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         Tor       Electric throttle control actuator         P1239       2       F27       4         P1239       2       F27       4         P1239       2       F27       4         P135       1       F6       3         P135 <td< th=""><th>&lt; DTC/CI</th><th>RCUIT</th><th></th><th></th><th>1 1255, 1</th><th>21001</th><th></th><th>[VQ37VHR]</th><th></th></td<>	< DTC/CI	RCUIT			1 1255, 1	21001		[VQ37VHR]	
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 Bank Connector Terminal Pr233 1 F6 6 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 the continuity between electric throttle control actuator harness connector and ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         1. Turn ignition switch OFF.         2. Disconnect ECM harness connector.         2. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         0. Check the continuity between electric throttle control actuator harness or connectors.         1. The ignition suitch OFF.         2. Disconnect ECM harness for short to ground and short to power.         Is the inspection result normal?         YES       > GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1. Check the continuity between electric throttle control actuator harness conne	NO >	> Repa	air or replac	ce ground	l connectio	n.			
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 Bank Connector Terminal Pr233 1 F6 6 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 the continuity between electric throttle control actuator harness connector and ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         1. Turn ignition switch OFF.         2. Disconnect ECM harness connector.         2. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         0. Check the continuity between electric throttle control actuator harness or connectors.         1. The ignition suitch OFF.         2. Disconnect ECM harness for short to ground and short to power.         Is the inspection result normal?         YES       > GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1. Check the continuity between electric throttle control actuator harness conne	2.CHECK			SITION S	ENSOR P	OWER SI	JPPLY CIR	CUIT-I	A
2. Turn ignition switch ON.       Bit is inspection result normal?         P129       2       F27       1         P129       2       F27       1         P2135       1       F6       6         St be inspection result normal?       YES       > 60 T0 3.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT       1         1. Turn ignition switch OFF.       2       Disconnect CM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.       6         DTC       Electric throttle control actuator       ECM         Continuity       Electric throttle control actuator       ECM         P1235       1       F6       3         1       F101       48       Existed         2       > 277       4       F101       48         P2135       1       F6       3       F101       48         P2135       1       F6       3       F101       48       Existed         NO       >> Repair open circuit, short to ground or short to power.       Is the inspection resuit normal?       YES       >> CO T								<u> </u>	
3. Check the voltage between electric throttle control actuator harness connector and ground.         DTC       Electric throttle control actuator         P1239       2         P2135       1         F87       1         Ground       Approx. 5         Is the inspection result normal?         YES       >> GO TO 3.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT         1. Turn ignition switch OFF.         2. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator         P1235       1       F6         2       F27       4         F101       40       Existed         P1235       1       F6       3         YES       > GO TO 4.       Signal normal?         YES       > GO TO 4.       Signal normal?         YES       > GO TO 4.       Existed         DTC       Electric throttle control actuator       ECM         Context result normal?       YES       > GO TO 4.         NO       >> R									
DTCBankConnectorTerminalGroundVoltage (V)P21351F271GroundApprox. 5P21351F66GroundApprox. 5Is 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 SHORT1. Turn ignition switch OFF.2. Disconnect ECM harness connector.3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.0. Check the continuity between electric throttle control actuator harness connector.1. Asis check harness for short to ground and short to power.1s the inspection result normal?YES>> GO TO 4.NO>> Repair open circuit, short to ground or short to power in harness or connectors.4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.2. Also check harness for short to ground and short to power.1. Check the continuity between electric terminalP123922F273F1013022. Also check harness for					ric throttle	control ac	tuator harn	less connector and ground.	EC
DTCBankConnectorTerminalGroundVoltage (V)P21351F271GroundApprox. 5P21351F66GroundApprox. 5Is 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 SHORT1. Turn ignition switch OFF.2. Disconnect ECM harness connector.3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.0. Check the continuity between electric throttle control actuator harness connector.1. Asis check harness for short to ground and short to power.1s the inspection result normal?YES>> GO TO 4.NO>> Repair open circuit, short to ground or short to power in harness or connectors.4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.2. Also check harness for short to ground and short to power.1. Check the continuity between electric terminalP123922F273F1013022. Also check harness for									
BankConnectorTerminalP12332F271GroundApprox.5Is 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 SHORT1.Turn ignition switch OFF.2.Disconnect ECM harness connector.3.Check the continuity between electric throttle control actuator harness connector and ECM harness connector.DTCElectric throttle control actuatorP12392P21351F63F10140P21351F63F10140P1239P12392F274F10140P21351F6S CO TO 4.NONONoPrepair open circuit, short to ground or short to power in harness connector and ECM harness connector.4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT1.Check the continuity between electric throttle control actuator harness connector and ECM harness connector.DTCElectric throttle control actuatorP12392P273F10130SSP12391F6534P12392P273F10135SP12392P27 <t< td=""><td>DTC</td><td>Elec</td><td>tric throttle co</td><td>ntrol actuat</td><td></td><td>Voltad</td><td>1e (V)</td><td></td><td>(</td></t<>	DTC	Elec	tric throttle co	ntrol actuat		Voltad	1e (V)		(
P2135       1       F6       6       Ground       Approx.5         Is the inspection result normal?       YES       >> GO T0.3.          NO       >> Repair open circuit, short to ground or short to power in harness or connectors.          3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT          1. Turn ignition switch OFF.          2. Disconnect ECM harness connector.          3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.          DTC       Electric throttle control actuator       ECM         P1239       2       F27       4       F101       48         Existed             4. Also check harness for short to ground and short to power.            Is the inspection result normal?       YES       >> GO T0.4.           NO       >> Repair open circuit, short to ground or short to power in harness connectors.           4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT           1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector. <td></td> <td>Bank</td> <td>Connector</td> <td>r Termin</td> <td></td> <td>Voltag</td> <td></td> <td></td> <td></td>		Bank	Connector	r Termin		Voltag			
P2135       1       F6       6         Is the inspection result normal?       YES       > GO TO 3.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         32.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT         1. Turn ignition switch OFF.         2. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator         P1239       2       F27         4. Also check harness for short to ground and short to power.       Existed         4. Also check harness for short to ground or short to power in harness or connectors.       4.         YES       > GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         P1239       2       F27       3       1       35       1       5       1       1	P1239	2	F27	1	Ground	Appr	ox 5		
YES       >> GO TO 3.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT         1. Turn ignition switch OFF.         2. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator       ECM       Continuity         P139       2       F27       4       F101       48       Existed         P2135       1       F6       3       F101       40       Existed         VES       > GO TO 4.       NO       >> Repair open circuit, short to ground or short to power in harness or connectors.       4. Also check harness for short to ground or short to power in harness or connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT       1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         7       C       Electric throttle control actuator       ECM       Continuity         7       P1239       2       F27       3       1       5         9       2       F27       4       F101       30       2         9       2       F27 </td <td>P2135</td> <td>1</td> <td>F6</td> <td>6</td> <td>Cround</td> <td>п лррп</td> <td>57. 5</td> <td></td> <td>[</td>	P2135	1	F6	6	Cround	п лррп	57. 5		[
NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT         1. Turn ignition switch OFF.         2. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator       ECM         P1239       2       F27       4       F101       48         P2135       1       F6       3       F101       48       Existed         A. Also check harness for short to ground and short to power.       Is the inspection result normal?       YES       >S GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.       4       Continuity         4. Check the continuity between electric throttle control actuator harness connectors.       4       Check the continuity between electric throttle control actuator harness connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT       1       Continuity         1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.       1         DTC       Electric throttle control actuator       ECM       Continuity         P1239       2       F27	Is the insp	ection	result norm	nal?					
Interview       Event the point of point of a start to ground of a short to power in manages of connectors.         3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT         1. Turn ignition switch OFF.         2. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         0. True       Electric throttle control actuator         0. Separation result normal?       YES         YES       > GO TO 4.         NO       > Repair open circuit, short to ground or short to power in harness connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector. <b>D</b> TC       Electric throttle control actuator         ECM       Continuity         P1239       2         P2135       1         F6       5									,
1. Turn ignition switch OFF.         2. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator       ECM         P1239       2       F27       4       F101       48         P2135       1       F6       3       F101       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 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.       5.         DTC       Electric throttle control actuator       ECM         DTC       Electric throttle control actuator       ECM         DTC       Electric throttle control actuator       ECM         P1239       2       F27       3         P1239       2       F27       31         P1239       2       F27       31         P1239       2       F27       31         Sthe inspection result normal?       S0       34 <td>-</td> <td></td> <td>•</td> <td></td> <td>-</td> <td></td> <td>•</td> <td></td> <td>b</td>	-		•		-		•		b
2. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         3. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         4. Also check harness for short to ground and short to power.         Is the inspection result normal?         YES       >> GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator         P1239       2       F27         2       F101       30         33       34	3.CHECK	( THR	OTTLE PO	SITION S	ENSOR G	ROUND		OR OPEN AND SHORT	
2. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         3. Disconnect ECM harness connector.         3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         4. Also check harness for short to ground and short to power.         Is the inspection result normal?         YES       >> GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator         P1239       2       F27         2       F101       30         33       34	1. Turn i	anition	switch OF	-					F
nector.       Electric throttle control actuator       ECM       Continuity         P1239       2       F27       4       F101       48         P2135       1       F6       3       F101       40       Existed         4. Also check harness for short to ground and short to power.       Is the inspection result normal?       YES       >> GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.       4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1.       Check the control actuator       ECM       Continuity         P1239       2       F27       2       31         7       2       31       5       5         9       2       F27       3       5         9       1       F6       5       31         1.       Context Terminal Connector Terminal Connector Terminal Context Terminal Context Terminal Context       Existed         P1239       2       F27       3       130       2         9       2       F27       3       130       2         9       2       F27       3       130       2         9       2       SO TO 5.       30 <td< td=""><td></td><td></td><td></td><td></td><td>ctor.</td><td></td><td></td><td></td><td></td></td<>					ctor.				
DTC       Electric throttle control actuator       ECM       Continuity         P1239       2       F27       4       F101       48       Existed         P2135       1       F6       3       F101       48       Existed         44. Also check harness for short to ground and short to power.       Is the inspection result normal?       Is the inspection result normal?         YES       >> GO TO 4.       NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT       1.       Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator       ECM       Continuity         P1239       2       F27       2       31         P1239       2       F27       3       Existed         DTC       Electric throttle control actuator       ECM       Continuity         P1239       2       F27       2       31         P2135       1       F6       4       F101       30         2.       Also check harness for short to ground and short to power.       Existed         2.       SGO TO 5.       NO       >> Repair open circu			ontinuity be	tween ele	ectric thrott	le control	actuator h	arness connector and ECM harness con-	
$\frac{\text{DTC}}{\text{Bank}  \text{Connector}  \text{Terminal}  \text{Connector}  \text{Terminal}  \text{Continuity}}}{\text{P1239}  2  F27  4  F101  48  \text{Existed}}}$ 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector. $\frac{\text{DTC}}{\text{Bank}  \text{Connector}  \text{Terminal}  \text{Connector}  \text{Terminal} \\ \text{Continuity} \\ \text{P1239}  2  F27  3 \\ \text{P2135}  1  F6  4 \\ \text{S1}  \text{S2} \\ \text{P2135}  1  F6  4 \\ \text{S2}  \text{S2} \\ \text{S2}  \text{Continuity} \\ \text{P1239}  2  F27  3 \\ \text{F101}  \frac{35}{34} \\ \text{F101}  \frac{35}{34} \\ \text{Existed} \\ \text{S2}. Also check harness for short to ground and short to power. \\ \text{Is the inspection result normal?} \\ \text{P2135}  1  F6  4 \\ \text{S2}  \text{S2} \\ \text{S2}  \text{S2}  \text{S2}  \text{S2}  \text{S3} \\ \text{S3}  \text{S3} \\ \text{S2}  \text{S3} \\ \text{S3}  \text{S3} \\ \text{S2}  \text{S3}  \text{S4}  \text{S4} \\ \text{S4}  \text{S4}  \text{S4} \\ \text{S5}  \text{S4} \\ \text{S5}  \text{S6}  \text{S6} \\ \text{S6}  \text{S7} \\ \text{S7}  \text{S8} \\ \text{S6}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S7} \\ \text{S7} \\ \text{S8}  \text{S6} \\ \text{S6}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S7} \\ \text{S7} \\ \text{S8}  \text{S6} \\ \text{S6}  \text{S7} \\ \text{S7} \\ \text{S8}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S7} \\ \text{S7} \\ \text{S8}  \text{S7} \\ \text{S8}  \text{S9} \\ \text{S7} \\ \text{S7} \\ \text{S8}  \text{S9} \\ \text{S7} \\$	necto	r.							(
$\frac{\text{DTC}}{\text{Bank}  \text{Connector}  \text{Terminal}  \text{Connector}  \text{Terminal}  \text{Continuity}}}{\text{P1239}  2  F27  4  F101  48  \text{Existed}}}$ 4. Also check harness for short to ground and short to power. Is the inspection result normal? YES >> GO TO 4. NO >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector. $\frac{\text{DTC}}{\text{Bank}  \text{Connector}  \text{Terminal}  \text{Connector}  \text{Terminal} \\ \text{Continuity} \\ \text{P1239}  2  F27  3 \\ \text{P2135}  1  F6  4 \\ \text{S1}  \text{S2} \\ \text{P2135}  1  F6  4 \\ \text{S2}  \text{S2} \\ \text{S2}  \text{Continuity} \\ \text{P1239}  2  F27  3 \\ \text{F101}  \frac{35}{34} \\ \text{F101}  \frac{35}{34} \\ \text{Existed} \\ \text{S2}. Also check harness for short to ground and short to power. \\ \text{Is the inspection result normal?} \\ \text{P2135}  1  F6  4 \\ \text{S2}  \text{S2} \\ \text{S2}  \text{S2}  \text{S2}  \text{S2}  \text{S3} \\ \text{S3}  \text{S3} \\ \text{S2}  \text{S3} \\ \text{S3}  \text{S3} \\ \text{S2}  \text{S3}  \text{S4}  \text{S4} \\ \text{S4}  \text{S4}  \text{S4} \\ \text{S5}  \text{S4} \\ \text{S5}  \text{S6}  \text{S6} \\ \text{S6}  \text{S7} \\ \text{S7}  \text{S8} \\ \text{S6}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S7} \\ \text{S7} \\ \text{S8}  \text{S6} \\ \text{S6}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S7} \\ \text{S7} \\ \text{S8}  \text{S6} \\ \text{S6}  \text{S7} \\ \text{S7} \\ \text{S8}  \text{S7} \\ \text{S6}  \text{S7} \\ \text{S7} \\ \text{S7} \\ \text{S8}  \text{S7} \\ \text{S8}  \text{S9} \\ \text{S7} \\ \text{S7} \\ \text{S8}  \text{S9} \\ \text{S7} \\$							1		
P12392F274F10148P21351F63F10140Existed4. Also check harness for short to ground and short to power.Is the inspection result normal?YES>> GO TO 4.NO>> Repair open circuit, short to ground or short to power in harness or connectors.4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.DTCElectric throttle control actuatorEnd to the throttle control actuatorECMOTCElectric throttle control actuatorP12392F2723135P21351F645342. 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 SENSORRefer to EC-458, "Component Inspection".Is the inspection result normal?St the inspection result normal?	DTC	Electric	c throttle contr	ol actuator			Continuity		
P2135       1       F6       3       F101       40       Existed         4.       Also check harness for short to ground and short to power.       Is the inspection result normal?         YES       >> GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1.       Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator       ECM         0       VEX       S         P1239       2       F27       3         1       F6       4       5         92135       1       F6       4         5       1       F6       3         6       34       Existed         2       F27       3       5         1       F6       4       5       1         2       F27       3       F101       35         30       34       2       1       76         2       Also check harness for short to ground and short to power.       1       1         1       S       S       GO TO 5.<		Bank	Connector	Terminal	Connector	Terminal		_	ł
P2135       1       F6       3       40         4. Also check harness for short to ground and short to power.       Is the inspection result normal?         YES       >> GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator         Electric throttle control actuator       ECM         P1239       2       F27         2       1       F101         30       34         P2135       1       F6       4         5       1       F6       4         5       NO       >> Repair open circuit, 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       Second or short to power in harness or connectors.         5. CHECK THROTTLE POSITION SENSOR       Second or short to power in harness or connectors.         5. CHECK THROTTLE POSITION SENSOR       Second or short to power in harness or connectors.	P1239	2	F27	4	F101	48	Existed		
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YES       >> GO TO 4.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1.       Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator       ECM $P1239$ 2       F27       2 $P1239$ 2       F27       31 $P1239$ 1       F6       4       5 $P2135$ 1       F6       4       Existed         2.       Also check harness for short to ground and short to power.       Existed       1         Stene inspection result normal?       YES       > GO TO 5.       0       >> Repair open circuit, short to ground or short to power in harness or connectors.         5.CHECK THROTTLE POSITION SENSOR       Refer to EC-458. "Component Inspection".       Is the inspection result normal?         Refer to EC-458. "Component Inspection".       Is the inspection result normal?	4. Also c	heck h	arness for	short to g	round and	short to p	ower.		
NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1.       Check the continuity between electric throttle control actuator harness connector and ECM harness connector.         DTC       Electric throttle control actuator       ECM       Continuity         P1239       2       F27       2       31       35         P2135       1       F6       4       30       Existed         2.       Also check harness for short to ground and short to power.       Existed       30       6         2.       Also check harness for short to ground and short to power.       Schepair open circuit, short to ground or short to power in harness or connectors.       6         5.       NO       >> Repair open circuit, short to ground or short to power in harness or connectors.       6         5.       CHECK THROTTLE POSITION SENSOR       Refer to EC-458. "Component Inspection".       1         8.       the inspection result normal?       Schepair open circuit, short to ground or short to power in harness or connectors.       5         6.       CHECK THROTTLE POSITION SENSOR       Refer to EC-458. "Component Inspection".       1         13.       the inspection result normal?       1       1	Is the insp	ection	result norm	<u>nal?</u>					
4. CHECK THROTTLE POSITION SENSOR 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         DTC       Electric throttle control actuator       Continuity         P1239       2       F27       2         1       F101       35       Existed         P2135       1       F6       4         5       30       34       Existed         2. Also check harness for short to ground and short to power.       Is the inspection result normal?         YES       >> GO TO 5.       NO         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         5.CHECK THROTTLE POSITION SENSOR         Refer to EC-458, "Component Inspection".         Is the inspection result normal?         St the inspection result normal?									
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DTC       Electric throttle control actuator       ECM       Continuity $P1239$ 2 $F27$ 2       31 $P1239$ 2 $F27$ 3 $F101$ $35$ $P2135$ 1 $F6$ 4 $F101$ $30$ $P2135$ 1 $F6$ 4 $F101$ $30$ $2$ Also check harness for short to ground and short to power.       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 THROTTLE POSITION SENSOR       Refer to EC-458. "Component Inspection".         Is the inspection result normal?       Is the inspection result normal?	4.CHECk	(THR	OTTLE PO	SITION S	ENSOR IN	IPUT SIG	NAL CIRC	UIT FOR OPEN AND SHORT	
DTC       Electric throttle control actuator       ECM       Continuity $P1239$ 2 $F27$ 2       31 $P1239$ 2 $F27$ 3 $F101$ $35$ $P2135$ 1 $F6$ 4 $F101$ $30$ $P2135$ 1 $F6$ 4 $F101$ $30$ $2$ Also check harness for short to ground and short to power.       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 THROTTLE POSITION SENSOR       Refer to EC-458. "Component Inspection".         Is the inspection result normal?       Is the inspection result normal?	1. Check	the co	ontinuity be	tween ele	ectric thrott	le control	actuator h	arness connector and ECM harness con-	ł
DTCHouse anotation of the anotationDomContinuity $Bank$ ConnectorTerminalConnectorTerminalP12392F27231P21351F64302Also check harness for short to ground and short to power.Existed2Also 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 SENSORRefer to EC-458, "Component Inspection".Is the inspection result normal?	nector	r.	-						
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P2135       1       F6       4       30         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-458, "Component Inspection".         Is the inspection result normal?	P1239	2	F27	3		35			ľ
5       34         2. Also check harness for short to ground and short to power.         Is the inspection result normal?         YES       >> GO TO 5.         NO       >> Repair open circuit, short to ground or short to power in harness or connectors.         5.CHECK THROTTLE POSITION SENSOR         Refer to EC-458, "Component Inspection".         Is the inspection result normal?				4	F101	30	Existed		
<ul> <li>2. Also check harness for short to ground and short to power.</li> <li><u>Is the inspection result normal?</u></li> <li>YES &gt;&gt; GO TO 5.</li> <li>NO &gt;&gt; Repair open circuit, short to ground or short to power in harness or connectors.</li> <li><b>5.</b>CHECK THROTTLE POSITION SENSOR</li> <li>Refer to <u>EC-458, "Component Inspection"</u>.</li> <li><u>Is the inspection result normal?</u></li> </ul>	P2135	1	F6	5		34	-		ľ
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Refer to <u>EC-458, "Component Inspection"</u> . Is the inspection result normal?	_						o ponor m		
Is the inspection result normal?									
·					<u>ction"</u> .				
YES >> GO TO 7.	•			<u>nal?</u>					
NO $>>$ GO TO 6.									

 $6. {\tt replace electric throttle control actuator}$ 

1. Replace malfunctioning electric throttle control actuator. Refer to EM-34, "Exploded View".

2. EC-458. "Special Repair Requirement".

#### >> 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-20, "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	Connector +		Cond	ition	Voltage (V)	
CONNECTOR	Terminal	Terminal				
	30 [TP sensor 1 (bank 1)]	40		Fully released	More than 0.36	
		40		Fully depressed	Less than 4.75	
	31 [TP sensor 1 (bank 2)]	48		Fully released	More than 0.36	
F101				Fully depressed	Less than 4.75	
FIUI	24 ITD concer 2 (book 1)	40	Accelerator pedal	Fully released	Less than 4.75	
	34 [TP sensor 2 (bank 1)]	40		Fully depressed	More than 0.36	
	35 [TP sensor 2 (bank 2)]	40		Fully released	Less than 4.75	
	SS [IF SENSOLZ (DALK Z)]	48		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-34, "Exploded View".

2. Go to EC-458. "Special Repair Requirement".

#### >> INSPECTION END

Special Repair Requirement

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### **1.**PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

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### P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

#### < DTC/CIRCUIT DIAGNOSIS >

### P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

### Description

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

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#### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause	E	
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) <ul> <li>Throttle control motor relay</li> </ul>	F	
P2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	<ul> <li>Harness or connectors (Throttle control motor relay circuit is shorted)</li> <li>Throttle control motor relay</li> </ul>	G	
DTC CONFIRMATION PROCEDURE  1.PRECONDITIONING					

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

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

2. Turn ignition switch ON.

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

#### Which DTC is detected?

P1290, P2100>>GO TO 2.

P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P1290 AND P2100

- 1. Turn ignition switch ON and wait at least 2 seconds.
- 2. Start engine and let it idle for 5 seconds.
- 3. Check DTC.

Is DTC detected?

YES	>> Go to EC-459, "Diagnosis Procedure".
NO	>> INSPECTION END

**3.**PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

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

#### Is DTC detected?

- YES >> Go to <u>EC-459, "Diagnosis Procedure"</u>. NO >> INSPECTION END
- NO >> INSPECTION ENL

### Diagnosis Procedure

**1.**CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

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### P1290, P2100, P2103 THROTTLE CONTROL MOTOR RELAY

#### < DTC/CIRCUIT DIAGNOSIS >

3. Disconnect IPDM E/R harness connector.

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 E3, F1

Harness connectors F104, F105

• Harness for open or short between ECM and IPDM E/R

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

### **3.**CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

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

DTC	IPDM E/R		EC	Continuity	
DIC	Connector	Terminal	Connector	Terminal	Continuity
P1290			F102	52	
P2100	E7	54	F101	3	Existed
P2103	E7	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 E3, F1

Harness for open or short between ECM and IPDM E/R

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

### 5.CHECK FUSE

- 1. Disconnect 15 A fuse (No. 51) from IPDM E/R.
- 2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace 15A fuse.

**6.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-35, "Exploded View"</u>.

NO >> Repair or replace harness or connectors.

[VQ37VHR]

### P1564 ASCD STEERING SWITCH

### Description

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated. Refer to <u>EC-77, "System Description"</u> for the ASCD function.

### DTC Logic

# DTC DETECTION LOGIC **NOTE**:

If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-395, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause				
P1564	ASCD steering switch	<ul> <li>An excessively high voltage signal from the ASCD steering switch is sent to ECM.</li> <li>ECM detects that input signal from the ASCD steering switch is out of the specified range.</li> <li>ECM detects that the ASCD steering switch is stuck ON.</li> </ul>	<ul> <li>Harness or connectors (The switch circuit is open or shorted.)</li> <li>ASCD steering switch</li> <li>ECM</li> </ul>	F			
DTC CO	NFIRMATION PRO	OCEDURE		Н			
1.PREC	1.PRECONDITIONING						
before cor 1. Turn i	nducting the next te		always perform the following procedure				
		and wait at least 10 seconds.		J			
>	•> GO TO 2.						
2.PERFC	ORM DTC CONFIR	MATION PROCEDURE		Κ			
<ol> <li>Press</li> <li>Press</li> <li>Press</li> </ol>	MAIN switch for at CANCEL switch fo	nd wait at least 10 seconds. least 10 seconds, then release it and w r at least 10 seconds, then release it an ERATE switch for at least 10 seconds,		L			
	SET/COAST switc	h for at least 10 seconds, then release i	t and wait at least 10 seconds.	M			
	Is DTC detected?						
	So to <u>EC-461, "E</u> INSPECTION EN	<u>)iagnosis Procedure"</u> . ID		Ν			
Diagnos	sis Procedure		INFOID:00000006352605	0			
1.снес	K GROUND CONN	ECTION		0			
1. Turn i	gnition switch OFF.			Р			

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

#### Is the inspection result normal?

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

2. CHECK ASCD STEERING SWITCH CIRCUIT

#### With CONSULT-III

### EC-461

[VQ37VHR]

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### P1564 ASCD STEERING SWITCH

< DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch ON.
- 2. Select "MAIN SW", "CANCEL SW", "RESUME/ACC SW" and "SET SW" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
MAIN SW	MAIN SWICH	Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
CANCEL SW	CANCEL SWICH	Released	OFF
RESUME/ACC SW	RESUME/ACCEL-	Pressed	ON
RESOME/ACC SW	ERATE switch	Released	OFF
SET SW	SET/COAST switch	Pressed	ON
5L1 5W	SE 1/COAST SWICH	Released	OFF

#### **Without CONSULT-III**

1. Turn ignition switch ON.

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

	ECM			
Connector	+	_	Condition	Voltage (V)
Connector	Terminal	Terminal		
	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.

### $\mathbf{3}.$ CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.

3. Disconnect combination switch harness connector.

4. Check the continuity between combination switch and ECM harness connector.

Combination switch	EC	Continuity		
Terminal	Connector Terminal		Continuity	
16	M107	108	Existed	

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

**4.**DETECT MALFUNCTIONING PART

Check the following.

Combination switch (spiral cable)

• Harness for open and short between ECM and combination switch

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

### EC-462

### P1564 ASCD STEERING SWITCH

#### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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## 5. Check ascd steering switch input signal circuit for open and short

#### 1. Check the continuity between combination switch and ECM harness connector.

Combination switch	EC	CM	Continuity	
Terminal	Connector	Terminal	Containanty	
13	M107	101	Existed	
2. Also check ha	arness for s	short to gr	ound and s	hort to power.
Is the inspection r	esult norm	al?		
YES >> GO T NO >> GO T	O 6.			
6.DETECT MAL	FUNCTION	NING PAR	Т	
	en and sho ir open circ	rt betweer cuit, short	to ground o	combination switch or short to power in harness or connectors.
Refer to EC-463,	"Compone	nt Inspect	ion".	
Is the inspection r	esult norm	al?		
· · ·	ace ASCD	-		r to <u>SR-14, "Exploded View"</u> .
8.CHECK INTER	RMITTENT	INCIDEN	Т	
Refer to <u>GI-43, "Ir</u>	ntermittent	Incident".		

>> INSPECTION END

### **Component Inspection**

1.CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF.

2. Disconnect combination switch (spiral cable) harness connector.

Check resistance between combination switch harness connector terminals under the following condi-3. L tions.

Combinat	tion switch	Condition	Resistance (Ω)			
Connector	Terminals	Condition	Resistance (12)			
		MAIN switch: Pressed	Approx. 0			
		CANCEL switch: Pressed	Approx. 250			
M303	13 and 16	SET/COAST switch: Pressed	Approx. 660			
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480			
		All ASCD steering switches: Released	Approx. 4,000			
Is the insp	ection resu	ult normal?				
YES >	S >> INSPECTION END					

>> Replace ASCD steering switch. Refer to <u>SR-14, "Exploded View"</u>. NO

### P1572 ASCD BRAKE SWITCH

### Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to <u>EC-77</u>, "System Description" for the ASCD function.

### DTC Logic

DTC DETECTION LOGIC

#### NOTE:

- If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-395, "DTC Logic"</u>.
- This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch is turned OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
		A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the ECM at the same time.	<ul> <li>Harness or connectors (The stop lamp switch circuit is shorted.)</li> <li>Harness or connectors (The ASCD brake switch circuit is shorted.)</li> </ul>
P1572 ASC	ASCD brake switch	B)	ASCD brake switch signal is not sent to ECM for extremely long time while the ve- hicle is being driven.	<ul> <li>Stop lamp switch</li> <li>ASCD brake switch</li> <li>Incorrect stop lamp switch installation</li> <li>Incorrect ASCD brake switch installation</li> <li>ECM</li> </ul>

### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING

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

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

#### NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

#### >> GO TO 2.

### 2. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

- 1. Start engine (VDC switch OFF).
- 2. Press MAIN switch and make sure that CRUISE lamp illuminates.
- 3. Drive the vehicle for at least 5 consecutive seconds under the following conditions.
- CAUTION: Always drive vehicle at a safe speed.

#### NOTÉ:

This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

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### P1572 ASCD BRAKE SWITCH

	P	21572 A	SCD BRAKE SWITCH		
< DTC/CIR	CUIT DIAGNOSIS >				[VQ37VHR]
<u>s 1st trip D</u>	TC detected?				
	Go to EC-465, "Diagnos	sis Proced	<u>dure"</u> .		
-	GO TO 3.				
	RM DTC CONFIRMATIC				
. Drive tl CAUTI		consecutiv	e seconds under the following	conditions.	
	s drive vehicle at a safe	e speed.			
NOTE:		uctod with	n the drive wheels lifted in th	o chon or by driv	ving the vehicle
			it is unnecessary to lift the v		ing the venicle.
Vehicle spee	ed	More than 3	0 km/h (19 mph)		
Selector lever Suitable position					
Driving locat	tion	seconds so	brake pedal for more than 5 as not to come off from the		
		above-ment	ioned vehicle speed.		
	1st trip DTC.				
	<u>TC detected?</u>	nia Drago	duro"		
YES >> NO >>	Go to <u>EC-465, "Diagnos</u> INSPECTION END	sis Proced	<u>ure</u> .		
iannosi	s Procedure				
nagnosi	STICCCULC				INFOID:000000006352609
.CHECK	OVERALL FUNCTION-I				
) With CO	DNSULT-III				
	nition switch ON.				
	"BRAKE SW1 III DATA "BRAKE SW1" indication		R" mode with CONSULT-III. e following conditions.		
			0		
Monitor item	1		Condition		Indication
	Brake pedal (A/T models o			Slightly depressed	OFF
BRAKE SW	1		els without synchrorev match mode)	enginiy depressed	
	Brake pedal (A/T models o Brake pedal or clutch peda	r M/T and s I (M/T mode	vnchrorev match mode) Is without synchrorev match mode)	Fully released	ON
Nithout	t CONSULT-III	(,	······································		
	nition switch ON.				
		M harnes	s connector terminals as per tl	ne following.	
	ECM				
Connector	+	-	Condition		Voltage (V)
	Terminal	Terminal			
			Brake pedal (A/T models or M/T an	d	
			synchrorev match mode) Brake pedal and clutch pedal (M/T	Slightly depress	ed Approx. 0
	126		models without synchrorev match		
M107	126 (ASCD brake switch signal)	128	mode)		
	· · · · · · · · · · · · · · · · · · ·	1	Brake pedal (A/T models or M/T an	d	

YES

Is the inspection result normal?

>> GO TO 2.

#### **EC-465**

NO-1 >> A/T models or M/T and synchrorev match mode: GO TO 3. NO-2 >> M/T models without synchrorev match mode: GO TO 8.

Brake pedal or clutch pedal (M/T models without synchrorev match mode)

synchrorev match mode)

Battery voltage

Fully released

2. CHECK OVERALL FUNCTION-II

#### () With CONSULT-III

Select "BRAKE SW2" and check indication under the following conditions.

Monitor item	C	Indication	
BRAKE SW2	Brako podal	Slightly depressed	ON
BRARE SWZ	Brake pedar	Fully released	OFF

#### **Without CONSULT-III**

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

	ECM					
Connector +		-	Condition		Voltage (V)	
Connector	Terminal	Terminal				
M107	122	128	Brake pedal	Slightly depressed	Battery voltage	
101	(Stop lamp switch signal)		Diake peual	Fully released	Approx. 0	

Is the inspection result normal?

YES >> GO TO 21.

NO >> GO TO 16.

 ${f 3.}$  check ascd brake switch power supply circuit

Turn ignition switch OFF. 1.

2. Disconnect ASCD brake switch harness connector.

- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ke switch	Ground	Voltage	
Connector	Terminal	Ciouna	volidge	
E109	1	Ground	Battery voltage	

Is the inspection result normal?

YES >> GO TO 5. NO

>> GO TO 4.

**4.**DETECT MALFUNCTIONING PART

#### Check the following.

- Fuse block (J/B) connector E103
- 10 A fuse (No. 3)

Harness for open or short between ASCD brake switch and fuse

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

## 5. Check ascd brake switch input signal circuit for open and short

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

ASCD bra	ke switch	EC	Continuity	
Connector	Connector Terminal		Terminal	Continuity
E109	2	M107	126	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

### P1572 ASCD BRAKE SWITCH

			P13/			
< DTC/CIR	CUIT DIA	GNOSI	S >			[VQ37VHR]
NO >>	GO TO 6	j.				
6.DETECT	MALFUN		ING PART			
Check the fo	ollowing.					
Harness c					en en diek	
<ul> <li>Harness fe</li> </ul>	or open o	r snort b	etween EC	M and ASCD brak	(e switch	
~~	Renair or	oon circu	uit short to	around or short to	power in harness or connec	tore
7.снеск	• •		-	ground or short to		
Is the inspe				ASCD Brake Sv	<u>vitcn)</u>	
	GO TO 2		<u>u:</u>			
			rake switch	. Refer to <u>BR-20,</u>	"Exploded View".	
8.CHECK	ASCD BR	AKE SV	VITCH CIR	CUIT		
1. Turn igr	nition swit	ch OFF.				<u></u>
2. Disconr	nect ASCI	D brake	switch harn	ess connector.		
	nition swit		en ASCD h	rake switch harne	ss connector and ground.	
4. Oncorr	ine venag	e betwee			so connector and ground.	
ASCD brai	ke switch			<b>0</b>		
Connector	Terminal	Ground		Condition	Voltage (V)	
<b>E</b> 400	4	0	Datast	Slightly depressed	Approx. 0	
E109	1	Ground	Brake peda	Fully released	Battery voltage	
Is the inspe	ction resu	lt norma	?			
	GO TO 1					
•	GO TO 9					
9.CHECK	ASCD BR	AKE SV	VITCH POV	VER SUPPLY CIF	RCUIT	
•	nition swit				(	
	nition swit		DOSITION SWI	tch harness conne	ector.	
			en clutch pe	edal position switc	h harness connector and gro	ound.
		1				
Clutch peda	I position sw	vitch Gr	ound Vo	tage		
Connector	Termir					
E108	1			v voltage		
Is the inspe			<u>ll?</u>			
-	GO TO 1 GO TO 1					
				г		
Check the fo						
Fuse bloc		nnector	E103			
<ul> <li>10 A fuse</li> </ul>	(No. 3)					
<ul> <li>Harness fe</li> </ul>	or open o	r snort b	etween clut	ch pedal position	switch and fuse	
	Popoir or	oon oire	uit or chart f	o ground in harne	ss or connectors	
				•	CUIT FOR OPEN AND SHO	
				FUT SIGNAL CIR	SUIT FOR OPEN AND SHO	
1. Turn igr	nition swit	ch OFF.				

1. Turn ignition switch OFF.

2. Check the continuity between clutch pedal position switch harness connector and ASCD brake switch harness connector.

Clutch pedal position switch		ASCD brake switch		Continuity
Connector	Terminal	Connector	Terminal	Continuity
E108	2	E109	1	Existed

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

Is the inspection result normal?

YES >> GO TO 12.

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

12. CHECK CLUTCH PEDAL POSITION SWITCH

Refer to EC-470. "Component Inspection (Clutch Pedal Position Switch)".

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace clutch pedal position switch. Refer to <u>CL-12, "Exploded View"</u>.

13. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Turn ignition switch OFF.

- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD 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 15.

NO >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M6
- Harness for open or short between ECM and ASCD brake switch

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

**15.**CHECK ASCD BRAKE SWITCH

Refer to EC-469, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace ASCD brake switch. Refer to <u>BR-20, "Exploded View"</u>.

**16.**CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect stop lamp switch harness connector.
- 3. Check the voltage between stop lamp switch harness connector and ground.

 Stop lamp switch
 Ground
 Voltage

 Connector
 Terminal
 Ground
 Battery voltage

Is the inspection result normal?

YES >> GO TO 18.

NO >> GO TO 17.

17. DETECT MALFUNCTIONING PART

## P1572 ASCD BRAKE SWITCH

DTC/CIRCL	JIT DIA	GNOSIS :	>		[VQ37VHR]
heck the follo Fuse block ( 10 A fuse (N	J/B) coi	nnector E1	03		
		r short betv	ween sto	p lamp swite	ch and battery
				F	
>> Re	epair op	en circuit,	short to	ground or s	hort to power in harness or connectors.
8.CHECK	STOP L	AMP SWI	TCH INP	UT SIGNAL	_ CIRCUIT FOR OPEN AND SHORT
		harness co			
					harness connector and ECM harness connector.
Stop lamp sw		ECN		Continuity	
		Connector	Terminal		
E110	2	M107	122	Existed	
			rt to grou	nd and sho	rt to power.
the inspection					
	O TO 2 O TO 1				
9.DETECT				т	
			NG PAR	1	
		on a otara F	100 140		
	1/11		103 11/2		
Fuse block (					lamp switch
Fuse block (					lamp switch
Fuse block ( Harness for	open or	r short betv	ween EC	M and stop	
Fuse block ( Harness for >> Re	opén or epair op	r short betv ben circuit,	ween EC short to	M and stop	lamp switch hort to power in harness or connectors.
Fuse block ( Harness for >> Re O.CHECK S	open or epair op STOP L	r short betw ben circuit, .AMP SWI <sup>-</sup>	ween EC short to TCH	M and stop ground or s	hort to power in harness or connectors.
Fuse block ( Harness for >> Re O.CHECK S efer to <u>EC-4</u>	open or epair op STOP L 70, "Cor	r short betw ben circuit, .AMP SWI <sup></sup> mponent Ir	ween EC short to TCH	M and stop ground or s	hort to power in harness or connectors.
Fuse block ( Harness for >> Re O.CHECK s efer to <u>EC-47</u> the inspection	open or epair op STOP L 70, "Cor on resu	r short betw ben circuit, AMP SWI <sup></sup>	ween EC short to TCH	M and stop ground or s	hort to power in harness or connectors.
Fuse block ( Harness for >> Re 0.CHECK s efer to <u>EC-43</u> the inspection YES >> Ge	open or epair op STOP L 70, "Con on resu O TO 2	r short betw ben circuit, AMP SWI <sup>-</sup> <u>mponent Ir</u> <u>It normal?</u> 1.	ween EC short to TCH hspection	M and stop ground or s <u>n (Stop Lam</u>	hort to power in harness or connectors. <u>p Switch)"</u>
Fuse block (Harness for $\rightarrow$ Re 0.CHECK S efer to EC-47 the inspection YES $\rightarrow$ Ge NO $\rightarrow$ Re	open or epair op STOP L 70. "Cor on resu O TO 2 eplace s	r short betw pen circuit, AMP SWI <sup></sup>	ween EC short to TCH <u>nspectior</u> switch. R	M and stop ground or s <u>n (Stop Lam</u> Refer to <u>BR-3</u>	hort to power in harness or connectors.
Fuse block (Harness for $\rightarrow$ Re <b>0.</b> CHECK Sefer to <u>EC-47</u> the inspection (ES >> Generation of the second secon	open or epair op STOP L 70. "Cor on resu O TO 2 eplace s	r short betw ben circuit, AMP SWI <sup></sup> <u>mponent Ir</u> <u>It normal?</u> 1. stop lamp s /ITTENT II	ween EC short to TCH <u>nspection</u> switch. R NCIDEN	M and stop ground or s <u>n (Stop Lam</u> Refer to <u>BR-3</u>	hort to power in harness or connectors. <u>p Switch)"</u>
Fuse block (Harness for $>> Re$ <b>0.</b> CHECK Sefer to <u>EC-47</u> the inspection YES $>> Generations of the text of text of the text of the text of t$	open or epair op STOP L 70. "Cor on resu O TO 2 eplace s	r short betw ben circuit, AMP SWI <sup></sup> <u>mponent Ir</u> <u>It normal?</u> 1. stop lamp s /ITTENT II	ween EC short to TCH <u>nspection</u> switch. R NCIDEN	M and stop ground or s <u>n (Stop Lam</u> Refer to <u>BR-3</u>	hort to power in harness or connectors. <u>p Switch)"</u>
Fuse block ( Harness for >> Re <b>0.</b> CHECK S efer to <u>EC-47</u> the inspection (ES $>> GetNO >> Re1.CHECK Iefer to GI-43$	open or epair op STOP L 70, "Cor on resu O TO 2 eplace s INTERN s, "Interr	r short betw ben circuit, AMP SWI <sup></sup>	ween EC short to TCH <u>nspection</u> switch. R NCIDEN	M and stop ground or s <u>n (Stop Lam</u> Refer to <u>BR-3</u>	hort to power in harness or connectors. <u>p Switch)"</u>
Fuse block ( Harness for >> Re <b>0.</b> CHECK s efer to <u>EC-47</u> the inspection (ES $>> GO$ NO $>> Re$ <b>1.</b> CHECK I efer to <u>GI-43</u> >> IN	open or epair op STOP L 70, "Col on resu O TO 2 eplace s INTERN 5, "Intern	r short betw ben circuit, AMP SWI <sup></sup>	ween EC short to TCH <u>hspection</u> switch. R NCIDEN <u>dent"</u> .	M and stop ground or s <u>n (Stop Lam</u> Refer to <u>BR-2</u> T	hort to power in harness or connectors. <u>p Switch)"</u> 20. "Exploded View"
Fuse block ( Harness for >> Re O.CHECK S efer to <u>EC-47</u> the inspection YES $>> GO$ NO $>> Re$ O.CHECK I efer to <u>GI-43</u> >> IN	open or epair op STOP L 70, "Col on resu O TO 2 eplace s INTERN 5, "Intern	r short betw ben circuit, AMP SWI <sup></sup>	ween EC short to TCH <u>hspection</u> switch. R NCIDEN <u>dent"</u> .	M and stop ground or s <u>n (Stop Lam</u> Refer to <u>BR-2</u> T	hort to power in harness or connectors. <u>p Switch)"</u> 20. "Exploded View"
Fuse block (Harness for $>> Re$ O.CHECK S efer to <u>EC-47</u> the inspection YES $>> Get NO >> Re1.CHECK Iefer to GI-43>> INcomponent$	open or epair op STOP L 70, "Con on resu O TO 2 eplace s INTERN 5, "Intern ISPECT t Inspe	r short betw ben circuit, AMP SWI <sup>-</sup> <u>mponent Ir</u> <u>It normal?</u> 1. stop lamp s AITTENT II <u>mittent Inci</u> FION END ection (A	ween EC short to TCH nspection switch. R NCIDEN dent".	M and stop ground or s <u>n (Stop Lam</u> Refer to <u>BR-2</u> T	hort to power in harness or connectors. <u>p Switch)"</u> 20. "Exploded View"
Fuse block ( Harness for $>> Re$ <b>O.CHECK S</b> efer to <u>EC-47</u> the inspection YES $>> GetNO >> Re1.CHECK Iefer to GI-43>> INCOMPONENT$	open or epair op STOP L 70, "Cor on resu O TO 2 eplace s INTERN S, "Interr ISPECT t Inspo SCD BR	r short betw pen circuit, AMP SWI <sup>-</sup> <u>mponent Ir</u> <u>It normal?</u> 1. stop lamp s /ITTENT II <u>mittent Inci</u> FION END ection (A AKE SWIT	ween EC short to TCH nspection switch. R NCIDEN dent".	M and stop ground or s <u>n (Stop Lam</u> Refer to <u>BR-2</u> T	hort to power in harness or connectors. <u>p Switch)"</u> 20. "Exploded View"
Fuse block ( Harness for >> Re 0.CHECK S efer to <u>EC-47</u> the inspection YES $>> GetNO >> Re1.CHECK Iefer to GI-43>> INcomponent.CHECK AS$	open or epair op STOP L 70, "Cor on resu O TO 2 eplace s INTERN S, "Interr ISPECT t Inspo SCD BR on swite	r short betw pen circuit, AMP SWI <sup>-</sup> <u>mponent Ir</u> <u>It normal?</u> 1. stop lamp s /ITTENT II <u>mittent Inci</u> FION END ection (A AKE SWIT ch OFF.	ween EC short to TCH <u>nspection</u> switch. R NCIDEN <u>dent"</u> .	M and stop ground or s <u>n (Stop Lam</u> Refer to <u>BR-2</u> T	hort to power in harness or connectors. <u>p Switch)"</u> 20. "Exploded View". ritch)
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20.CHECK s efer to EC-47 the inspection YES >> GO NO >> RO 21.CHECK I efer to GI-43 >> IN COMPONENT .CHECK AS . Turn ignition Disconneot . Check the Terminals	open or epair op STOP L 70, "Con on resu O TO 2 eplace s INTERN S, "Interr ISPECT t Inspe SCD BR on swite ct ASCE e continu	r short betw ben circuit, AMP SWIT mponent Ir It normal? 1. stop lamp s AITTENT II mittent Inci TION END ection (A AKE SWIT ch OFF. D brake sw uity betwee Condition	ween EC short to TCH nspection switch. R NCIDEN dent". ASCD E rCH-I	M and stop ground or s <u>a (Stop Lam</u> Refer to <u>BR-2</u> T Brake Sw brake Switc	hort to power in harness or connectors. <u>p Switch)"</u> 20. "Exploded View". ritch) wrond::::::::::::::::::::::::::::::::::::
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Fuse block ( Harness for >> Re CO.CHECK S efer to EC-47 the inspection YES >> Ge NO >> Re CHECK I efer to GI-43 >> IN COMPONENT .CHECK AS . Turn ignition .CHECK AS	open or epair op STOP L 70, "Col on resu O TO 2 eplace s INTERN STOP L TO 2 eplace s INTERN ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT ISPECT	r short betw ben circuit, AMP SWIT mponent In It normal? 1. stop lamp s AITTENT II mittent Inci TION END ection (A AKE SWIT ch OFF. D brake sw uity betwee Condition Fully relea Slightly de	ween EC short to TCH nspection switch. R NCIDEN dent". ASCD E	M and stop ground or s (Stop Lam Refer to <u>BR-2</u> T Brake Sw brake Swite Continuity Existed	hort to power in harness or connectors. <u>p Switch)"</u> 20. "Exploded View". ritch) wrond::::::::::::::::::::::::::::::::::::

2. CHECK ASCD BRAKE SWITCH-II

Adjust ASCD brake switch installation. Refer to <u>BR-9</u>, "<u>Inspection and Adjustment</u>".
 Check the continuity between ASCD brake switch terminals under the following conditions.

## P1572 ASCD BRAKE SWITCH

### < DTC/CIRCUIT DIAGNOSIS >

Terminals	C	Continuity	
1 and 2	Brake pedal	Fully released	Existed
i anu z	Diake pedal	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to <u>BR-20, "Exploded View"</u>.

## Component Inspection (Clutch Pedal Position Switch)

INFOID:000000006352611

# 1. CHECK CLUTCH PEDAL POSITION SWITCH-I

- 1. Turn ignition switch OFF.
- 2. Disconnect clutch pedal position switch harness connector.
- 3. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	С	ondition	Continuity
1 and 2	Clutch pedal	Fully released	Existed
1 410 2	Ciucii peuai	Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2. CHECK CLUTCH PEDAL POSITION SWITCH-II

1. Adjust clutch pedal position switch installation. Refer to CL-9, "Inspection and Adjustment".

2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Clutch pedal	Fully released	Existed
	Cidicit pedal	Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch pedal position switch. Refer to <u>CL-12, "Exploded View"</u>.

## Component Inspection (Stop Lamp Switch)

INFOID:000000006352612

## 1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect stop lamp switch harness connector.

3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
	blake 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 <u>BR-9, "Inspection and Adjustment"</u>.

2. Check the continuity between stop lamp switch terminals under the following conditions.

## P1572 ASCD BRAKE SWITCH

### < DTC/CIRCUIT DIAGNOSIS >

Toursis als		Condition	Continuit
Terminals	C	Condition Fully released	Continuity Not existed
1 and 2	Brake pedal	Slightly depressed	Existed
Is the insp	ection result		LVISICO
	> INSPECT		
NO >	> Replace s	top lamp switch. F	Refer to BR-2

## P1574 ASCD VEHICLE SPEED SENSOR

## Description

The ECM receives two vehicle speed signals via the CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to <u>EC-77, "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 U1XXXX.
- If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to <u>EC-373, "M/T MODELS : DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to <u>EC-395, "DTC Logic"</u>.
- If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to <u>EC-397, "DTC Logic"</u>.

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.	<ul> <li>Harness or connectors (The CAN communication line is open or shorted.)</li> <li>Combination meter</li> <li>ABS actuator and electric unit (control unit)</li> <li>Wheel sensor</li> <li>TCM</li> <li>ECM</li> </ul>

## 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 (VDC switch OFF).
- 2. Drive the vehicle at more than 40 km/h (25 MPH).

#### 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.

3. Check DTC.

### Is DTC detected?

YES >> Go to <u>EC-472, "Diagnosis Procedure"</u>. NO >> INSPECTION END

## **Diagnosis Procedure**

**1.**CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-204, "Diagnosis Description".

Is the inspection result normal?

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## EC-472

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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. 2.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"		А
Refer to <u>BRC-22, "CONSULT-III Function"</u> .	[	
Is the inspection result normal?		EC
YES >> GO TO 3.	•	
NO >> Repair or replace.		С
3. CHECK DTC WITH COMBINATION METER		
Refer to MWI-34, "CONSULT-III Function (METER/M&A)".		D
>> INSPECTION END		
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## P1606 VVEL CONTROL MODULE

## Description

The VVEL control module consists of a microcomputer and connectors for signal input and output and for power supply. The VVEL control module controls VVEL system.

## DTC Logic

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1606	VVEL control module	<ul> <li>VVEL control module calculation function is malfunctioning.</li> <li>VVEL EEP-ROM system is malfunc- tioning.</li> </ul>	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-474, "Diagnosis Procedure".
- NO >> INSPECTION END

### **Diagnosis** Procedure

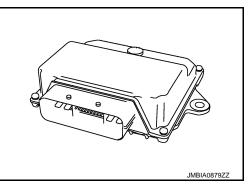
### **1.**PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-474, "DTC Logic"</u>.
- Is the DTC P1606 displayed again?
- YES >> GO TO 2.
- NO >> INSPECTION END

2.REPLACE VVEL CONTROL MODULE

1. Replace VVEL control module.

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## P1606 VVEL CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

2. Go to EC-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> INSPECTION END

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## P1607 VVEL CONTROL MODULE

## Description

The VVEL control module consists of a microcomputer and connectors for signal input and output and for power supply. The VVEL control module controls VVEL system.

## DTC Logic

### DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1607	VVEL control module circuit	• The internal circuit of the VVEL con- trol module is malfunctioning.	VVEL control module

### DTC 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-476, "Diagnosis Procedure".
- NO >> INSPECTION END

### **Diagnosis** Procedure

### **1.**PERFORM DTC CONFIRMATION PROCEDURE

- 1. Turn ignition switch ON.
- 2. Erase DTC.
- 3. Perform DTC Confirmation Procedure. See <u>EC-476, "DTC Logic"</u>.

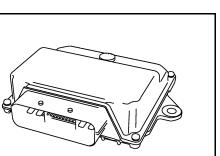
#### Is the DTC P1607 displayed again?

- YES >> GO TO 2.
- NO >> INSPECTION END
- 2.REPLACE VVEL CONTROL MODULE

1. Replace VVEL control module.



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## P1607 VVEL CONTROL MODULE

#### < DTC/CIRCUIT DIAGNOSIS >

### 2. Go to EC-18. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (VVEL CONTROL MOD-ULE) : Special Repair Requirement".

>> INSPECTION END

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[VQ37VHR]

## P1608 VVEL SENSOR POWER SUPPLY

## DTC Logic

[VQ37VHR]

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### 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.	<ul> <li>Harness or connectors (VVEL control shaft position sensor power supply circuit is open or shorted.)</li> <li>VVEL control shaft position sensor</li> <li>VVEL control module</li> </ul>

## 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-478, "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 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 positior	Ground	Voltage (V)		
Bank	Connector	Terminal	Giouna	voltage (v)	
1	F46	3			
I	F40	6	Ground	Approx 5	
2	E47	3	Ground	Approx. 5	
2	F47	6		Approx. 5	

Is the inspection result normal?

YES >> GO TO 7. NO >> GO TO 3.

## P1608 VVEL SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

**3.**CHECK VVEL CONTROL SHAFT POSITION SENSOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect VVEL control module harness connector.
- EC Check the continuity between VVEL control shaft position sensor harness connector and VVEL control 3. module harness connector.

VVEL co	ontrol shaft position	on sensor	VVEL control module		Continuity	
Bank	Connector	Terminal Connector Terminal			Continuity	
1	F46	E46	3		9	
I		6	E15	22	Existed	
2	F47	3	EIS	7	Existed	
2	Γ47	6		20		

4. Als	o check harness for	short to grour	nd and power.	
<u>Is the i</u>	nspection result norr	<u>mal?</u>		
YES	>> GO TO 5.			
	>> GO TO 4. ECT MALFUNCTIC			
<b>4.</b> DEI	ECT MALFUNCTIC	NING PART		
Check	the following.			

Harness connectors F1, E3

Harness for open or short between VVEL control shaft position sensor and VVEL control module

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

<b>5.</b> CHECK INTERMITTENT INCIDENT	
---------------------------------------	--

Refer to GI-43, "Intermittent Incident". Is the inspection result normal? YES >> GO TO 6. NO >> Repair or replace.

**Ó.**REPLACE VVEL CONTROL MODULE

1. Replace VVEL control module.

2. Go to EC-18, "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.

8.REPLACE VVEL ACTUATOR SUB ASSEMBLY

1. Replace VVEL actuator sub assembly.

Go to EC-479, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

1.PERFORM VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT

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## P1608 VVEL SENSOR POWER SUPPLY

< DTC/CIRCUIT DIAGNOSIS >

Refer to <u>EC-22</u>, "VVEL CONTROL SHAFT POSITION SENSOR ADJUSTMENT : Special Repair Requirement".

>> GO TO 2.

2. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

## P1805 BRAKE SWITCH

## Description

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is being driven.

## DTC Logic

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## DTC DETECTION LOGIC

DTC No.	Trouble dia	ignosis nam	e D	TC detecting condition	Possible cause
P1805	Brake swite	ch		ch signal is not sent to ECM for ex- time while the vehicle is being driv-	<ul> <li>Harness or connectors (Stop lamp switch circuit is open or short- ed.)</li> <li>Stop lamp switch</li> </ul>
DTC CON	FIRMATIO		CEDURE		
1.PERFO	RM DTC C	ONFIRM	ATION PROC	EDURE	
<ol> <li>Fully de</li> <li>Erase t</li> </ol>	nition swite epress the he DTC. 1st trip DT	brake pe	dal for at leas	t 5 seconds.	
		-481, "Dia	agnosis Proce	dure".	
Diagnosi	s Proced	dure			INFOID:00000006352627
<b>1.</b> снеск	STOP LAI	MP SWIT	CH CIRCUIT		
0	nition swite		depressing o	nd releasing the broke nodel	
2. Check	the stop la	mp when	depressing a	nd releasing the brake pedal	
Brake	e pedal		Stop lamp	-	
Fully r	eleased	No	t illuminated	_	
Slightly o	lepressed	11	luminated	_	
Is the inspe	ection resu	It normal?		-	
	• GO TO 4 • GO TO 2				
~				SUPPLY CIRCUIT	
			ch harness co		
				vitch harness connector and	ground.
Stop lam	-	Ground	Voltage		
Connector	Terminal				
E110	1		Battery voltage		
Is the inspe			-		
	• GO TO 4 • GO TO 3				
3.DETEC			G PART		
Check the f					
		nnector E	103		

Fuse block (J/B) connector E103
10 A fuse (No. 7)

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## P1805 BRAKE SWITCH

### < 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.

2. Disconnect ECM harness connector.

3. Check the continuity between stop lamp switch harness connector and ECM harness connector.

Stop lamp switch		EC	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-482, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace stop lamp switch. Refer to <u>BR-20, "Exploded View"</u>.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

### Component Inspection (Stop Lamp Switch)

**1.**CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect stop lamp switch harness connector.

3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	C	Continuity	
1 and 2	Brake pedal	Fully released	Not existed
	blake pedal	Slightly depressed	,

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to <u>BR-9</u>, "Inspection and Adjustment".

2. Check the continuity between stop lamp switch terminals under the following conditions.

## EC-482

## P1805 BRAKE SWITCH

### < DTC/CIRCUIT DIAGNOSIS >

1 and 2     Brake pedal     Fully released     Not existed       Slightly depressed     Existed	Terminals	C	Condition	Continuity
1 and 2     Brake pedal     Slightly depressed     Existed       s the inspection result normal?     YES     >> INSPECTION END				
s the inspection result normal? YES >> INSPECTION END	1 and 2	Brake pedal		
YES >> INSPECTION END	Is the insp	ection result		
NO >> Replace stop lamp switch. Refer to <u>BR-2</u>	YES >	> INSPECT	ION END	
	NO >	> Replace s	top lamp switch. F	teter to <u>BR-2</u>

## P2122, P2123 APP SENSOR

## Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.

DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-398, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122	Accelerator pedal posi- tion sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	Harness or connectors     (APP sensor 1 circuit is open or shorted.)
P2123	Accelerator pedal posi- tion sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	<ul> <li>Accelerator pedal position sensor (APP sensor 1)</li> </ul>

### DTC CONFIRMATION PROCEDURE

### **1.**PRECONDITIONING

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

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

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

#### >> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- 1. Start engine and let it idle for 1 second.
- 2. Check DTC.

#### Is DTC detected?

YES >> Go to <u>EC-484, "Diagnosis Procedure"</u>. NO >> INSPECTION END

### **Diagnosis** Procedure

**1.**CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

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

Is the inspection result normal?

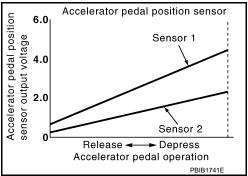
## EC-484



INFOID:000000006352631

INFOID:000000006352629

INFOID:00000006352630



[VQ37VHR]

## P2122, P2123 APP SENSOR

DTC/CIRCUI	T DIAGNOS			[VQ37VHR]
YES >> GO				
	air or replace	•		
CHECK APF	SENSOR 1	POWER SI	IPPLY CIRCUIT	
		edal positio	n (APP) sensor harness connector.	
	n switch ON.	en APP sei	sor harness connector and ground.	
. Check the v	Ullage Delwe		isor hamess connector and ground.	
APP senso	r			
	Groun Groun	d Voltage	(V)	
E112	5 Groun	d Appro:		
the inspection				
(ES >> GO		<u> </u>		
NO >> GO				
.DETECT MA	LFUNCTION	ING PART		
heck the follow				
Harness conn	ectors M6, E			
Harness for o	pen or short b	etween EC	M and accelerator pedal position se	ensor
_			· · · · · · · · · · ·	
	•		ground or short to power in harness	s or connectors.
CHECK APF	SENSOR 1	GROUND (	IRCUIT FOR OPEN AND SHORT	
	n switch OFF			
	ECM harnes			hornoog connoctor
Check the t	continuity bet	ween APP :	ensor harness connector and ECM	namess connector.
APP sensor		ECM		
Connector Terr	ninal Connect	or Terminal	Continuity	
E112	4 M107	100	Existed	
Also check	harness for s	hort to grou	nd and short to power.	
the inspection				
/ES >> GO				
10 >> GO				
DETECT MA	LFUNCTION	ING PART		
heck the follow				
Harness conn			M and appalate to readel position of	
namess for o	Den of short i	between EC	M and accelerator pedal position se	anson
>> Por	air onen circ	uit shart ta	ground or short to power in harness	or connectors
•	•	-	AL CIRCUIT FOR OPEN AND SHO	
Check the o	continuity bet	ween APP s	ensor harness connector and ECM	harness connector.
4.55				
APP sensor		ECM	Continuity	
	ninal Connect			
	3 M107	97	Existed	
		-	nd and short to power.	
the inspection		<u>al?</u>		
YES >> GO				
NO >> GO				
		INC DART		

## P2122, P2123 APP SENSOR

#### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

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-486. "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. Refer to ACC-4, "Exploded View".
- 2. Go to EC-486, "Special Repair Requirement".

#### >> INSPECTION END

## 10. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

### >> INSPECTION END

### Component Inspection

## 1. CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

3. Turn ignition switch ON.

4. Check the voltage ECM harness connector terminals as per the following.

	ECM					
Connector	+ –		Condition		Voltage (V)	
Connector	Terminal	Terminal				
M107	97 (APP sensor 1)	100 104	Accelerator pedal	Fully released	0.45 - 1.0	
				Fully depressed	4.2 - 4.8	
			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-4, "Exploded View".

2. Go to EC-486, "Special Repair Requirement".

>> INSPECTION END

## Special Repair Requirement

INFOID:000000006352633

## **1.**PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

Revision: 2011 October

## EC-486

# P2122, P2123 APP SENSOR

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	٨
Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair R	A Requirement".
>> GO TO 3. <b>3.</b> PERFORM IDLE AIR VOLUME LEARNING	EC
Refer to EC-20. "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	С
>> END	0
>> END	D
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## P2127, P2128 APP SENSOR

## Description

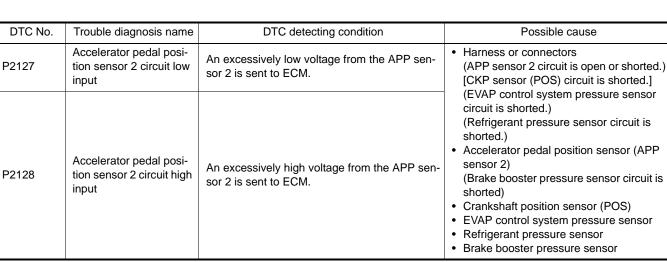
The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.

### DTC Logic

### DTC DETECTION LOGIC



### DTC 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.

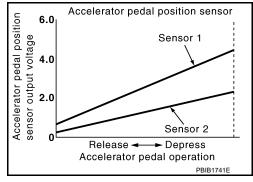
### >> GO TO 2.

## 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-489, "Diagnosis Procedure".
- NO >> INSPECTION END



INFOID:000000006352635

[VQ37VHR]

#### 0

			P21	27, P2128		NSOR		
< DTC/CIF		AGNOSIS	>				[VQ37VHF	۱]
Diagnos	is Proce	dure					INFOID:00000006352	
1.снеск	.CHECK GROUND CONNECTION					A		
	•	onnection		er to Ground In	spection in	<u>GI-46, "Circu</u>	it Inspection".	EC
NO >:	> GO TO 2 > Repair o	r replace (						С
				JPPLY CIRCU				
2. Turn ig	gnition swi	tch ON.		n (APP) senso Isor harness c				D
								E
	sensor	Ground	Voltage	(V)				
Connector E112	Terminal 6	Ground	Approx	5				F
Is the insp			Approx	5				1
YES >: NO >:	> GO TO 7 > GO TO 3	7. 3.	_		и <b>т</b> и			G
			JWER SU	JPPLY CIRCU	-			
2. Discor	gnition swi nnect ECN the contir	l harness			connector	and ECM har	rness connector.	Н
APP s	sensor	EC	CM	Continuity				I
Connector	Terminal	Connector	Terminal	Continuity				
E112	6	M107	103	Existed				J
	<u>ection rest</u> > GO TO १ > GO TO ४	5.	2					K
4.DETEC	T MALFU	NCTIONIN	IG PART					
Check the • Harness • Harness	connector			M and acceler	ator pedal p	osition senso	Dr	L
_ >:	> Repair o	pen circui	t.					M
<b>5.</b> CHECK	SENSOR	POWER	SUPPLY	CIRCUIT-III				h. 1
Check har	ness for sł	nort to pov	ver and sh	ort to ground,	between the	e following te	rminals.	— N
EC	CM			Sensor				0
Connector	Terminal		Name		Connector	Terminal		0
F101	45	Brake boos	ster pressure	esensor	E48	1		
	46	CKP sense	or (POS)		F2	1		Р

74

103

107

Gear lever position sensor

Refrigerant pressure sensor

EVAP control system pressure sensor

APP sensor

F102

M107

F57

E112

B30

E172

3

6

3

3

- 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-315, "Component Inspection".)
- Gear lever position sensor (Refer to EC-404, "Component Inspection".)
- Brake booster pressure sensor (Refer to <u>EC-391, "Component Inspection"</u>.)
- EVAP control system pressure sensor (Refer to EC-348. "Component Inspection".)
- Refrigerant pressure sensor (Refer to <u>EC-536, "Diagnosis Procedure"</u>.)

Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace malfunctioning component.

**I**.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 s	ensor	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 sensor		EC	Continuity		
Connector	Terminal	Connector Terminal		Continuity	
E112	1	M107	98	Existed	

2. 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 <u>EC-491</u>, "Component Inspection". Is the inspection result normal?

## P2127, P2128 APP SENSOR

	RCUIT DIAGNOS		127, P2128 A	PP SENSO	<b>K</b>	[VQ37VHR]									
	> GO TO 13.	515 >													
NO >	> GO TO 12.						A								
12.REPL	_ACE ACCELER/	ATOR PEDA	L ASSEMBLY												
	ce accelerator pe EC-491, "Special			4, "Exploded Vie	<u>w"</u> .		EC								
2. 0010			<u>unement</u> .												
	> INSPECTION E						С								
	CK INTERMITTE		IT												
Refer to G	I-43, "Intermittent	Incident".					D								
>	> INSPECTION E	IND													
Compon	ent Inspectio	n				INFOID:00000006352637	E								
	-			D											
			STION SENSO	ĸ			F								
2. Recor	gnition switch OF nnect all harness	connectors o	lisconnected.				Г								
	gnition switch ON the voltage ECN		nnector terminals	s as per the follo	wina.										
					g.		(								
	ECM		_												
Connector	+ Tarminal		Con	dition	Voltage (V)		ŀ								
	Terminal	Terminal		Fully released	0.45 - 1.0										
14407	97 (APP sensor 1)	or 1) 100	100	100	100	100	100	100	100	100		Fully depressed	4.2 - 4.8		
M107	98 (APP sensor 2)	104	<ul> <li>Accelerator pedal</li> </ul>	Fully released	0.22 - 0.50										
		10		Fully depressed	2.1 - 2.5		J								
	ection result norn > INSPECTION E														
NO >	> GO TO 2.						k								
	CE ACCELERAT														
	ce accelerator pe EC-486, "Special			4, "Exploded Vie	<u>w"</u> .		L								
2. 0010		<u>rtopul rtoq</u>	<u>anomone</u> .												
>	> INSPECTION E	ND					N								
Special I	Repair Requir	rement				INFOID:000000006352638									
1.PERFC	ORM ACCELERA	FOR PEDAL	RELEASED PO	SITION LEARN	ING		Γ								
						al Repair Requirement".									
							C								
•	> GO TO 2.														
					Special Dapa	ir Doguiromont"	F								
	<u>C-20, "THROTTL</u>	E VALVE UL	<u>.03ed PUSITIO</u>		opecial Repa	<u>ii Requirement</u> .	ſ								
•	> GO TO 3.														
<b>3.</b> PERFC	ORM IDLE AIR VO	DLUME LEA	RNING												

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

## P2138 APP SENSOR

## Description

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.

Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for engine operations such as fuel cut.

### DTC Logic

### DTC DETECTION LOGIC

#### NOTE:

If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to <u>EC-398, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal posi- tion sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	<ul> <li>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.)</li> <li>Accelerator pedal position sensor (APP sensor 2) (Brake booster pressure sensor circuit is shorted)</li> <li>Crankshaft position sensor (POS)</li> <li>EVAP control system pressure sensor</li> <li>Brake booster pressure sensor</li> <li>Refrigerant pressure sensor</li> <li>Refrigerant pressure sensor</li> </ul>

### 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.

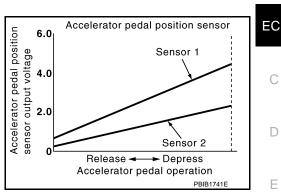
## 2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.

## 2. Check DTC.

Is DTC detected?

- YES >> Go to EC-494, "Diagnosis Procedure".
- NO >> INSPECTION END



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INFOID:000000006352640

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### < DTC/CIRCUIT DIAGNOSIS >

### **Diagnosis** Procedure

INFOID:00000000635264

### 1.CHECK GROUND CONNECTION

1. 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.

NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

- Disconnect accelerator pedal position (APP) sensor harness connector. 1.
- 2. Turn ignition switch ON.
- 3. Check the voltage between APP sensor harness connector and ground.

APP	sensor	Ground	Voltage (V)	
Connector	Terminal	Ciouna	voltage (v)	
E112	5	Ground	Approx. 5	

Is the inspection result normal?

YES >> GO TO 4. NO

>> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

· Harness for open or short between ECM and accelerator pedal position sensor

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

### 4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.

Check the voltage between APP sensor harness connector and ground. 2.

APP	sensor	Ground	Voltage (V)
Connector	Terminal	Ciouna	voltage (v)
E112	6	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 5.

**5.**CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

#### 1. Turn ignition switch OFF.

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

APP s	ensor	EC	Continuity	
Connector	Terminal	Connector	Connector Terminal	
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

#### < DTC/CIRCUIT DIAGNOSIS >

• 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.

	СМ		Sensor				
Connector	Terminal	Name	9	Connector	Terminal	-	
E101	45	Brake booster pressur	e sensor	E48	1	-	
F101	46	CKP sensor (POS)		F2	1	-	
F102	74	Gear lever position ser	nsor	F57	3	-	
	103	APP sensor		E112	6	-	
M107	407	EVAP control system p	pressure sensor	B30	3	-	
	107	Refrigerant pressure s	ensor	E172	3	-	
YES > NO > CHECH heck the Cranksh Gear lev Brake bo EVAP co Refriger	> GO TO a > Repair s ( COMPO following. aft position er position poster pres ontrol syste ant pressu	hort to ground or sh	fer to <u>EC-315,</u> C-404, "Comp to <u>EC-391, "C</u> (Refer to <u>EC-3</u>	"Component onent Inspec omponent In 348, "Compo	t Inspectio tion".) spection". nent Inspe	<u>n"</u> .)	
IO > CHECP Turn i Disco	( APP SEN gnition swi	malfunctioning com				narness connector.	
		-					
	sensor	ECM	Orationity				
	Terminal	Connector Terminal	Continuity				
APP :	Terminal 4 2	Connector Terminal M107 104	Existed				
APP s Connector E112 Also c	4 2 heck harn	M107	- Existed	to power.			
APP : Connector E112 Also c the insp (ES > NO >	4 2 heck harn ection res > GO TO > GO TO	M107 100 104 ess for short to grou <u>ult normal?</u> 11. 10.	Existed	to power.			
APP : Connector E112 Also c the insp (ES > NO >	4 2 heck harn ection res > GO TO > GO TO	M107 100 104 ess for short to grou ult normal? 11.	Existed	to power.			

>> 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.

## EC-495

EC

APP sensor		EC	Continuity	
Connector	Connector Terminal		Terminal	Continuity
F112	3	M107	97	Existed
LIIZ	1	101	98	LAISIEU

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

Is the inspection result normal?

YES >> GO TO 13. NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors M6, E106

Harness for open or short between ECM and accelerator pedal position sensor

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

**13.**CHECK APP SENSOR

Refer to EC-496, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> GO TO 14.

14.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".

2. Go to EC-497, "Special Repair Requirement"

#### >> INSPECTION END

15. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

#### >> INSPECTION END

### **Component Inspection**

# 1.CHECK ACCELERATOR PEDAL POSITION SENSOR

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Turn ignition switch ON.
- 4. Check the voltage ECM harness connector terminals as per the following.

ECM					
Connector	+	_	Condition		Voltage (V)
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.

< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]
2.REPLACE ACCELERATOR PEDAL ASSEMBLY	ļ
<ol> <li>Replace accelerator pedal assembly. Refer to <u>ACC-4, "Exploded View"</u>.</li> <li>Go to EC-486, "Special Repair Requirement".</li> </ol>	ľ
2. Go to EC-486, "Special Repair Requirement".	E
>> INSPECTION END	
Special Repair Requirement	INFOID:000000006352643
<b>1.</b> PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING	
Refer to EC-19. "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Rep	bair Requirement".
>> GO TO 2.	
<b>2.</b> PERFORM THROTTLE VALVE CLOSED POSITION LEARNING	E
Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Req	uirement".
>> GO TO 3.	F
<b>3.</b> PERFORM IDLE AIR VOLUME LEARNING	
Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".	C
>> END	
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## P2765 INPUT SPEED SENSOR

### Description

Input speed sensor is installed in transmission and detects transmission input shaft speed. ECM receives input speed signal and performs SynchroRev Match mode (S-MODE) control according to input speed signal.

## DTC Logic

NOTE:

INFOID:000000006352645

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If DTC P2765 is displayed with DTC P0335, P0340 or P0345, first perform the trouble diagnosis for DTC P0335, P0340 or P0345. Refer to <u>EC-312, "DTC Logic"</u> or <u>EC-316, "DTC Logic"</u>.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2765	Input speed sensor circuit	There is a difference between engine speed signal calculated by ECM and input shaft speed sensor signal.	<ul> <li>Harness or connectors (Input speed sensor circuit is open or shorted.)</li> <li>Input speed sensor</li> </ul>

#### DTC CONFIRMATION PROCEDURE

## 1.PRECONDITIONING

DTC DETECTION LOGIC

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.
- 2. Drive the vehicle for at least 10 consecutive seconds under the following conditions.

Vehicle speed	More than 20 km/h (12 mph)
Shift lever	Except neutral position
Clutch pedal	Fully released

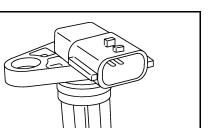
#### CAUTION:

#### Always drive vehicle at a safe speed

3. Check DTC.

#### Is DTC detected?

- YES >> Go to EC-499, "Diagnosis Procedure".
- NO >> INSPECTION END





## **P2765 INPUT SPEED SENSOR**

DTC/CIRCUIT iagnosis Pro		IS >			[VQ37VHR]
-					
	ocedure				INFOID:00000006352646
.CHECK GROU		ECTION			
Turn ignition					
			to Ground I	nspection in <u>GI-46, "Circuit Ins</u>	spection".
the inspection (ES >> GO 1		<u>al /</u>			
		e ground conn	ection.		
.CHECK INPU	T SPEED SI	ENSOR POW	/ER SUPPL	Y CIRCUIT	
		sensor harnes	s connecto	r.	
Turn ignition		en innut snee	d sensor h	arness connector and ground.	
	nage betwee				
Input spec	ed sensor	Gro	und	Voltago (V)	
Connector	Terminal	l GIO	una	Voltage (V)	
F58	1	Gro	und	Battery voltage	
the inspection		<u>al?</u>			
/ES >> GO 1 NO >> GO 1					
.DETECT MAL					
heck the followi Harness conne Harness for ope	ing. ectors F103, l en or short b	M116 between input		sor and IPDM E/R ort to power in harness or con	nectors.
heck the followi Harness conne Harness for ope >> Repa .CHECK INPU Turn ignition	ing. ectors F103, I en or short b air open circu T SPEED SI switch OFF.	M116 between input uit, short to gr ENSOR GRO	ound or sh		
heck the followi Harness conne Harness for ope >> Repa .CHECK INPU Turn ignition Disconnect E	ing. ectors F103, I en or short b air open circu T SPEED SI switch OFF. ECM harness	M116 between input uit, short to gr ENSOR GRO s connector.	ound or sh	ort to power in harness or con	
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heck the followi Harness conner Harness for ope >> Repa .CHECK INPU Turn ignition Disconnect E Check the co Input speed s Connector F58 Also check he the inspection	ing. ectors F103, I en or short b air open circu IT SPEED SI switch OFF. ECM harness ontinuity betw sensor Terminal 2 harness for si result norma	M116 between input uit, short to gr ENSOR GRO s connector. ween input sp EC Connector F102 hort to ground	eed sensor M Terminal	ort to power in harness or con UIT FOR OPEN AND SHORT harness connector and ECM Continuity Existed	
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heck the followi Harness conner Harness for ope ->> Repa .CHECK INPU Turn ignition Disconnect E Check the co Input speed s Connector F58 Also check he the inspection XO >> Repa .CHECK INPU Check the co	ing. ectors F103, I en or short b air open circu T SPEED SI switch OFF. ECM harness ontinuity betw sensor Terminal 2 harness for sl result norma TO 5. air open circu T SPEED SI ontinuity betw sensor	M116 between input uit, short to gr ENSOR GRO s connector. ween input sp EC Connector F102 hort to ground al? uit, short to gr ENSOR INPL ween input sp EC	eed sensor Terminal 84 d and short round or sho IT SIGNAL eed sensor	ort to power in harness or cont UIT FOR OPEN AND SHORT harness connector and ECM Continuity Existed to power. Ort to power in harness or cont CIRCUIT FOR OPEN AND SI harness connector and ECM	- harness connector. nectors. HORT
heck the followi Harness conner Harness for ope SRepa CHECK INPUT Turn ignition Disconnect E Check the co Input speed s Connector F58 Also check he the inspection (ES >> GO T NO >> Repa .CHECK INPUT Check the co Input speed s Connector F58	ing. ectors F103, I en or short b air open circu T SPEED SI switch OFF. ECM harness ontinuity betw sensor Terminal 2 harness for sl result norma TO 5. air open circu IT SPEED SI ontinuity betw sensor Terminal 3	M116 between input uit, short to gr ENSOR GRO s connector. ween input sp EC Connector F102 hort to ground al? uit, short to gr ENSOR INPL ween input sp EC Connector	eed sensor Terminal 84 d and short round or sho IT SIGNAL eed sensor CM Terminal 75	ort to power in harness or cont UIT FOR OPEN AND SHORT harness connector and ECM Continuity Existed to power. Ort to power in harness or cont CIRCUIT FOR OPEN AND SI harness connector and ECM Continuity Existed	- harness connector. nectors. HORT
heck the followi Harness conner Harness for ope SRepa CHECK INPUT Turn ignition Disconnect E Check the co Input speed s Connector F58 Also check he the inspection (ES >> GO T NO >> Repa .CHECK INPUT Check the co Input speed s Connector F58	ing. ectors F103, I en or short b air open circu T SPEED SI switch OFF. ECM harness ontinuity betw sensor Terminal 2 harness for sI result norma TO 5. air open circu T SPEED SI ontinuity betw sensor Terminal 3 harness for sI air open circu	M116 between input uit, short to gr ENSOR GRO s connector. ween input sp EC Connector F102 hort to ground al? uit, short to gr ENSOR INPL ween input sp EC Connector F102 hort to ground	eed sensor Terminal 84 d and short round or sho IT SIGNAL eed sensor CM Terminal 75	ort to power in harness or cont UIT FOR OPEN AND SHORT harness connector and ECM Continuity Existed to power. Ort to power in harness or cont CIRCUIT FOR OPEN AND SI harness connector and ECM Continuity Existed	- harness connector. nectors. HORT

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

6.CHECK INPUT SPEED SENSOR

## **P2765 INPUT SPEED SENSOR**

< DTC/CIRCUIT DIAGNOSIS >

Refer to EC-500, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace input speed sensor. Refer to <u>TM-37, "Exploded View"</u>.

7. CHECK INTERMITTENT INCIDENT

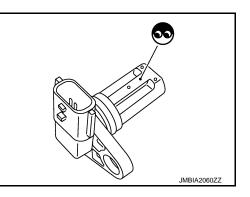
Refer to GI-43, "Intermittent Incident".

### >> INSPECTION END

## Component Inspection

1.CHECK INPUT SPEED SENSOR-I

- 1. Turn ignition switch OFF.
- 2. Disconnect input speed sensor harness connector.
- 3. Remove the sensor. Refer to TM-37, "Exploded View".
- 4. Visually check the sensor for chipping.
- Is the inspection result normal?
- YES >> GO TO 2.
- NO >> Replace input speed sensor. Refer to <u>TM-37</u>, "Exploded <u>View"</u>.



## 2.CHECK INPUT SPEED SENSOR-II

Check resistance between input speed sensor terminals as per the following items.

Terminals (Polarity)	Resistance
1 (+) - 2 (-)	
1 (+) - 3 (-)	Except 0 or $\infty \Omega$ [at 25°C (77°F)]
2 (+) - 3 (-)	*

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace input speed sensor. Refer to <u>TM-37</u>, "Exploded View".

## P2A00, P2A03 A/F SENSOR 1

## Description

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement  $\lambda = 1$ , but also in the lean and rich range. Together with its control electronics, the sensor

outputs a clear, continuous signal throughout a wide  $\lambda$  range. The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).

## **DTC Logic**

### DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not it will shift to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause	K
P2A00	Air fuel ratio (A/F) sensor 1 (bank 1) circuit range/per- formance	<ul> <li>The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period</li> </ul>	<ul> <li>A/F sensor 1</li> <li>A/F sensor 1 heater</li> <li>Heated oxygen sensor 2</li> </ul>	L
P2A03	Air fuel ratio (A/F) sensor 1 (bank 2) circuit range/per- formance	<ul> <li>The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a specified period.</li> </ul>	<ul> <li>Fuel pressure</li> <li>Fuel injector</li> <li>Intake air leaks</li> <li>Exhaust gas leaks</li> </ul>	M

### DTC CONFIRMATION PROCEDURE

## **1.**PRECONDITIONING

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

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

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

## >> GO TO 2.

## 2.PERFORM DTC CONFIRMATION PROCEDURE

1. Clear the mixture ratio self-learning value. Refer to <u>EC-24, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.

## EC-501

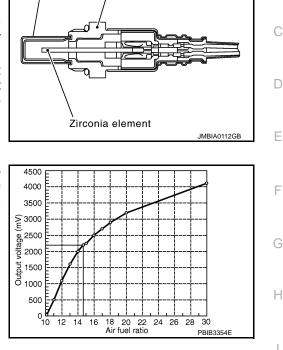
А

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[VQ37VHR]



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## P2A00, P2A03 A/F SENSOR 1

### < DTC/CIRCUIT DIAGNOSIS >

- 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 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-502, "Diagnosis Procedure".
- NO >> INSPECTION END

### **Diagnosis** Procedure

INFOID:000000006352650

### 1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

Check ground connection M95. Refer to Ground Inspection in <u>GI-46, "Circuit Inspection"</u>.

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 <u>EM-39, "Removal and Installa-</u>tion".

>> GO TO 3.

3.CHECK FOR EXHAUST GAS LEAK

- 1. Start engine and run it at idle.
- 2. 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.
- 2. 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.

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

 Clear the mixture ratio self-learning value. Refer to <u>EC-24, "MIXTURE RATIO SELF-LEARNING VALUE</u> <u>CLEAR : Special Repair Requirement"</u>.

2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to <u>EC-279</u>. "Diagnosis <u>Procedure"</u> or <u>EC-283</u>. "Diagnosis Procedure".

NO >> GO TO 6.

**6.**CHECK HARNESS CONNECTOR

- 1. Turn ignition switch OFF.
- 2. 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.

## P2A00, P2A03 A/F SENSOR 1

< DTC/CI	RCUIT	DIAGNOS	IS >	,		[VQ37VH	HR]
_	•	air or replace ENSOR 1 F					A
		switch ON. Itage betwe	en A/F se	nsor 1 ha	rness connector a	and ground.	EC
		A/F sensor	· 1				
DTC	Bank	Connector	Terminal	Ground	Voltage		С
P2A00	1	F3	4	Ground	Battery voltage		
P2A03	2	F20	4	Giouna	Ballery vollage		
YES > NO >	•> GO 1 •> GO 1			-			E
Check the • Harness • IPDM E/ • 15 A fus	followi conne /R harn e (No	ng. ctors E3, F1 ess connect	tor E7		1 and fuse		F
>	> Repa	air or replace	e harness	or connec	ctors.		
9.CHECH	K A/F S	ENSOR 1 II	NPUT SIG	NAL CIR	CUIT FOR OPEN	I AND SHORT	Н
2. Disco	nnect E	switch OFF	s connecto			or and ECM barpass 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	
P2A00	4	F3	1		57		
FZA00	I	ГJ	2	F102	61	Existed	
P2A03	2	<b>F</b> 20	1	F IUZ	65	Existed	
F2AU3	2	F20	2	2			

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	Connector	Terminal	Gibunu	Clound Continuity
P2A00	1	F3	1		
F 2AUU	I	15	2	Ground	Not existed
P2A03	2	F20	1	Ground	
FZA03	2	F20	2		
			·	• •	• •

DTC		ECM	Ground	Continuity	
DIC	Bank	Bank Connector		Cibulia	Continuity
P2400	2A00 1 2A03 2	F102	57		Not existed
1 2400			61	Ground	
<b>D</b> 2402			65	Gibunu	
PZA03			66		

5. Also check harness for short to power.

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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-190, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 13.

**11.**CHECK HEATED OXYGEN SENSOR 2

Refer to EC-261, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace malfunctioning heated oxygen sensor 2. Refer to EM-39, "Exploded View".

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. Refer to EM-39, "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).

Do you have CONSULT-III?

YES >> GO TO 14.

NO >> GO TO 15.

14.CONFIRM A/F ADJUSTMENT DATA

#### With CONSULT-III

- Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III.

3. Make sure that "0.000" is displayed on CONSULT-III screen.

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 EC-24, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR: Special Repair Requirement".

Do you have CONSULT-III?

- YES >> GO TO 16.
- NO >> INSPECTION END

**16.**CONFIRM A/F ADJUSTMENT DATA

#### With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Select "A/F ADJ-B1" and "A/F ADJ-B2" in "DATA MONITOR" mode with CONSULT-III.
- 3. Make sure that "0.000" is displayed on CONSULT-III screen.

>> INSPECTION END

## Revision: 2011 October

# ASCD BRAKE SWITCH

### Description

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types of input (ON/OFF signal). Refer to EC-77, "System Description" for the ASCD function.

## **Component Function Check**

< DTC/CIRCUIT DIAGNOSIS >

## 1.CHECK ASCD BRAKE SWITCH FUNCTION

### With CONSULT-III

- Turn ignition switch ON. 1.
- Select "BRAKE SW1" in "DATA MONITOR" mode with CONSULT-III. 2.
- 3. Check "BRAKE SW1" indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal (A/T or M/T models and synchrorev match mode) Brake pedal and clutch pedal (M/T models without synchror- ev match mode)	Slightly depressed	OFF
DRAKE SWI	Brake pedal (A/T or M/T models and synchrorev match mode) Brake pedal or clutch pedal (M/T models without synchrorev match mode)	Fully released	ON

### Without CONSULT-III

1. Turn ignition switch ON.

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

	ECM					
Connector	+	-	Condition		Voltage (V)	J
Connector	Terminal	Terminal				
M107	126	128	Brake pedal (A/T or M/T models and synchrorev match mode) Brake pedal and clutch pedal (M/T mod- els without synchrorev match mode)	Slightly depressed	Approx. 0	K
WT07	(ASCD brake switch signal)	120	Brake pedal (A/T or M/T models and synchrorev match mode) Brake pedal or clutch pedal (M/T models without synchrorev match mode)	Fully released	Battery voltage	L

### Is the inspection result normal?

	-
YES	>> INSPECTION END

NO >> Go to EC-505, "Diagnosis Procedure".

## Diagnosis Procedure

## **1.INSPECTION START**

Check which type of transmission the vehicle is equipped with.

### Which type of transmission?

A/T models or M/T models and synchrorev match mode>>GO TO 2.

M/T models without synchrorev match mode>>GO TO 7.

## 2.check ascd brake switch power supply circuit

- 1. Turn ignition switch OFF.
- Disconnect ASCD brake switch harness connector. 2.
- 3. Turn ignition switch ON.

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### < DTC/CIRCUIT DIAGNOSIS >

4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ke switch	Ground	Voltage
Connector	Terminal	Giouna	vollage
E109	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. 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.
- 2. Disconnect ECM harness connector.
- 3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ke switch	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E109	2	M107	126	Existed

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

Is the inspection result normal?

YES >> GO TO 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-508. "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace ASCD brake switch. Refer to <u>BR-20. "Exploded View"</u>.

**7.**CHECK ASCD BRAKE SWITCH CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect ASCD brake switch harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between ASCD brake switch harness connector and ground.

ASCD bra	ake switch	Ground	C	Condition	Voltage (V)
Connector	Terminal	Giouna		Jonation	voltage (v)
E109	1	Ground	Brake pedal	Slightly depressed	Approx. 0
L109	I	Giouna	blake pedal	Fully released	Battery voltage

Is the inspection result normal?



CTC/CIRC	UIT DIAGNO	OSIS >			[VQ37VHR]
	60 TO 12.				
	O TO 8.				
			POWER SUPPL		
	ion switch O		switch harness	connector	
	ion switch O		Switch hamess		,
. Check the	e voltage bet	ween clutc	h pedal position	switch harness connector and grour	nd.
		1		_	
	osition switch	Ground	Voltage		
Connector	Terminal			_	
E108	1	Ground	Battery voltage	_	
s the inspect		mal?			
	60 TO 10. 60 TO 9.				
<b>9.</b> DETECT N			RT		
Check the foll Fuse block		tor E103			
10 A fuse (N					
Harness for	open or sho	rt between	clutch pedal po	sition switch and fuse	
			-	harness or connectors.	
10.CHECK	ASCD BRAK	KE SWITCH	H INPUT SIGNA	AL CIRCUIT FOR OPEN AND SHOR	Т
	•		utch position sw	vitch harness connector and ASCD b	rake switch harness
Clutch pedal p	osition switch	ASCD	brake switch		
Connector	Terminal	Connecto	or Terminal	Continuity	
E108	2	E109	1	Existed	
3. Also cheo	k harness fo	or short to c	pround and shor		
s the inspect					
	G TO 11.				
	• •	-	•	hort to power in harness or connector	ſS.
11.снеск	CLUTCH PE	DAL POSI	TION SWITCH		
Refer to EC-5	08, "Compoi	nent Inspec	ction (Clutch Pe	dal Position Switch)".	
s the inspect					
YES >> C	GO TO 15.				
				efer to <u>CL-12, "Exploded View"</u> .	
12.снеск	ASCD BRAK	KE SWITCH	H INPUT SIGNA	AL CIRCUIT FOR OPEN AND SHOR	Т
	ion switch O				
2. Disconne	ct ECM harn	ess conne			
<ol><li>Check the</li></ol>	e continuity b	between AS	SCD brake swite	ch harness connector and ECM harne	ess connector.

3. Check the continuity between ASCD brake switch harness connector and ECM harness connector.

ASCD bra	ke switch	EC	CM	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E109	2	M107	126	Existed

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

#### Is the inspection result normal?

YES >> GO TO 14.

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 13.

## 13. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E106, M6

• Harness for open or short between ECM and ASCD brake switch

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

**14.**CHECK ASCD BRAKE SWITCH

Refer to EC-508. "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace ASCD brake switch. Refer to <u>BR-20, "Exploded View"</u>.

15. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

### >> INSPECTION END

## Component Inspection (ASCD Brake Switch)

INFOID:000000006352654

## 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	ondition	Continuity
1 and 2	Brake pedal	Fully released	Existed
r and z	Drake pedal	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 <u>BR-9, "Inspection and Adjustment"</u>.

2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	С	ondition	Continuity
1 and 2	Brake pedal	Fully released	Existed
	Diake pedai	Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace ASCD brake switch. Refer to <u>BR-20, "Exploded View"</u>.

Component Inspection (Clutch Pedal Position Switch)

INFOID:000000006352655

1. CHECK CLUTCH PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.

2. Disconnect clutch pedal position switch harness connector.

3. Check the continuity between clutch pedal position switch terminals under the following conditions.

### < DTC/CIRCUIT DIAGNOSIS >

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Terminals	Condition		Continuity				
1 and 2	Clutch pedal	Fully released	Existed				
T anu z		Fully depressed	Not existed				
Is the inspec	s the inspection result normal?						
YES >> INSPECTION END							

NO >> GO TO 2.

## 2. CHECK CLUTCH PEDAL POSITION SWITCH-II

2. Check the continuity between clutch pedal position switch terminals under the following conditions.

Terminals	С	Continuity	
1 and 2	Clutch podal	Fully released	Existed
	Clutch pedal	Fully depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch pedal position switch. Refer to <u>CL-12, "Exploded View"</u>.

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## ASCD INDICATOR

## < DTC/CIRCUIT DIAGNOSIS >

## ASCD INDICATOR

## Description

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.

CRUISE lamp illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.

SET lamp illuminates when the following conditions are met.

- CRUISE lamp is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of the ASCD setting.

SET lamp remains lit during ASCD control.

Refer to EC-77, "System Description" for the ASCD function.

## Component Function Check

INFOID:000000006352657

INFOID:00000006352658

### **1.**CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CON	SPECIFICATION	
CRUISE LAMP	• Ignition switch: ON • MAIN switch: Pressed at the 1st time $\rightarrow$ at the 2nd time		$ON\toOFF$
<ul> <li>MAIN switch: ON</li> <li>When vehicle speed is between 40 km/h (25 MPH) an 144 km/h (89 MPH)</li> </ul>		ASCD: Operating	ON
	ASCD: Not operating	OFF	

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to <u>EC-510</u>, "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 COMBINATION METER

Refer to MWI-34, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

**3.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

- YES >> Replace combination meter. Refer to <u>MWI-103, "Exploded View"</u>.
- NO >> Repair or replace.

INFOID:00000006352656

## **COOLING FAN**

## < DTC/CIRCUIT DIAGNOSIS >

## COOLING FAN

#### Description INFOID:00000006352659 COOLING FAN CONTROL MODULE Cooling fan control module receives ON/OFF pulse duty signal from IPDM E/R. Corresponding to this ON/OFF pulse duty signal, cooling fan control module sends cooling fan motor operating voltage to cooling fan motor. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage. COOLING FAN MOTOR Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage. Component Function Check INFOID:000000006352660 1.CHECK COOLING FAN FUNCTION (I) With CONSULT-III 1. Turn ignition switch ON. Perform "FAN DUTY CONTROL" in "ACTIVE TEST" mode with CONSULT-III. 2. 3. Make sure that cooling fan speed varies according to the percentage. **Without CONSULT-III** 1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-11, "Diagnosis Description". 2. Make sure that cooling fan operates. Is the inspection result normal? YES >> INSPECTION END NO >> Go to EC-511, "Diagnosis Procedure". Diagnosis Procedure INFOID:000000006352661 1.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT-I 1. Turn ignition switch OFF. 2. 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 control module Ground Voltage Connector Terminal 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 1. Turn ignition switch OFF. Check the continuity between cooling fan control module harness connector and ground. 2.

Cooling fan co	ontrol module	Ground	Continuity	
Connector	Terminal	Ground		
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.

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### < DTC/CIRCUIT DIAGNOSIS >

## **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	Connector Terminal		Continuity	
E5	12	Ground	Existed	
E6	41	Giouna	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 modul		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.

3. Turn ignition switch ON.

4. Check the voltage between cooling fan control module harness connector and ground.

Cooling fan d	control module	Ground	Voltage	
Connector	Terminal		voltage	
_	4	Ground	Battery voltage	
— 6		Ground	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-513, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace cooling fan motor. Refer to <u>CO-19, "Exploded View"</u>.

### 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.

4. Check the voltage between cooling fan relay harness connector and ground.

## EC-512

Cooling	fan relay			<u> </u>
Connector	Terminal	Ground	Voltage	
	1			
E17	3	Ground	Battery voltag	ge
Is the insp	ection res	ult norma	l?	
YES >	> GO TO 9 > GO TO 9	9.	_	
8.DETEC	T MALFU	NCTION	ING PART	
Check the	following.			
• 10A fuse			or <b>F</b> 7	
<ul><li>IPDM E/</li><li>50A fusik</li></ul>				
• Harness	for open o	or short b		ng fan relay and fuse
<ul> <li>Harness</li> </ul>	for open o	or short d	etween cooli	ng fan relay and battery
>	> Renair c	nen circi	uit short to a	round or short to power in harness or connectors.
~	•	•	-	DDULE POWER SUPPLY CIRCUIT-III
	gnition swi			
2. Discor	nect IPDI	M E/R ha	rness conne	
3. Check	the contir	nuity betw	veen cooling	fan relay harness connector and IPDM E/R harness connector.
Casling	for roles			
Connector	fan relay Terminal	Connecto	DM E/R	Continuity
E17	2	E6	74	Existed
		-		fan relay harness connector and cooling fan control module harness
conne		iaity bett	voon ooomig	
Cooling	fan relay	Cooling fa	an control modu	le — Continuity
Connector	Terminal	Connect		
E17	5	E37	3	Existed
			-	d and short to power.
Is the insp YES >	> GO TO		<u>u :</u>	
			uit, short to g	round or short to power in harness or connectors.
10.сне		ING FAN	RELAY	
Refer to E	C-514, "Co	omponen	t Inspection	(Cooling Fan Relay)".
Is the insp			-	
	> GO TO			
	> Replace	-	-	
			<b>FINCIDENT</b>	
Perform <u>G</u>				
Is the insp				
			R. Refer to <u>F</u> harness cor	<u>PCS-35, "Exploded View"</u> . nnectors.
				Fan Motor) INFOID:00000006352662
<b>1.</b> CHECK		G FAN M	IOTOR	
	gnition swi			
runnų	9.11011.301			

## **COOLING FAN**

### < DTC/CIRCUIT DIAGNOSIS >

- 2. Disconnect cooling fan control module harness connectors E301, E302.
- 3. Supply cooling fan control module terminals with battery voltage and check operation.

Cool	ling fan contro			
Motor	Connector	Terminal		Operation
WOU	Connector	(+)	(-)	
1	E301	4	5	Cooling fan operates.
2	E302	6	7	

#### Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace cooling fan motor. Refer to <u>CO-19. "Exploded View"</u>.

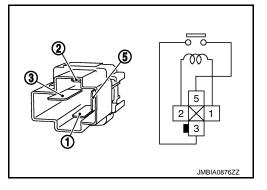
## Component Inspection (Cooling Fan Relay)

INFOID:000000006352663

## 1. CHECK COOLING FAN RELAY

- 1. Turn ignition switch OFF.
- 2. Remove cooling fan relay.
- 3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace cooling fan relay.

## **ELECTRICAL LOAD SIGNAL**

## < DTC/CIRCUIT DIAGNOSIS >

## ELECTRICAL LOAD SIGNAL

## Description

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

### Component Function Check

## 1. CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

- Turn ignition switch ON. 1.
- Connect CONSULT-III and select "DATA MONITOR" mode. 2.
- Select "LOAD SIGNAL" and check indication under the following conditions. 3.

Monitor item	Condition		Indication		
LOAD SIGNAL	Rear window defogger switch	ON	ON		
	Real window delogger switch	OFF	OFF		
Is the inspection result normal?					

YES	>> GO TO 2.
NO	>> Go to EC-515, "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.	J
NO	>> Go to <u>EC-515, "Diagnosis Procedure"</u> .	

## **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
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-515, "Diagnosis Procedure".

## Diagnosis Procedure

## **1.**INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-515, "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-88, "Work Flow".

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## ELECTRICAL LOAD SIGNAL

< DTC/CIRCUIT DIAGNOSIS >

 $>> {\sf INSPECTION} \; {\sf END} \\ {\bf 3.} {\sf CHECK} \; {\sf HEADLAMP} \; {\sf SYSTEM} \\$ 

Refer to EXL-77, "Work Flow".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to HAC-5, "Work Flow".

>> INSPECTION END

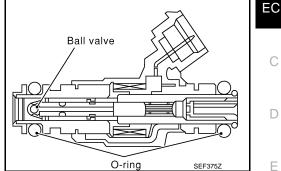
## **FUEL INJECTOR**

## < DTC/CIRCUIT DIAGNOSIS >

## FUEL INJECTOR

## Description

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



## **Component Function Check**

**1.**INSPECTION START

Turn ignition switch to START.

Are any cylinders ignited?

YES >> GO TO 2.

NO >> Go to EC-517, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

### With CONSULT-III

- 1. Start engine.
- 2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-III.
- 3. Make sure that each circuit produces a momentary engine speed drop.

### Without CONSULT-III

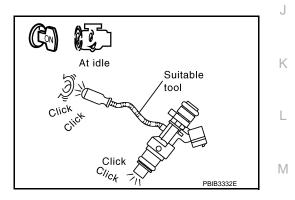
- 1. Start engine.
- 2. Listen to each fuel injector operating sound.

### Clicking sound should be heard.

### Is the inspection result normal?

YES	>> INSPECTION END
-----	-------------------

NO >> Go to EC-517, "Diagnosis Procedure".



## **Diagnosis Procedure**

INFOID:000000006352669

## 1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect fuel injector harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between fuel injector harness connector and ground.

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[VQ37VHR]

INFOID:00000006352668

## **FUEL INJECTOR**

### < DTC/CIRCUIT DIAGNOSIS >

Fuel injector			Ground	Voltage
Cylinder	Connector	Terminal	Giouna	voltage
1	F121	1		
2	F122	1		
3	F123	1	Ground	Potton voltogo
4	F124	1	Giouna	Battery voltage
5	F125	1	-	
6	F126	1	1	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E3, F1
- Harness connectors 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.

## $\mathbf{3}$ . 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	F121	2		89	
2	F122	2		85	
3	F123	2	F102	81	Existed
4	F124	2	F IUZ	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?

**4.**DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F106, F107
- Harness connectors F10, F120
- 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 <u>EC-519</u>, "Component Inspection". <u>Is the inspection result normal?</u>

## FUEL INJECTOR

FUEL INJECTOR		
< DTC/CIRCUIT DIAGNOSIS >	[VQ37VHR]	
YES >> GO TO 6.		
NO >> Replace malfunctioning fuel injector. Refer to <u>EM-43, "Exploded View"</u> .		А
6.CHECK INTERMITTENT INCIDENT		
Refer to GI-43, "Intermittent Incident".		EC
Is the inspection result normal?		20
<ul> <li>YES &gt;&gt; Replace IPDM E/R. Refer to <u>PCS-35, "Exploded View"</u>.</li> <li>NO &gt;&gt; Repair open circuit, short to ground or short to power in harness or connectors.</li> </ul>		С
Component Inspection	INFOID:000000006352670	
1.CHECK FUEL INJECTOR		D
<ol> <li>Turn ignition switch OFF.</li> <li>Disconnect fuel injector harness connector.</li> <li>Check resistance between fuel injector terminals as follows.</li> </ol>		E
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 <u>EM-43, "Exploded View"</u> .		G
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## < DTC/CIRCUIT DIAGNOSIS > FUEL PUMP

## Description

INFOID:000000006352671

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INFOID:00000006352673

[VQ37VHR]

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*	1	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**

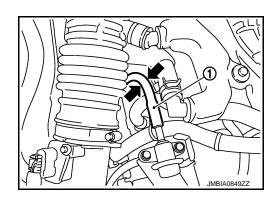
## **1.**CHECK FUEL PUMP FUNCTION

- 1. Turn ignition switch ON.
- 2. Pinch fuel feed hose (1) with two fingers.

## Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> <u>EC-520</u>, "Diagnosis Procedure".



## **Diagnosis** Procedure

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

## **FUEL PUMP**

### < DTC/CIRCUIT DIAGNOSIS >

-		-
Chack the voltage between	n IPDM E/R harness connector and ground.	
CHECK THE VUILAGE DELWEEN	I IF DIVI L/N HAIHESS CONNECTOR AND GIOUND.	
5	5	

IPDN	/I E/R	R Ground Voltage	
Connector	Terminal	Giouna	voltage
E7	77	Ground	Battery voltage

#### Is the inspection result normal?

YES	>> GO TO 3.
NO	>> GO TO 10.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E3, F1
- Harness connectors F104, F105
- Harness for open or short between IPDM E/R and ECM
  - >> Repair open circuit, short to ground or short to power in harness or connectors.

### 4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

- 1. Turn ignition switch OFF.
- 2. Reconnect all harness connectors disconnected.
- 3. Disconnect "fuel level sensor unit and fuel pump" harness connector.
- 4. Turn ignition switch ON.
- 5. Check the voltage between "fuel level sensor unit and fuel pump" harness connector and ground.

	ensor unit and pump	Ground	Voltage
Connector	Terminal		
B22	1	Ground	Battery voltage should exist for 1 second after ignition switch is turned ON.
Is the inspe	ection result	normal	2
-	> GO TO 8. > GO TO 5.		
5.снеск			

- 1. Turn ignition switch OFF.
- 2. Disconnect 15 A fuse (No. 41) from IPDM E/R.
- 3. Check 15 A fuse.

#### Is the inspection result normal?

YES >> GO TO 6.

### 6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

- 1. 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

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. EC

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## FUEL PUMP

### < DTC/CIRCUIT DIAGNOSIS >

## 7. DETECT MALFUNCTIONING PART

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"

>> 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. Disconnect dropping resistor harness connector.
- 3. Check the continuity between "fuel level sensor unit and fuel pump" harness connector and ground.

	Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal		
B22	3	Ground	Existed

4. 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-522, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace fuel pump. Refer to <u>FL-5. "Exploded View"</u>.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-35, "Exploded View".

NO >> Repair or replace harness or connectors.

## Component Inspection

INFOID:000000006352674

## 1.CHECK FUEL PUMP

- 1. 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>.

## < DTC/CIRCUIT DIAGNOSIS >

## **IGNITION SIGNAL**

### Description

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

Compone		tion Cheo	ck	INFOID:00000006352676	С
1.INSPEC	TION STAI	RT			
Turn ignitio	n switch Ol	FF, and rest	art engine.		D
Does the e			5		
YES-2 >> No >>	<ul> <li>Without C</li> <li>Go to EC-</li> </ul>	ISULT-III: G ONSULT-III 523, "Diagr	: GO TO 3. Iosis Proce	<u>dure"</u> .	E
Z.CHECK	IGNITION	SIGNAL FL	INCTION		F
With CO					
				E TEST" mode with CONSULT-III. nomentary engine speed drop.	
Is the inspe		•		nomentary engine speed drop.	G
-	INSPECT				
NO >>	Go to EC-	523, "Diagr	osis Proce	dure".	Н
3.CHECK	IGNITION	SIGNAL FL	INCTION		
	gine idle. he voltage :		een ECM h	arness connector terminals under the following conditions with an	I
					J
	E	СМ			
	+	-	_	Voltage signal	Κ
Connector	Terminal	Connector	Terminal		1 1
	11	_		50mSec/div	
	12	_			L
F101	15	M107	128		
	16	_			Μ
	19	-			IVI
	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-523, "Diagnosis Procedure".

### **Diagnosis Procedure**

1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn it ON.

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

А

EC

INFOID:000000006352675

[VQ37VHR]

INFOID:000000006352677

Ν

	ECM		
Connector	+	_	Voltage
Connector	Terminal	Terminal	
M107	125	128	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>EC-172, "Diagnosis Procedure"</u>.

2. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.
- 3. Turn ignition switch ON.
- 4. Check the voltage between condenser harness connector and ground.

Cond	lenser	Ground	Voltage
Connector	Terminal	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	enser	Continuity
Connector	Terminal	Connector	Terminal	Continuity
E7	53	F8	1	Existed

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

Is the inspection result normal?

YES >> Go to <u>EC-172, "Diagnosis Procedure"</u>. NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

Harness connectors E3, F1

Harness for open or short between IPDM E/R and condenser

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

## 5. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

- 1. Turn ignition switch OFF.
- 2. Check the continuity between condenser harness connector and ground.

Cond	enser	Ground	Continuity
Connector	Terminal	Cround	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.

	IRCUIT D	IAGNOSI	S >		[VQ37VHR]
CHEC	CK CONDE	NSER			
Refer to	EC-527, "(	Componen	t Inspectio	n (Condenser)"	
<u>s the ins</u>	pection re	sult norma	<u> ?</u>		
	>> GO TO		or		
-	>> Replac			IPPLY CIRCUIT-IV	
	onnect all r			lisconnected. Inector.	
3. Turn	ignition sv	vitch ON.			
4. Cheo	ck the volta	age betwee	en ignition	coil harness connecto	r and ground.
	Ignition co	oil			
Cylinder	Connector	1	- Ground	Voltage	
1	F11	3			
2	F12	3			
3	F13	3		Detterress	
4	F14	3	- Ground	Battery voltage	
5	F15	3			
6	F16	3			
<u>s the ins</u>	pection re	sult norma	?		
YES	>> GO TO	9.			
NO	>> GO TO	8.			
NO <b>B.</b> DETE	CT MALF	8. JNCTIONI	NG PART		
NO B.DETE Check th	CT MALFU	9 8. JNCTIONI J.	NG PART		
NO B.DETE Check th Harnes	CT MALFU	9 8. JNCTIONI J. pr F1		ition coil and harness	connector F1
NO B.DETE Check th Harnes	CT MALFU	9 8. JNCTIONI J. pr F1		ition coil and harness	connector F1
NO B.DETE Check th Harnes Harnes	CT MALFU e following ss connecto ss for open >> Repair	9 8. JNCTIONI J. or F1 or short b or replace	etween ig harness o	r connectors.	
NO B.DETE Check th Harnes Harnes	CT MALFU e following ss connecto ss for open >> Repair	9 8. JNCTIONI J. or F1 or short b or replace	etween ig harness o		
NO B.DETE Check th Harnes Harnes B.CHEC	CT MALFU e following ss connecto ss for open >> Repair CK IGNITIC ignition sv	9 8. JNCTIONI J. or F1 or short b or replace DN COIL G vitch OFF.	etween ig harness o ROUND (	r connectors. CIRCUIT FOR OPEN A	AND SHORT
NO B.DETE Check th Harnes Harnes B.CHEC	CT MALFU e following ss connecto ss for open >> Repair CK IGNITIC ignition sv	9 8. JNCTIONI J. or F1 or short b or replace DN COIL G vitch OFF.	etween ig harness o ROUND (	r connectors.	AND SHORT
NO B.DETE Check th Harnes Harnes B.CHEC	CT MALFU e following ss connecto ss for open >> Repair CK IGNITIC ignition sv ck the cont	9 8. JNCTIONI J. or F1 or short b or replace DN COIL G vitch OFF. inuity betw	etween ig harness o ROUND (	r connectors. CIRCUIT FOR OPEN A	AND SHORT
NO B.DETE Check th Harnes Harnes CHEC . Turn 2. Chec	CT MALFU e following s connecto s for open >> Repair CK IGNITIC ignition sv ck the cont	9 8. JNCTIONI J. or F1 or short b or replace DN COIL G vitch OFF. inuity betw	etween ig harness o ROUND (	r connectors. CIRCUIT FOR OPEN A	AND SHORT
NO B.DETE Check th Harnes Harnes B.CHEC	CT MALFU e following ss connecto ss for open >> Repair CK IGNITIC ignition sv ck the cont	9 8. JNCTION or F1 or short b or replace ON COIL G vitch OFF. inuity betw	etween ig harness o ROUND ( veen ignitio	r connectors. CIRCUIT FOR OPEN A on coil harness connec	AND SHORT
NO B.DETE Check th Harnes Harnes D.CHEC 1. Turn 2. Check Cylinder	CT MALFU e following ss connectors for open >> Repair CK IGNITIC ignition sv ck the cont Ignition coil Connector	9 8. JNCTIONI J. or F1 or short b or replace ON COIL G vitch OFF. inuity betw	etween ig harness o ROUND ( veen ignitio	r connectors. CIRCUIT FOR OPEN A on coil harness connec	AND SHORT
NO B.DETE Check th Harnes Harnes B.CHEC 1. Turn 2. Chec Cylinder 1	CT MALFU e following ss connectors for open >> Repair CK IGNITIC ignition sw ck the cont Ignition coil Connector F11	9 8. JNCTION J. or F1 or short b or replace ON COIL G vitch OFF. inuity betw Terminal 2	etween ig harness o ROUND ( veen ignitio Ground	or connectors. CIRCUIT FOR OPEN A on coil harness connec Continuity	AND SHORT
NO B.DETE Check th Harnes Harnes B.CHEC 1. Turn 2. Check Cylinder 1 2	CT MALFU e following ss connectors for open >> Repair CK IGNITIC ignition sw ck the cont Ignition coil Connector F11 F12	9 8. JNCTIONI J. or F1 or short b or replace ON COIL G vitch OFF. inuity betw Terminal 2 2	etween ig harness o ROUND ( veen ignitio	r connectors. CIRCUIT FOR OPEN A on coil harness connec	AND SHORT
NO B.DETE Check the Harnes Harnes D.CHEC 1. Turn 2. Check Cylinder 1 2 3	CT MALFU e following ss connectors for open >> Repair CK IGNITIC ignition sv ck the cont Ignition coil Connector F11 F12 F13	9 8. JNCTIONI J. or F1 or short b or replace DN COIL G vitch OFF. inuity betw Terminal 2 2 2	etween ig harness o ROUND ( veen ignitio Ground	or connectors. CIRCUIT FOR OPEN A on coil harness connec Continuity	AND SHORT
NO B.DETE Check th Harnes Harnes D.CHEC I. Turn 2. Check Cylinder 1 2 3 4	CT MALFU e following ss connectors for open >> Repair CK IGNITIC ignition sw ck the cont Ignition coil Connector F11 F12 F13 F14	9 8. JNCTIONI J. or F1 or short b or replace DN COIL G vitch OFF. inuity betw Terminal 2 2 2 2 2	etween ig harness o ROUND ( veen ignitio Ground	or connectors. CIRCUIT FOR OPEN A on coil harness connec Continuity	AND SHORT
NO B.DETE Check th Harnes Harnes D.CHEC 1. Turn 2. Chec Cylinder 1 2 3 4 5 6	CT MALFU e following ss connectors for open >> Repair CK IGNITIC ignition sw ck the cont Ignition coil Connector F11 F12 F13 F14 F15	9 8. JNCTIONI J. Dr F1 or short b or replace DN COIL G vitch OFF. inuity betw Terminal 2 2 2 2 2 2 2 2 2	etween ign harness o ROUND ( veen ignitio Ground	r connectors. CIRCUIT FOR OPEN A on coil harness connec Continuity	AND SHORT
NO B.DETE Check th Harnes Harnes D.CHEC 1. Turn 2. Chec Cylinder 1 2 3 4 5 6 3. Also	CT MALFU e following ss connectors for open >> Repair CK IGNITIC ignition sw ck the cont Ignition coil Connector F11 F12 F13 F14 F15 F16	9 8. JNCTIONI J. Dr F1 or short b or replace DN COIL G vitch OFF. inuity betw Terminal 2 2 2 2 2 2 2 2 2 2	etween ign harness of ROUND ( veen ignition Ground Ground	r connectors. CIRCUIT FOR OPEN A on coil harness connec Continuity	AND SHORT
NO B.DETE Check th Harnes Harnes D.CHEC 1. Turn 2. Chec Cylinder 1 2 3 4 5 6 3. Also s the ins YES	CT MALFU e following ss connectors for open >> Repair CK IGNITIC ignition sw ck the cont Ignition coil Connector F11 F12 F13 F14 F15 F16 check har spection res >> GO TO	9 8. JNCTIONI J. or F1 or short b or replace DN COIL G vitch OFF. inuity betw Terminal 2 2 2 2 2 2 2 2 2 1 2 1 2 1 2 1 2 1 2	etween ign harness of ROUND ( veen ignition Ground Ground	er connectors. CIRCUIT FOR OPEN A on coil harness connec Continuity Existed	AND SHORT ctor and ground.
NO B.DETE Check th Harnes Harnes D.CHEC 1. Turn 2. Chec Cylinder 1 2 3 4 5 6 3. Also s the ins YES NO	CT MALFU e following ss connectors for open >> Repair CK IGNITIC ignition sw ck the cont Ignition coil Connector F11 F12 F13 F14 F15 F16 check har spection res >> GO TO >> Repair	9 8. JNCTIONI J. Dr F1 or short b or replace DN COIL G vitch OFF. inuity betw Terminal 2 2 2 2 2 2 2 2 2 2 10. 0 pen circu	etween ig harness of ROUND ( veen ignition Ground Ground	r connectors. CIRCUIT FOR OPEN A on coil harness connec Continuity Existed	AND SHORT ctor and ground.

## **EC-525**

### < DTC/CIRCUIT DIAGNOSIS >

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	Continuity
1	F11	1		20	
2	F12	1		16	
3	F13	1	F101	12	Existed
4	F14	1	FIUI	11	EXISTED
5	F15	1		15	
6	F16	1		19	

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

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

• Harness connectors F104, F105

• Harness for open or short between ignition coil and ECM

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

## 12. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-526, "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-52, "Exploded View".

13. CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

>> INSPECTION END

## Component Inspection (Ignition Coil with Power Transistor)

INFOID:000000006352678

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.

2. Disconnect ignition coil harness connector.

3. Check resistance between ignition coil terminals as per the following.

Terminals	Resistance (Ω) [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-52, "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.

1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.

### < DTC/CIRCUIT DIAGNOSIS >

Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.
 NOTE:

Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.

- 4. Start engine.
- 5. After engine stalls, crank it two or three times to release all fuel pressure.
- 6. Turn ignition switch OFF.
- 7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
- 8. Remove ignition coil and spark plug of the cylinder to be checked.
- 9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
- 10. Connect spark plug and harness connector to ignition coil.
- 11. Fix ignition coil using a rope etc. with gap of 13 17 mm (0.52 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
- 12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

#### Spark should be generated.

#### **CAUTION:**

- During the operation, always stay 50 cm (19.7 in) or more away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.
- It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.
   NOTE:

When the gap is less than 13 mm (0.52 in), spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

- YES >> INSPECTION END
- NO >> Replace malfunctioning ignition coil with power transistor. Refer to <u>EM-52, "Exploded View"</u>.

### Component Inspection (Condenser)

## 1.CHECK CONDENSER

- 1. Turn ignition switch OFF.
- 2. Disconnect condenser harness connector.

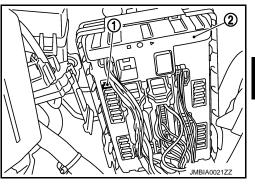
3. Check resistance between condenser terminals as per the following.

Terminals	Resistance (MΩ)		
1 and 2	Above 1 [at 25°C (77°F)]		

### Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace condenser.



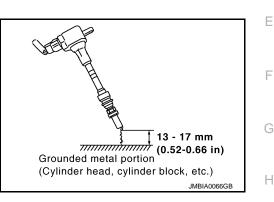
[VQ37VHR]

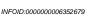
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### < DTC/CIRCUIT DIAGNOSIS >

## MALFUNCTION INDICATOR LAMP

## Description

The Malfunction Indicator Lamp (MIL) is located on the combination meter.

The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MIL should turn off. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.

For details, refer to <u>EC-150, "DIAGNOSIS DESCRIPTION : Malfunc-</u> tion Indicator Lamp (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-528, "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 COMBINATION METER

Refer to MWI-34, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

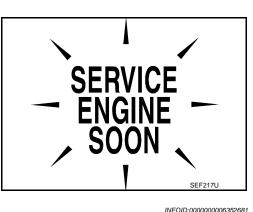
**3.**CHECK INTERMITTENT INCIDENT

Refer to GI-43, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to <u>MWI-103, "Exploded View"</u>.

NO >> Repair or replace.



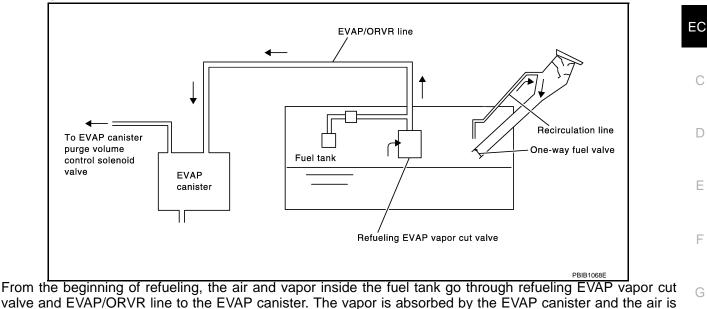
INFOID:000000006352680

INFOID:000000006352682

### < DTC/CIRCUIT DIAGNOSIS >

## ON BOARD REFUELING VAPOR RECOVERY (ORVR)

## Description



released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and Н refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

### WARNING:

<ul> <li>When conducting inspections below, be sure to observe the following:</li> <li>Put a "CAUTION: FLAMMABLE" sign in workshop.</li> <li>Never smoke while servicing fuel system. Keep open flames and sparks away from workshop.</li> </ul>	k area.
<ul> <li>Always furnish the workshop with a CO<sub>2</sub> fire extinguisher.</li> <li>CAUTION:</li> </ul>	J
<ul> <li>Before removing fuel line parts, carry out the following procedures:</li> <li>Put drained fuel in an explosion-proof container and put lid on securely.</li> <li>Release fuel pressure from fuel line. Refer to <u>EC-636, "Inspection"</u>.</li> <li>Disconnect battery ground cable.</li> <li>Always replace O-ring when the fuel gauge retainer is removed.</li> </ul>	K
<ul> <li>Never kink or twist hose and tube when they are installed.</li> <li>Never tighten hose and clamps excessively to avoid damaging hoses.</li> <li>After installation, run engine and check for fuel leaks at connections.</li> <li>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.</li> </ul>	L
Component Function Check	INFOID:000000006352684
1. CHECK ORVR FUNCTION	Ν
<ul><li>Check whether the following symptoms are present.</li><li>Fuel odor from EVAP canister is strong.</li><li>Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.</li></ul>	0
Are any symptoms present?         YES       >> Go to EC-529, "Diagnosis Procedure".         NO       >> INSPECTION END	Ρ
Diagnosis Procedure	INFOID:000000006352685
1.INSPECTION START	
Check whether the following symptoms are present.	

A: Fuel odor from EVAP canister is strong.

INFOID:000000006352683

А

F

< DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

A >> GO TO 2. B >> GO TO 7.

2. CHECK EVAP CANISTER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
- 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

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

NO >> GO TO 4.

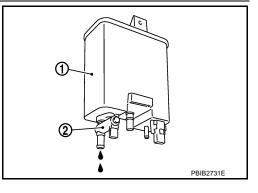
3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

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. Refer to FL-13. "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 EM-34, "Exploded View".

**6.**CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-532. "Component Inspection".

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to <u>FL-10, "Exploded View"</u>.

**7.**CHECK EVAP CANISTER

- 1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to <u>FL-13. "Exploded View"</u>.
- 2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 2.2 kg (4.9 lb).

Is the inspection result normal?

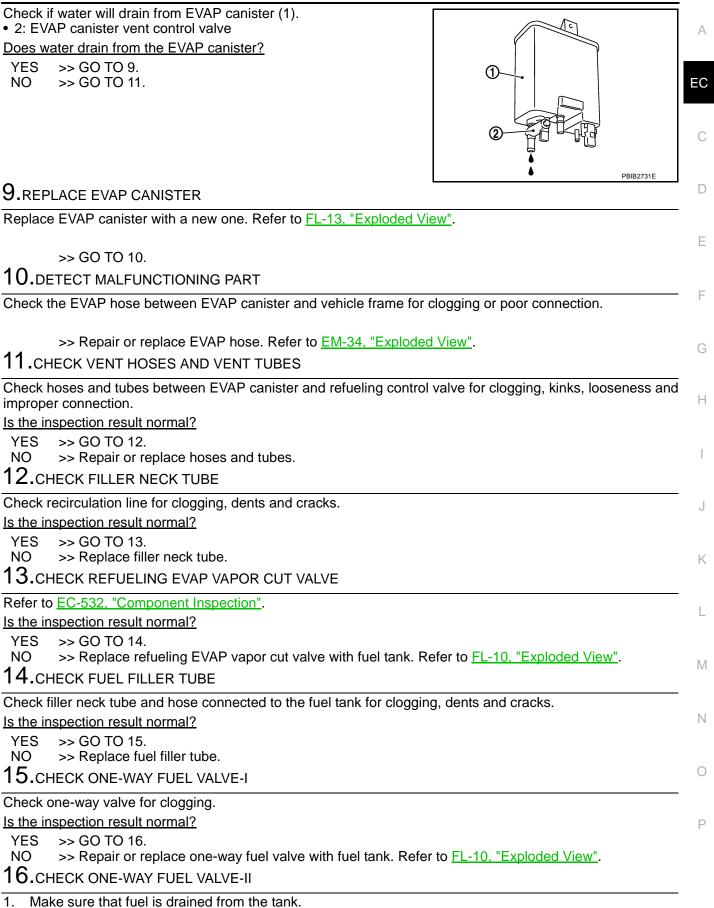
YES >> GO TO 8.

NO >> GO TO 9.

 $\mathbf{8}$ .CHECK IF EVAP CANISTER IS SATURATED WITH WATER



### [VQ37VHR]



Remove fuel filler tube and hose.

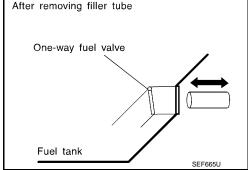
### < DTC/CIRCUIT DIAGNOSIS >

[VQ37VHR]

 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-10</u>, "Exploded View".



Component Inspection

INFOID:000000006352686

**1.**INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

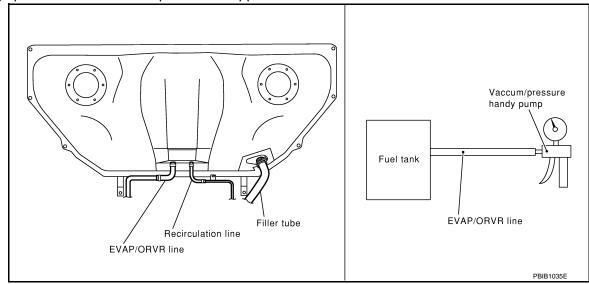
YES >> GO TO 2. NO >> GO TO 3.

NO >> GO IO 3.

**2.**CHECK REFUELING EVAP VAPOR CUT VALVE

### BWith CONSULT-III

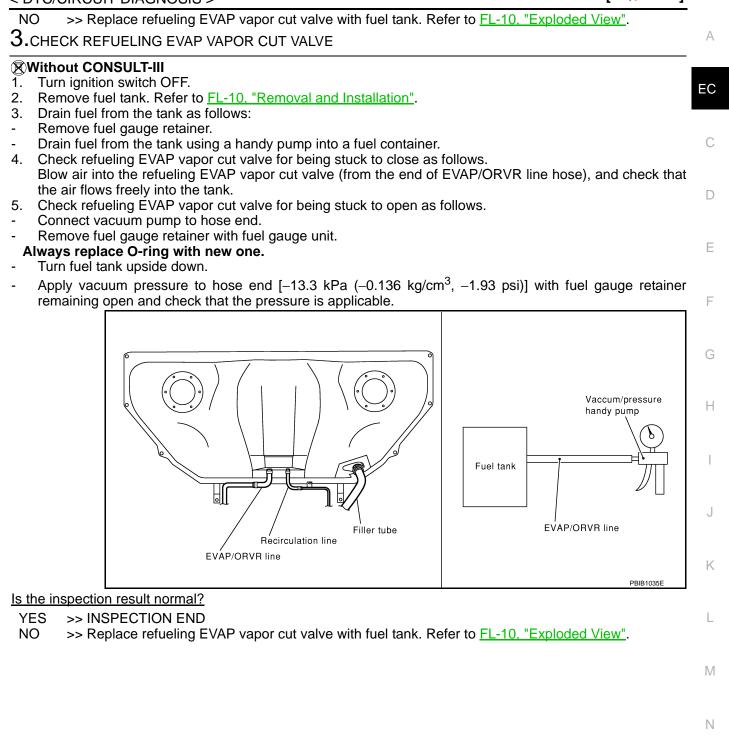
- 1. Turn ignition switch OFF.
- 2. Remove fuel tank. Refer to FL-10, "Removal and Installation".
- 3. Drain fuel from the tank as follows:
- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT-III.
- Check refueling EVAP vapor cut valve for being stuck to close as follows. Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
- 5. Check refueling 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/cm<sup>3</sup>, -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]



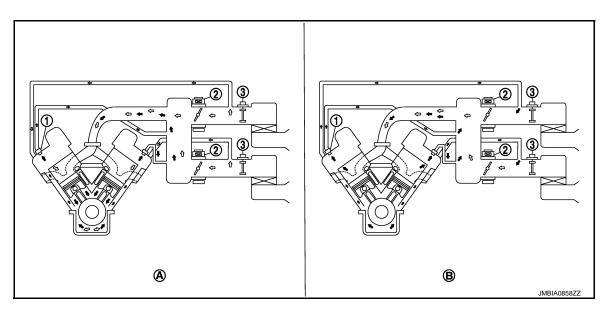
### < DTC/CIRCUIT DIAGNOSIS >

## POSITIVE CRANKCASE VENTILATION

## Description

INFOID:000000006352687

[VQ37VHR]



1. PCV valve

- 2. Electric throttle control actuator
- Mass air flow sensor

3

A. Normal condition

B. Hi-load condition

- └☐ : Fresh air
- 🖛 : Blow-by air

This system returns blow-by gas to the intake manifold.

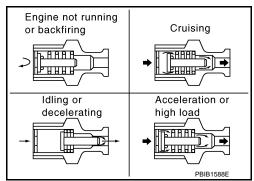
The positive crankcase ventilation (PCV) value is provided to conduct crankcase blow-by gas to the intake manifold.

During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.

Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.

Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



**Component Inspection** 

**1.**CHECK PCV VALVE

INFOID:00000006352688

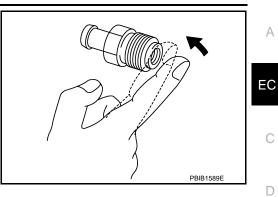
## **POSITIVE CRANKCASE VENTILATION**

### < DTC/CIRCUIT DIAGNOSIS >

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

- >> INSPECTION END YES
- NO >> Replace PCV valve. Refer to EM-52, "Exploded View".



[VQ37VHR]

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### < DTC/CIRCUIT DIAGNOSIS >

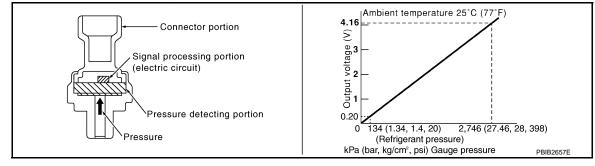
## REFRIGERANT PRESSURE SENSOR

## Description

INFOID:000000006352689

IVQ37VHR

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



## **Component Function Check**

INFOID:000000006352690

## 1.CHECK REFRIGERANT PRESSURE SENSOR FUNCTION

- 1. Start engine and warm it up to normal operating temperature.
- 2. Turn A/C switch and blower fan switch ON.
- 3. Check the voltage between ECM harness connector terminals as per the following.

	ECM		
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-536, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:000000006352691

## 1.CHECK GROUND CONNECTION

- 1. Turn A/C switch and blower fan switch OFF.
- 2. Turn ignition switch OFF.
- 3. Check ground connection M95. Refer to Ground Inspection in GI-46, "Circuit Inspection".

#### Is the inspection result normal?

NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

- 1. Disconnect refrigerant pressure sensor harness connector.
- 2. Turn ignition switch ON.
- 3. Check the voltage between refrigerant pressure sensor harness connector and ground.

Refrigerant pr	essure sensor	Ground	Voltage (V)
Connector	Terminal	Ciouna	voltage (v)
E172	3	Ground	Approx. 5
		10	

Is the inspection result normal?

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

## **REFRIGERANT PRESSURE SENSOR**

CTC/CIRC	UIT DIAGN	IOSIS >			[VQ37VHR]
<b>3.</b> DETECT	MALFUNCT	IONING P	ART		
Check the fo					
Harness co Harness co					
			en ECM ar	nd refrigera	nt pressure sensor
				5	
>> F	Repair open	circuit, sho	ort to grou	und or short	to power in harness or connectors.
<b>1.</b> CHECK R	EFRIGERA	NT PRESS	SURE SE	NSOR GRO	OUND CIRCUIT FOR OPEN AND SHORT
	tion switch (				
2. Disconne	ect ECM hai	rness conn			
	ne continuity	between i	refrigeran	t pressure	sensor harness connector and ECM harness connec-
tor.					
Refrigerant pre	essure sensor	EC	CM		
Connector	Terminal	Connector	Terminal	Continuity	
E172	1	M107	112	Existed	
1. Also che	ck harness	for short to		nd short to	power.
s the inspec			J		
YES >> (	GO TO 6.				
_	GO TO 5.				
D.DETECT					
	MALFUNCI	IONING P	ART		
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Refer to <u>GI-43, "Intermittent Incident"</u>. Is the inspection result normal?

## **REFRIGERANT PRESSURE SENSOR**

### < DTC/CIRCUIT DIAGNOSIS >

- YES >> Replace refrigerant pressure sensor. Refer to <u>HA-47</u>, "<u>REFRIGERANT PRESSURE SENSOR</u> : <u>Removal and Installation</u>".
- NO >> Repair or replace.

## SHIFT POSITION INDICATOR

The shift lever position is indicated by shift position indicator on combination meter. ECM receives gear posi-

tion signal from gear lever position sensor and transmits the signal to combination meter via CAN communica-

>> INSPECTION END YES >> Go to EC-539, "Diagnosis Procedure". NO

< DTC/CIRCUIT DIAGNOSIS >

**Component Function Check** 

Turn ignition switch ON.

Is the inspection result normal?

1. CHECK SHIFT POSITION INDICATOR

2. Check that shift position indicator turns ON.

Description

tion.

1.

SHIFT POSITION INDICATOR

### **Diagnosis** Procedure

1. СНЕСК 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 "COMBINATION METER"

Refer to MWI-34, "CONSULT-III 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-103,

>> Repair or replace. NO

"Exploded View".

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### < DTC/CIRCUIT DIAGNOSIS >

## S-MODE SWITCH

## Description

When S-MODE switch is pressed (less than 1 second), S-MODE indicator illuminates, combination meter sends S-MODE switch signal to ECM via the CAN communication, and then SynchroRev Match mode (S-MODE) is activated. When S-MODE is pressed and held (1 second or more), S-MODE indicator turns OFF and S-MODE is cancelled, and then returns to normal M/T.

## Component Function Check

1.CHECK S-MODE SWITCH FUNCTION-I

### NOTE:

### If DTC UXXXX are displayed, first perform the trouble diagnosis for DTC UXXXX.

- 1. Turn ignition switch ON.
- 2. Select "M/T SYNCHRO SW" in "DATA MONITOR" mode with CONSULT-III.
- 3. Check "M/T SYNCHRO SW" indication under the following conditions.

Monitor item	Condition		Indication
M/T SYNCHRO SW	S-MODE switch	Pressed	ON
W/T STNCI ICO SW	S-MODE SWICH	Released	OFF

Is the inspection result normal?

YES >> GO TO 2.

NO >> Go to <u>EC-540, "Diagnosis Procedure"</u>.

2. CHECK S-MODE SWITCH FUNCTION-II

Check the S-MODE indicator under the following condition.

	Condition	S-MODE indicator
S-MODE switch	Press (less than 1 second)	Illuminated
	Press (1 second or more)	Not illuminated

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-540, "Diagnosis Procedure".

## **Diagnosis Procedure**

**1.**CHECK DTC WITH "COMBINATION METER"

Refer to MWI-34, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble diagnosis relevant to DTC indicated.

## 2. CHECK S-MODE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect S-MODE switch harness connector.

3. Turn ignition switch ON.

4. Check the voltage between S-MODE switch harness connector and ground.

S-MODE switch		Ground	Voltage
Connector	Terminal	Cround	vollage
M255	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.



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INFOID:000000006352696

INFOID:000000006352697

#### **S-MODE SWITCH**

NO       >> 60 T0 3.         3.DETECT MALFUNCTIONING PART         Check the following.         • Hamess connectors M98, M252         • Fuse block (J/B) connector M1         10 A fuse (No. 3)         • Harness for open or short between S-MODE switch and fuse         >> Repair open circuit, short to ground or short to power in harness or connectors.         4.CHECK S-MODE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT         1. Turn ignition switch OFF.         2. Disconnect combination meter harness connector.         3. Check the continuity between S-MODE switch harness connector and combination meter harness conector. <u>Connector</u> <u>the connector Terminal Connector Terminal Continuity</u> <u>M255</u> 1         M30       12 <u>Existed</u> 4. Also check harness for short to ground and short to power.         Is the inspection result normal?         YES       > 60 T0 5.         5.DETECT MALFUNCTIONING PART         Check the following.         • Harness for open or ishort between S-MODE switch and combination meter         >> Repair open circuit, short to ground or short to power in harness or connectors.         6.CHECK S-MODE SWITCH         Refer to EC-541. "Component Inspection".         Is the inspection result normal?         <	< DTC/CIR	CUIT DIAGNO	SIS >			[VQ37VHR]
Check the following. Harness connectors M98, M252 Fises block (JB) connector M1 10 A fuse (No. 3) Harness for open or short between S-MODE switch and fuse >> Repair open circuit, short to ground or short to power in harness or connectors. 4. CHECK S-MODE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT 1. Turn ignition switch OFF. 2. Disconnect combination meter harness connector. 3. Check the continuity between S-MODE switch harness connector and combination meter harness connector. 3. Check the continuity between S-MODE switch harness connector and combination meter harness connector. 3. Check the continuity between S-MODE switch harness connector and combination meter harness connector. 3. Check the continuity between S-MODE switch harness connector and combination meter harness connector. 3. MODE switch Combination meter Continuity M255 1 M53 12 Existed 4. Also check harness for short to ground and short to power. 3. the inspection result normal? YES >> GO TO 6. NO >> GO TO 5. DETECT MALFUNCTIONING PART Check the following. Harness for open or short between S-MODE switch and combination meter >> Repair open circuit, short to ground or short to power in harness or connectors. 3. CHECK S-MODE SWITCH Refer to <u>C-541</u> , "Component Inspection". a the inspection result normal? YES >> GO TO 7. NO >> Replace S-MODE switch. Refer to <u>IP-25</u> , "Exploded View". 4. CHECK INTERMITTENT INCIDENT Refer to <u>GI-43</u> , "Intermittent Incident". >> INSPECTION END Component Inspection 4. CHECK S-MODE Switch harness connector. 3. Check the continuity between S-mode switch erminals under the following conditions.						
Harness connectors M98, M252 Fuse block (J/B) connector M1 10 A fuse (No. 3) Harness for open or short between S-MODE switch and fuse >> Repair open circuit, short to ground or short to power in harness or connectors	<b>3.</b> DETEC1	MALFUNCTIO	DNING PAF	RT		
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Connector         Terminal         Continuity           M255         1         M53         12         Existed           Also check harness for short to ground and short to power.         Stele inspection result normal?         Existed           YES         > GO TO 6.         NO         > GO TO 5.           DETECT MALFUNCTIONING PART         Existed         Stele following.           Harness connectors M98, M252         Harness for open or short between S-MODE switch and combination meter           >> Repair open circuit, short to ground or short to power in harness or connectors.           CHECK S-MODE SWITCH           Refer to EC-541, "Component Inspection".           at he inspection result normal?           YES         > GO TO 7.           NO         > Replace S-MODE switch. Refer to IP-25, "Exploded View".           CHECK INTERMITTENT INCIDENT           Refer to GL-43, "Intermittent Incident".           >> INSPECTION END           Component Inspection          CHECK S-MODE SWITCH          CHECK S-MODE Switch harness connector.	. Turn ig 2. Discon 3. Check	nition switch Ol nect combinatio	F. on meter ha	arness connecto	r.	
Connector       Terminal       Connector       Terminal         M255       1       M53       12       Existed         Also check harness for short to ground and short to power.       Ithe inspection result normal?         YES       > GO TO 6.         NO       >> GO TO 5.         DETECT MALFUNCTIONING PART         heck the following.         Harness connectors M98, M252         Harness for open or short between S-MODE switch and combination meter         >> Repair open circuit, short to ground or short to power in harness or connectors.         CHECK S-MODE SWITCH         efer to EC-541. "Component Inspection".         the inspection result normal?         YES       >> GO TO 7.         NO       >> Replace S-MODE switch. Refer to IP-25, "Exploded View".         .CHECK INTERMITTENT INCIDENT         efer to GL43. "Intermittent Incident".         >> INSPECTION END         Component Inspection         CHECK S-MODE SWITCH         Turn ignition switch OFF.         Disconnect S-MODE switch harness connector.         Check the continuity between S-MODE switch terminals under the following conditions.	S-MC	DE switch	Comb	bination meter	Continuity	
Also check harness for short to ground and short to power. the inspection result normal? YES >> GO TO 6. NO >> GO TO 5. .DETECT MALFUNCTIONING PART heck the following. Harness connectors M98, M252 Harness for open or short between S-MODE switch and combination meter >> Repair open circuit, short to ground or short to power in harness or connectors. .CHECK S-MODE SWITCH efer to EC-541, "Component Inspection". the inspection result normal? YES >> GO TO 7. NO >> Replace S-MODE switch. Refer to <u>IP-25, "Exploded View"</u> . .CHECK INTERMITTENT INCIDENT efer to <u>GI-43.</u> "Intermittent Incident". >> INSPECTION END omponent Inspection .CHECK S-MODE SWITCH Turn ignition switch OFF. Disconnect S-MODE switch harness connector. Check the continuity between S-MODE switch terminals under the following conditions.	Connector	Terminal	Connecto	r Terminal	Continuity	_
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CHECK S-MODE SWITCH  efer to EC-541, "Component Inspection". the inspection result normal?  YES >> GO TO 7. NO >> Replace S-MODE switch. Refer to IP-25, "Exploded View". CHECK INTERMITTENT INCIDENT  efer to GI-43, "Intermittent Incident". >> INSPECTION END omponent Inspection .CHECK S-MODE SWITCH  Turn ignition switch OFF. Disconnect S-MODE switch harness connector. Check the continuity between S-MODE switch terminals under the following conditions.	Harness o Harness f	connectors M98 or open or sho	rt between			
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YES >> GO TO 7. NO >> Replace S-MODE switch. Refer to IP-25. "Exploded View". .CHECK INTERMITTENT INCIDENT Refer to GI-43. "Intermittent Incident". >> INSPECTION END Component Inspection .CHECK S-MODE SWITCH . Turn ignition switch OFF. . Disconnect S-MODE switch harness connector. . Check the continuity between S-MODE switch terminals under the following conditions.	efer to <u>EC</u>	-541, "Compor	nent Inspec	tion".		
NO       >> Replace S-MODE switch. Refer to IP-25, "Exploded View".         .CHECK INTERMITTENT INCIDENT         .efer to GI-43. "Intermittent Incident".         .> INSPECTION END         Component Inspection         .CHECK S-MODE SWITCH         . Turn ignition switch OFF.         . Disconnect S-MODE switch harness connector.         . Check the continuity between S-MODE switch terminals under the following conditions.	•		mal?			
<ul> <li>Sefer to <u>GI-43. "Intermittent Incident"</u>.</li> <li>&gt; INSPECTION END</li> <li>Component Inspection</li> <li>CHECK S-MODE SWITCH</li> <li>Turn ignition switch OFF.</li> <li>Disconnect S-MODE switch harness connector.</li> <li>Check the continuity between S-MODE switch terminals under the following conditions.</li> </ul>			DE switch	. Refer to <u>IP-25,</u>	"Exploded Vie	<u>ew"</u> .
<ul> <li>&gt;&gt; INSPECTION END</li> <li>component Inspection</li> <li>CHECK S-MODE SWITCH</li> <li>Turn ignition switch OFF.</li> <li>Disconnect S-MODE switch harness connector.</li> <li>Check the continuity between S-MODE switch terminals under the following conditions.</li> </ul>	CHECK	INTERMITTEN		IT		
omponent Inspection       INFOID:000000005         .CHECK S-MODE SWITCH       Turn ignition switch OFF.         Disconnect S-MODE switch harness connector.       Check the continuity between S-MODE switch terminals under the following conditions.	efer to <u>GI</u>	43, "Intermitter	nt Incident".			
omponent Inspection       INFOID:00000006         .CHECK S-MODE SWITCH       Infointion switch OFF.         Disconnect S-MODE switch harness connector.       Check the continuity between S-MODE switch terminals under the following conditions.						
<ul> <li>Turn ignition switch OFF.</li> <li>Disconnect S-MODE switch harness connector.</li> <li>Check the continuity between S-MODE switch terminals under the following conditions.</li> </ul>						INFOID:00000006352698
<ul> <li>Disconnect S-MODE switch harness connector.</li> <li>Check the continuity between S-MODE switch terminals under the following conditions.</li> </ul>	.CHECK	S-MODE SWIT	СН			
Terminals Condition Continuity	. Discon	nect S-MODE s	switch harn		rminals under	the following conditions.
	Terminals	Conditi	on	Continuity		
1 and 2 S-MODE switch Existed	1 and 2	S-MODE switch	Pressed	Existed		

Is the inspection result normal?

Released

Not Existed

YES >> INSPECTION END

### S-MODE SWITCH

#### < DTC/CIRCUIT DIAGNOSIS >

NO >> Replace S-MODE switch. Refer to <u>IP-25, "Exploded View"</u>.

### ECU DIAGNOSIS INFORMATION ECM

#### **Reference Value**

#### \_

INFOID:000000006352699 EC

[VQ37VHR]

А

#### С

- VALUES ON THE DIAGNOSIS TOOL
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector. \* Specification data may not be directly related to their components signals/values/operations.

i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIM-ING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

#### CONSULT-III MONITOR ITEM

Monitor Item	C	Values/Status	
ENG SPEED	Run engine and compare CONSUL	Almost the same speed as the tachometer indication	
MAS A/F SE-B1	See EC-164, "Description".		
MAS A/F SE-B2	See EC-164, "Description".		
B/FUEL SCHDL	See EC-164, "Description".		
A/F ALPHA-B1	See EC-164, "Description".		
A/F ALPHA-B2	See EC-164, "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
HO2S2 (B1)	<ul> <li>Revving engine from idle up to 3,00 are met.</li> <li>Engine: After warming up</li> <li>After keeping engine speed betwee idle for 1 minute under no load</li> </ul>	0 - 0.3 V ←→ Approx. 0.6 · 1.0 V	
HO2S2 (B2)	<ul> <li>Revving engine from idle up to 3,00 are met.</li> <li>Engine: After warming up</li> <li>After keeping engine speed betwee idle for 1 minute under no load</li> </ul>	0 - 0.3 V ←→ Approx. 0.6 - 1.0 V	
HO2S2 MNTR (B1)	<ul> <li>Revving engine from idle up to 3,00 are met.</li> <li>Engine: After warming up</li> <li>After keeping engine speed betwee idle for 1 minute under no load</li> </ul>	$LEAN \longleftrightarrow RICH$	
HO2S2 MNTR (B2)	<ul> <li>Revving engine from idle up to 3,00 are met.</li> <li>Engine: After warming up</li> <li>After keeping engine speed betwee idle for 1 minute under no load</li> </ul>	$LEAN \longleftrightarrow RICH$	
VHCL SPEED SE	Turn drive wheels and compare CO cation.	Almost the same speed as speedometer indication	
BATTERY VOLT	Ignition switch: ON (Engine stopped	d)	11 - 14 V
	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.00 V
ACCEL SEN 1	(Engine stopped)	Accelerator pedal: Fully depressed	4.4 - 4.8 V
	Ignition switch: ON	Accelerator pedal: Fully released	0.45 - 1.00 V
ACCEL SEN 2* <sup>1</sup>	(Engine stopped)	Accelerator pedal: Fully depressed	4.3 - 4.8 V

#### < ECU DIAGNOSIS INFORMATION >

Monitor Item	Co	ondition	Values/Status
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 1-B1	<ul><li>(Engine stopped)</li><li>Selector lever: D (A/T) or 1st (M/T)</li></ul>	Accelerator pedal: Fully depressed	Less than 4.75 V
1	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V
TP SEN 2-B1 <sup>*1</sup>	<ul><li>(Engine stopped)</li><li>Selector lever: D (A/T) or 1st (M/T)</li></ul>	Accelerator pedal: Fully depressed	Less than 4.75 V
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank tempera- ture
EVAP SYS PRES	Ignition switch: ON		Approx. 1.8 - 4.8 V
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
START SIGNAL	• Ignition switch: $ON \rightarrow START \rightarrow OI$	N	$OFF\toON\toOFF$
	Ignition switch: ON	Accelerator pedal: Fully released	ON
CLSD THL POS	(Engine stopped)	Accelerator pedal: Slightly depressed	OFF
		Air conditioner switch: OFF	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: ON (Compressor operates.)	ON
PW/ST SIGNAL	• Engine: After warming up, idle the	Steering wheel: Not being turned	OFF
PW/ST SIGNAL	engine	Steering wheel: Being turned	ON
		Rear window defogger switch: ON	
LOAD SIGNAL	Ignition switch: ON	and/or Lighting switch: 2nd position	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: $ON \rightarrow OFF \rightarrow ON$		$ON\toOFF\toON$
	Engine: After warming up, idle the	Heater fan switch: ON	ON
HEATER FAN SW	engine	Heater fan switch: OFF	OFF
		Brake pedal: Fully released	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Slightly depressed	ON
	<ul> <li>Engine: After warming up</li> <li>Selector lever: P or N (A/T), Neu-</li> </ul>	Idle	2.0 - 3.0 msec
INJ PULSE-B1	<ul><li>tral (M/T)</li><li>Air conditioner switch: OFF</li><li>No load</li></ul>	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	2.0 - 3.0 msec
INJ PULSE-B2	<ul> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	1.9 - 2.9 msec
	Engine: After warming up	Idle	7° BTDC
IGN TIMING	<ul> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	25° - 45° BTDC
	Engine: After warming up	Idle	5 - 35%
CAL/LD VALUE	<ul> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,500 rpm	5 - 35%
	Engine: After warming up	Idle	2.0 - 6.0 g/s
MASS AIRFLOW	<ul> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,500 rpm	7.0 - 20.0 g/s

#### < ECU DIAGNOSIS INFORMATION >

Monitor Item	Co	ondition	Values/Status
PURG VOL C/V	<ul> <li>Engine: After warming up</li> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> </ul>	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
	<ul><li> Air conditioner switch: OFF</li><li> No load</li></ul>	2,000 rpm	_
	Engine: After warming up	Idle	0 - 2%
NT/V SOL (B1)	<ul> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	Approx. 0 - 50%
	<ul> <li>Engine: After warming up</li> <li>Selector lever: P or N (A/T), Neu-</li> </ul>	Idle	0 - 2%
NT/V SOL (B2)	<ul> <li>tral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	Approx. 0 - 50%
	Engine: After warming up, idle the	Air conditioner switch: OFF	OFF
AIR COND RLY	engine	Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	<ul><li>For 1 second after turning ignition s</li><li>Engine running or cranking</li></ul>	witch: ON	ON
	Except above		OFF
VENT CONT/V	Ignition switch: ON		OFF
THRTL RELAY	Ignition switch: ON		ON
A/F S1 HTR (B2)	Engine: After warming up, idle the e (More than 140 seconds after starting)	4 - 100%	
HO2S2 HTR (B1)	<ul> <li>Engine speed: Below 3,600 rpm aft</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between idle for 1 minute under no load</li> </ul>	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	
HO2S2 HTR (B2)	<ul> <li>Engine speed: Below 3,600 rpm aft</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between idle for 1 minute under no load</li> </ul>	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
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 CO cation.	NSULT-III value with the speedometer indi-	Almost the same speed as the speedometer indication
		Idle air volume learning has not been per- formed yet.	YET
IDL A/V LEARN	Engine: Running	Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illumi- nated.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	Engine: After warming up	More than 70°C (158°F)	
A/F S1 HTR (B1)	Engine: After warming up, idle the e (More than 140 seconds after starting)	4 - 100%	
VHCL SPEED SE	Turn drive wheels and compare CO cation.	Almost the same speed as the speedometer indication	
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
		MAIN switch: Pressed	ON
MAIN SW	Ignition switch: ON	MAIN switch: Released	OFF

#### < ECU DIAGNOSIS INFORMATION >

Monitor Item	Co	ondition	Values/Status	
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON	
CANCEL SW		CANCEL switch: Released	OFF	
RESUME/ACC SW	Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON	
RESUME/ACC SW		RESUME/ACCELERATE switch: Re- leased	OFF	
SET SW	Ignition switch: ON	SET/COAST switch: Pressed	ON	
5ET 5W	Ignition switch: ON	SET/COAST switch: Released	OFF	
BRAKE SW1	a Ignition quitable ON	Brake pedal: Fully released	ON	
(ASCD brake switch)	Ignition switch: ON	Brake pedal: Slightly depressed	OFF	
BRAKE SW2	a Ignition quitable ON	Brake pedal: Fully released	OFF	
(Stop lamp switch)	Ignition switch: ON	Brake pedal: Slightly depressed	ON	
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	$ON \rightarrow OFF$	
	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	
FAN DUTY	Engine: Running		0 - 100%	
AC EVA TEMP	<ul><li>Engine: Idle</li><li>Both A/C switch and blower fan swi</li></ul>	Changes according to in- structed value from combi- nation meter		
AC EVA TARGET	<ul><li>Engine: Idle</li><li>Both A/C switch and blower fan swi</li></ul>	tch: ON (Compressor operates)	Changes according to in- structed value from combi- nation meter	
A/F ADJ-B1	Engine: Running		-0.330 - 0.330	
A/F ADJ-B2	Engine: Running		-0.330 - 0.330	
	Ignition switch: ON	Accelerator pedal: Fully released	More than 0.36 V	
TP SEN 1-B2	<ul><li>(Engine stopped)</li><li>Selector lever: D (A/T) or 1st (M/T)</li></ul>	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* <sup>1</sup>	(Engine stopped) • Selector lever: D (A/T) or 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75 V	
		Selector lever: P or N (A/T), Neutral (M/T)	ON	
P/N POSI SW	Ignition switch: ON	Selector lever: Except above	OFF	
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temper ature	
AC PRESS SEN	<ul> <li>Engine: Idle</li> <li>Both A/C switch and blower fan switch: ON (Compressor operates)</li> </ul>		1.0 - 4.0 V	
A/F SEN1 (B2)	Engine: After warming up	Fluctuates around 2.2 V		
ATOM PRES SEN	Engine: After warming up Maintaining engine speed at 2,000 rpm Fluctuates around 2.2 V     This item is displayed but is not applicable to this model.			
BRAKE BST PRES SE	This item is displayed but is not app	licable to this model.		

#### < ECU DIAGNOSIS INFORMATION >

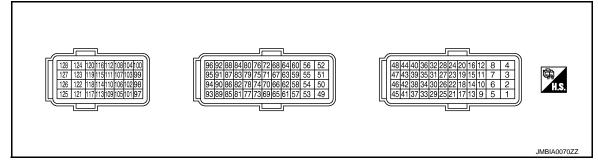
Monitor Item	Co	ondition	Values/Status
INT/V TIM (B1)	<ul> <li>Engine: After warming up</li> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> </ul>	Idle	-5 - 5°CA
	<ul> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	2,000 rpm	Approx. 0 - 30°CA
INT/V TIM (B2)	<ul> <li>Engine: After warming up</li> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> </ul>	Idle 2,000 rpm	-5 - 5°CA Approx. 0 - 30°CA
	No load		
MAP SENSOR	This item is displayed but is not app	Dilcable to this model.	
EVAP LEAK DIAG	Ignition switch: ON		Depending on condition of EVAP leak diagnosis
EVAP DIAG READY	Ignition switch: ON (READY)		Depending on ready condi- tion of EVAP leak diagnosis
VVEL LEARN	• Ignition switch: OFF $\rightarrow$ ON	VVEL learning has not been performed yet.	YET
	(After warming up)	VVEL learning has already been per- formed successfully.	DONE
VVEL SEN LEARN- B1	VVEL learning has already been pe	erformed successfully	Approx. 0.30 - 0.80 V
VVEL SEN LEARN- B2	VVEL learning has already been pe	erformed successfully	Approx. 0.30 - 0.80 V
	Engine: After warming up	Idle	Approx. 0.25 - 1.40 V
VVEL POSITION SEN-B1	<ul> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	When revving engine up to 2,000 rpm quickly	Approx. 0.25 - 4.75 V
	Engine: After warming up	Idle	Approx. 0.25 - 1.40 V
VVEL POSITION SEN-B2	<ul> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	When revving engine up to 2,000 rpm quickly	Approx. 0.25 - 4.75 V
	Engine: After warming up	Idle	Approx. 0 - 20 deg
VVEL TIM-B1	<ul> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	When revving engine up to 2,000 rpm quickly	Approx. 0 - 90 deg
	Engine: After warming up	Idle	Approx. 0 - 20 deg
VVEL TIM-B2	<ul> <li>Selector lever: P or N (A/T), Neutral (M/T)</li> <li>Air conditioner switch: OFF</li> <li>No load</li> </ul>	When revving engine up to 2,000 rpm quickly	Approx. 0 - 90 deg
ALT DUTY	Engine: Idle		0 - 80%
	Power generation voltage variable	control: Operating	ON
ALT DUTY SIG	Power generation voltage variable	OFF	
GEAR POSITION	Ignition switch: ON	Shift position: N $\rightarrow$ 1st $\rightarrow$ 2nd $\rightarrow$ 3rd $\rightarrow$ 4th $\rightarrow$ 5th $\rightarrow$ 6th $\rightarrow$ R	$N \rightarrow 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow R$
	• Ignition quitch: ON	S-MODE switch: Pressed (less than 1 second)	ACTIVE
M/T SYN REV STAT	Ignition switch: ON	S-MODE switch: Pressed (1 second or more)	INACT
	· Ignition quitable ON	S-MODE switch: Pressed	ON
M/T SYNCHRO SW	Ignition switch: ON	S-MODE switch: Released	OFF

#### < ECU DIAGNOSIS INFORMATION >

Monitor Item	C	ondition	Values/Status		
CPP SW	Ignition switch: ON	Clutch pedal: Fully released	ON		
CFF 3W	• Ignition switch. ON	Clutch pedal: Fully depressed	OFF		
CLUTCH INTLCK	Ignition switch: ON	Clutch pedal: Fully released	OFF		
SW	· Ignition switch. ON	Clutch pedal: Fully depressed	ON		
M/T N POS LEARN	Ignition switch: ON	M/T neutral position learning is success- fully complete.	DONE		
M/T N FOS ELANN		M/T neutral position learning is not complete yet.	YET		
THRTL STK CNT B1	This item is displayed but is not applied but is not applied.	plicable to this model.			
	DTC P0139 self-diagnosis (delayed	INCMP			
HO2 S2 DIAG1 (B1)	<ul> <li>DTC P0139 self-diagnosis (delayed successfully.</li> </ul>	CMPLT			
	DTC P0159 self-diagnosis (delayed)	INCMP			
HO2 S2 DIAG2 (B1)	DTC P0159 self-diagnosis (delayed successfully.	CMPLT			
	DTC P0139 self-diagnosis (slow re	INCMP			
HO2 S2 DIAG1 (B2)	DTC P0139 self-diagnosis (slow re- cessfully.	CMPLT			
	DTC P0159 self-diagnosis (slow re	INCMP			
HO2 S2 DIAG2 (B2)	DTC P0159 self-diagnosis (slow re- cessfully.	CMPLT			
A/F SEN1 DIAG2 (B1)	This item is displayed but is not 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.

#### 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-III.

#### < ECU DIAGNOSIS INFORMATION >

#### [VQ37VHR]

	inal No. e color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	EC
1 (O)	128 (B)	A/F sensor 1 heater (bank 1)	Output	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed (More than 140 seconds after starting engine)</li> </ul>	2.9 - 8.8 V★ 50mSec/div 50mSec/div 50mSec/div 50mSec/div 50mSec/div 50mSec/div	C
2	128	Throttle control motor	Output	[Ignition switch: ON] • Engine stopped	0 - 14 V★ 500µSec/div	E
(G)	(B)	(Open) (bank 1)		<ul> <li>Selector lever: D (A/T) or 1st (M/T)</li> <li>Accelerator pedal: Fully depressed</li> </ul>	5V/div JMBIA0031GB	F
				[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully released	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div JMBIA0032GB	H
3 (R)	128 (B)	Throttle control motor re- lay power supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	J
4 (BR)	128 (B)	Throttle control motor (Close) (bank 1)	Output	<ul> <li>[Ignition switch: ON]</li> <li>Engine stopped</li> <li>Selector lever: D (A/T) or 1st (M/T)</li> <li>Accelerator pedal: In the middle of releasing operation</li> </ul>	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div JMBIA0033GB	K
5 (W)	128 (B)	A/F sensor 1 heater (bank 2)	Output	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed (More than 140 seconds after starting engine)</li> </ul>	2.9 - 8.8 V★ 50mSec/div 50mSec/div 50mSec/div 50mSec/div 50mSec/div	M
8 (B)	_	ECM ground	_	_	_	0

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### < ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Арргох.)
11 (GR)		Ignition signal No. 4		[Engine is running]	0 - 0.2 V★ 50mSec/div
12 (L)		Ignition signal No. 3		<ul> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on</li> </ul>	£
15 (V)	128	Ignition signal No. 5	Output	rpm at idle	2V/div JMBIA0035GB
16 (G)	(B)	Ignition signal No. 2			0.1 - 0.4 V★ 50mSec/div
19 (SB)		Ignition signal No. 6		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	
20 (Y)		Ignition signal No. 1			2V/div JMBIA0036GB
17 (P)	128 (B)	,,,	Output	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	10 V★ 50mSec/div € 50mSec/div 50mSec/div 50mSec/div JMBIA0037GB
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
	18 128 (W) (B)			<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	BATTERY VOLTAGE (11 - 14 V)
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000rpm</li></ul>	7 - 12 V★ 

# < ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
21	128	EVAP canister purge vol-		<ul><li>[Engine is running]</li><li>Idle speed</li><li>Accelerator pedal: Not depressed even slightly, after engine starting</li></ul>	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € 10V/div JMBIA0039GB	EC C D
(GR)	(B)	ume control solenoid valve	Output	<ul> <li>[Engine is running]</li> <li>Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)</li> </ul>	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div € 10V/div JMBIA0040GB	E F
22 (R)	128 (B)	Fuel pump relay	Output	<ul> <li>[Ignition switch: ON]</li> <li>For 1 second after turning ignition switch ON</li> <li>[Engine is running]</li> <li>[Ignition switch: ON]</li> <li>More than 1 second after turning ignition switch ON</li> </ul>	0 - 1.5 V BATTERY VOLTAGE (11 - 14 V)	Н
24 (P)	128 (B)	ECM relay (Self shut-off)	Output	<ul> <li>[Engine is running]</li> <li>[Ignition switch: OFF]</li> <li>A few seconds after turning ignition switch OFF</li> <li>[Ignition switch: OFF]</li> </ul>	0 - 1.5 V BATTERY VOLTAGE	J
25 (O)	128 (B)	Throttle control motor re- lay	Output	<ul> <li>More than a few seconds after turning ignition switch OFF</li> <li>[Ignition switch: ON → OFF]</li> </ul>	(11 - 14 V) 0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V	L
26 (W)	128 (B)	Gear lever position sen- sor X-axis	Input	[Ignition switch: ON] [Ignition switch: ON] • Engine stopped • Shift lever: N→1st→2nd→3rd→4th→5th→6th→R	0 - 1.0 V N: 1.45 - 2.35 V 1st: 0.90 - 1.40 V 2nd: 0.90 - 1.35 V 3rd: 1.70 - 2.15 V 4th: 1.65 - 2.10 V 5th: 2.70 - 3.15 V 6th: 2.65 - 3.10 V R: 3.50 - 4.05 V	N
27 (G)	128 (B)	Gear lever position sen- sor Y-axis	Input	[Ignition switch: ON] • Engine stopped • Shift lever: N→1st→2nd→3rd→4th→5th→6th→R	N: 2.15 - 3.00 V 1st: 1.10 - 1.60 V 2nd: 3.40 - 3.90 V 3rd: 1.10 - 1.65 V 4th: 3.40 - 3.90 V 5th: 1.10 - 1.60 V 6th: 3.40 - 3.90 V R: 3.40 - 3.90 V	Ρ

#### < ECU DIAGNOSIS INFORMATION >

	nal No. color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
28 (BR)	128 (B)	VVEL actuator motor re- lay abort signal (VVEL control module)	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0 V
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	BATTERY VOLTAGE (11 - 14 V)
29 (G)	128 (B)	Intake valve timing control solenoid valve (bank 2)	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 12 V★
30	40	Throttle position sensor 1	loput	[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)	Input	[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 (bank 2)	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)			[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	<ul> <li>[Engine is running]</li> <li>Engine speed: Below 3,600 rpm after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	10 V★ 50mSec/div = 50mSec/div 50mSec/div 50mSec/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 (bank 1)	Input	[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)			[Ignition switch: ON] • Engine stopped • Selector lever: D (A/T) or 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V

# < ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value	A
+		Signal name	Input/ Output	Condition	(Approx.)	
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	EC
(W)	(B)	(bank 2)	input	<ul> <li>[Ignition switch: ON]</li> <li>Engine stopped</li> <li>Selector lever: D (A/T) or 1st (M/T)</li> <li>Accelerator pedal: Fully depressed</li> </ul>	More than 0.36 V	D
36 (O)	_	Sensor ground [Brake booster pressure sensor]	_	_	_	E
37	128	Crankshaft position sen-	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	4.0 - 5.0 V★ 1mSec/div € 2V/div JMBIA0041GB	F
(W)	(B)	sor (POS)		[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0 V★ 1mSec/div € 2V/div JMBIA0042GB	H
38 (O)	96 (P)	Manifold absolute pres- sure (MAP) sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.2 V	K
(0)	(1)			<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	1.5 V	
39	36	Brake booster pressure	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li><li>Brake pedal: Fully released</li></ul>	1.2 V	L
(P)	(O)	sensor	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li><li>Brake pedal: Fully depressed</li></ul>	3.0 V	Ν
40 (R)	_	Sensor ground [Throttle position sensor (bank 1)]	_	_	_	0
41	128	Clutch pedal position	Input	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Clutch pedal: Fully released</li></ul>	0 V	Р
(SB)	(B)	switch		[Ignition switch: ON] • Engine stopped • Clutch pedal: Fully depressed	BATTERY VOLTAGE (11 - 14 V)	

#### < ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
42 (GR)	128 (B)	Clutch interlock switch	Input	[Ignition switch: ON] • Engine stopped • Clutch pedal: Fully released [Ignition switch: ON]	0 V
· · ·				Engine stopped     Clutch pedal: Fully depressed	BATTERY VOLTAGE (11 - 14 V)
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 sen- sor (POS)]		_	_
48 (B)		Sensor ground [Throttle position sensor (bank 2)]		_	_
49 (GR)	128 (B)	Throttle control motor (Close) (bank 2)	Output	<ul> <li>[Ignition switch: ON]</li> <li>Engine stopped</li> <li>Selector lever: D (A/T) or 1st (M/T)</li> <li>Accelerator pedal: In the middle of releasing operation</li> </ul>	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0033GB
50	128	Throttle control motor	Output	<ul> <li>[Ignition switch: ON]</li> <li>Engine stopped</li> <li>Selector lever: D (A/T) or 1st (M/T)</li> <li>Accelerator pedal: Fully depressed</li> </ul>	0 - 14 V★ 500µSec/div 500µSec/div 500µSec/div 500µSec/div 500µSec/div JMBIA0031GB
(V)	(B)	(Open) (bank 2)	Sapar	<ul> <li>[Ignition switch: ON]</li> <li>Engine stopped</li> <li>Selector lever: D (A/T) or 1st (M/T)</li> <li>Accelerator pedal: Fully released</li> </ul>	0 - 14 V★ 500µSec/div 500µSec/div
52 (R)	128 (B)	Throttle control motor re- lay power supply (bank 2)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
53	128	Ignition switch	Input	[Ignition switch: OFF]	
(W)	(B)		input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

#### < ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
54 (Y)	_	Engine communication line (VVEL control module)	Input/ output	_	_	EC
55 (LG)	_	Engine communication line (VVEL control module)	Input/ output	_	_	С
57 (L)	128 (B)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2 V	D
59	128	Camshaft position sensor	laput	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	3.0 - 5.0 V★ 20mSec/div 5 2V/div JMBIA0045GB	E
(O)	(B)	(PHASE) (bank 1)	Input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div ÷ 2V/div JMBIA0046GB	G H
60 (G)	128 (B)	Sensor power supply [Camshaft position sen- sor (PHASE) (bank 1), Manifold absolute pres- sure (MAP) sensor, Pow- er steering pressure sensor]	_	[Ignition switch: ON]	5 V	J
61 (R)	128 (B)	A/F sensor 1 (bank 1)	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	1.8 V Output voltage varies with air fuel ratio.	L
63	128	Camshaft position sensor		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	3.0 - 5.0 V★ 20mSec/div 	M
(L)	(B)	(PHASE) (bank 2)	Input	[Engine is running] • Engine speed: 2,000 rpm	3.0 - 5.0 V★ 20mSec/div € 2V/div JMBIA0046GB	O
64 (SB)	128 (B)	Sensor power supply [Camshaft position sen- sor (PHASE) (bank 2), Battery current sensor]	_	[Ignition switch: ON]	5 V	

#### < ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
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	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	1.8 V Output voltage varies with air fuel ratio.
67 (P)	128 (B)	Intake air temperature sensor (bank 1)	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 (bank 1)]	_	_	_
69 (W)	128 (B)	Knock sensor (bank 2)	Input	[Engine is running] • Idle speed	2.5 V* <sup>1</sup>
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* <sup>1</sup>
74 (L)	128 (B)	Sensor power supply (Gear lever position sen- sor)	_	[Ignition switch: ON]	5 V
75	128	Input speed sensor	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	0.25 V★ 5mSec/div € 2V/div JMBIA2100GB
(W)	(B)	Input speed sensor	input	[Engine is running] • Engine speed: 2,000 rpm	0.25 V★ 5mSec/div contact of the second sec
76 (W)	128 (B)	Heated oxygen sensor 2 (bank 1)	Input	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V

# < ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value	А
+		Signal name	Input/ Output	Condition	(Approx.)	
				[Ignition switch: ON] • Engine stopped	0.4 V	EC
77 (SB)	68 (LG)	Mass air flow sensor (bank 1)	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0.7 - 1.2 V	С
				<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>	1.3 - 1.7 V	D
78 (G)	84 (B)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.	E
79	94	Mass air flow sensor	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0.7 - 1.2 V	F
(BR)	(Y)	(bank 2)	input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,500 rpm</li></ul>	1.3 - 1.7 V	G
80 (O)	128 (B)	Heated oxygen sensor 2 (bank 2)	Input	<ul> <li>[Engine is running]</li> <li>Revving engine from idle to 3,000 rpm quickly after the following conditions are met</li> <li>Engine: after warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load</li> </ul>	0 - 1.0 V	Η
81 (R) 82 (V) 85 (BR)		Fuel injector No. 3 Fuel injector No. 6 Fuel injector No. 2		<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>NOTE:</li> <li>The pulse cycle changes depending on rpm at idle</li> </ul>	BATTERY VOLTAGE (11 - 14 V)★ 50mSec/div	J
86 (W)	128 (B)	Fuel injector No. 5	Output		10V/div JMBIA0047GB BATTERY VOLTAGE (11 - 14 V)★	L
89 (GR)		Fuel injector No. 1		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Engine speed: 2,000 rpm</li></ul>	50mSec/div	Μ
90 (O)		Fuel injector No. 4			10V/div JMBIA0048GB	Ν
83* <sup>2</sup> (LG)	_	_				0
84 (B)		Sensor ground (Heated oxygen sensor 2, Engine coolant tempera- ture sensor, Engine oil temperature sensor, Input speed sensor)	_	_	_	Ρ

### < ECU DIAGNOSIS INFORMATION >

	inal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
87	96	Power steering pressure	Output	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5 V
(Y)	(P)	sensor	Output	[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8 V
88 (R)	_	Sensor ground (Gear lever position sen- sor)	_	_	_
91 (SB)	95 (G)	Battery current sensor	Input	<ul> <li>[Engine is running]</li> <li>Battery: Fully charged*<sup>3</sup></li> <li>Idle speed</li> </ul>	2.6 - 3.5 V
92 (G)	_	Sensor ground [Camshaft position sen- sor (PHASE) (bank 2)]	_	_	_
93 (P)	128 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
94 (Y)	_	Sensor ground [Mass air flow sensor (bank 2)]	_	_	_
95 (G)	_	Sensor ground [Battery current sensor]	_	_	_
96 (P)	_	Sensor ground [Camshaft position sen- sor (PHASE) (bank 1), Manifold absolute pres- sure (MAP) sensor, Pow- er steering pressure sensor]	_	_	_
97	100	Accelerator pedal position	Input	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Accelerator pedal: Fully released</li></ul>	0.45 - 1.00 V
(R)	(VV)	sensor 1	input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.2 - 4.8 V
98	104	Accelerator pedal position	Input	<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Accelerator pedal: Fully released</li></ul>	0.22 - 0.50 V
(P)	(GR)	sensor 2		<ul><li>[Ignition switch: ON]</li><li>Engine stopped</li><li>Accelerator pedal: Fully depressed</li></ul>	2.1 - 2.5 V
99 (L)	100 (W)	Sensor power supply (Accelerator pedal posi- tion sensor 1)	_	[Ignition switch: ON]	5 V
100 (W)	_	Sensor ground (Accelerator pedal posi- tion sensor 1)		_	_

#### < ECU DIAGNOSIS INFORMATION >

	nal No. e color)	Description		Oraclitica	Value	A
+		Signal name	Input/ Output	Condition	(Approx.)	
				[Ignition switch: ON] • ASCD steering switch: OFF	4 V	EC
				[Ignition switch: ON] • MAIN switch: Pressed	0 V	С
101 (SB)	108 (Y)	ASCD steering switch (models with ASCD sys- tem)	Input	[Ignition switch: ON] • CANCEL switch: Pressed	1 V	_
				<ul><li>[Ignition switch: ON]</li><li>RESUME/ACCELERATE switch: Pressed</li></ul>	3 V	D
				[Ignition switch: ON] <ul> <li>SET/COAST switch: Pressed</li> </ul>	2 V	Е
102 (GR)	112 (SB)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	1.8 - 4.8 V	F
103 (G)	104 (GR)	Sensor power supply (Accelerator pedal posi- tion sensor 2)	_	[Ignition switch: ON]	5 V	G
104 (GR)	_	Sensor ground (Accelerator pedal posi- tion sensor 2)	_	_	_	
105 (L)	112 (SB)	Refrigerant pressure sen- sor	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Both A/C switch and blower fan motor switch: ON (Compressor operates)</li> </ul>	1.0 - 4.0 V	H
106 (W)	128 (B)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.	
107 (BR)	112 (SB)	Sensor power supply (EVAP control system pressure sensor, Refrig- erant pressure sensor)	_	[Ignition switch: ON]	5 V	J
108 (Y)	_	Sensor ground (ASCD 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)	L
(G)	(D)			[Ignition switch: ON] • Selector lever: Except above	0 V	Μ
110	128	Engine speed output sig-	0	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed NOTE: The pulse cycle changes depending on rpm at idle</li> </ul>	1 V★ 10mSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	N O
(R)	(B)	nal	Output	[Engine is running] • Engine speed is 2,000 rpm	1 V★ 10mSec/div € 2V/div JMBIA0077GB	Ρ

#### < ECU DIAGNOSIS INFORMATION >

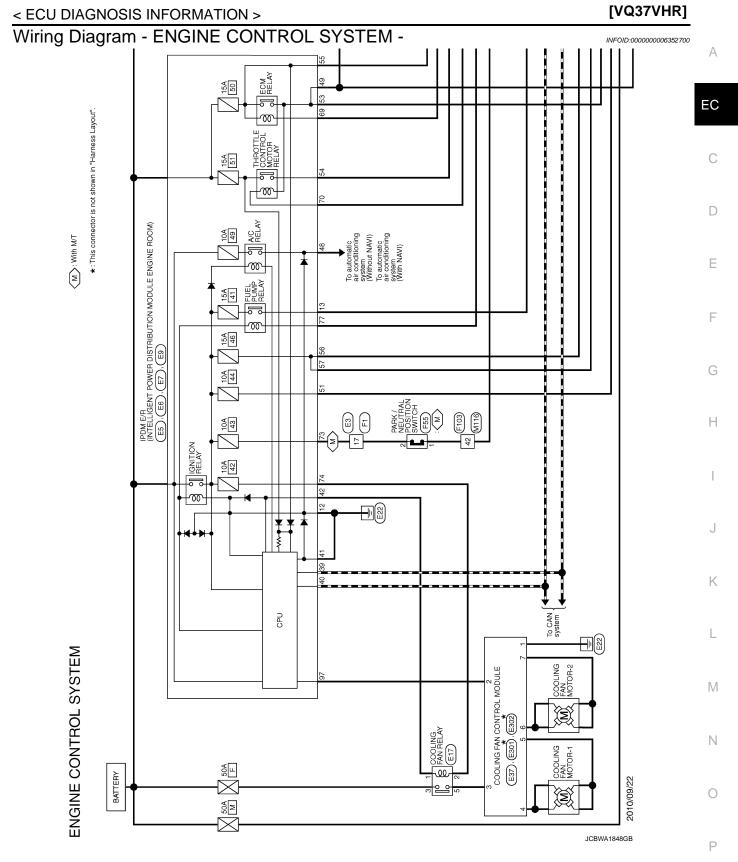
	inal No. e color)	Description		Condition	Value
+		Signal name	Input/ Output	Condition	(Approx.)
112 (SB)	_	Sensor ground (EVAP control system pressure sensor, Refrig- erant pressure sensor)	_	_	_
113 (P)		CAN communication line	Input/ Output	_	_
114 (L)	_	CAN communication line	Input/ Output	_	_
117 (Y)	128 (B)	Data link connector	Input/ Output	_	_
121 (LG)	128 (B)	EVAP canister vent con- trol valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
122	128	Stop Jomp quitab	locut	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
(P)	(B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
123 (B) 124 (B)	_	ECM ground	_	_	_
125 (R)	128 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
126	128	ASCD brake switch (mod-	Incut	[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
(BR)	(B)	els with ASCD system)	Input	[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
127 (B) 128 (B)	_	ECM ground	_	_	_

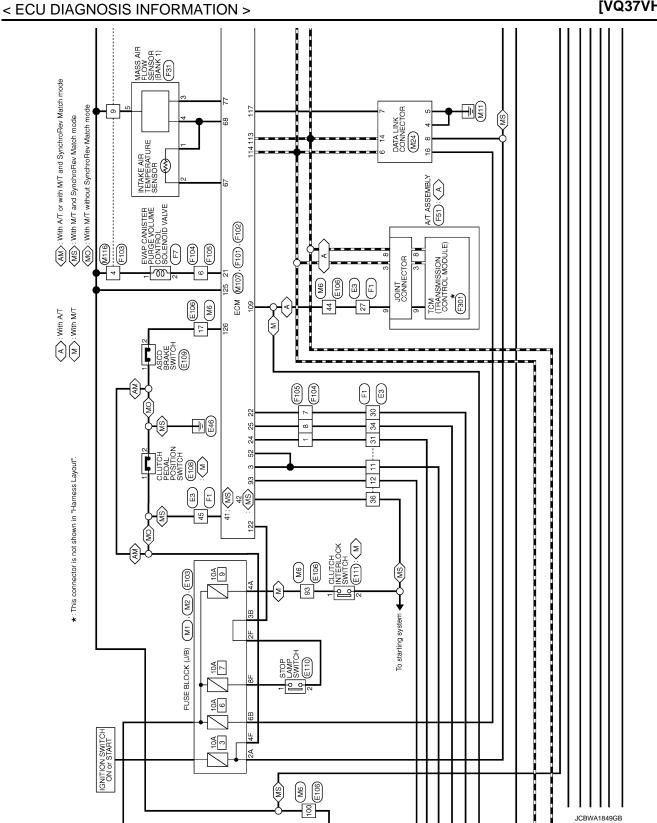
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

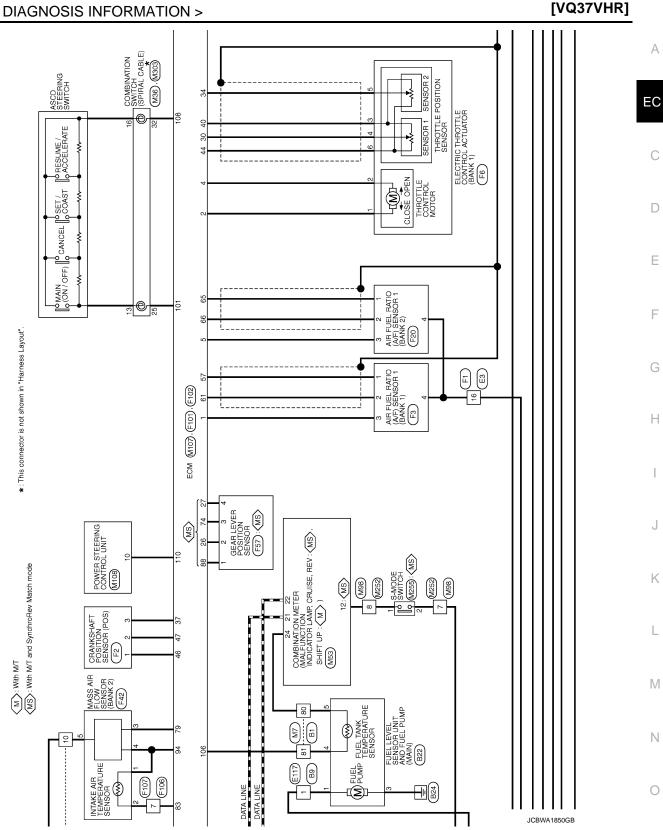
\*1: This may vary depending on internal resistance of the tester.

\*2: This harness is not used.

\*3: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3. "How to Handle Battery".







**EC-563** 

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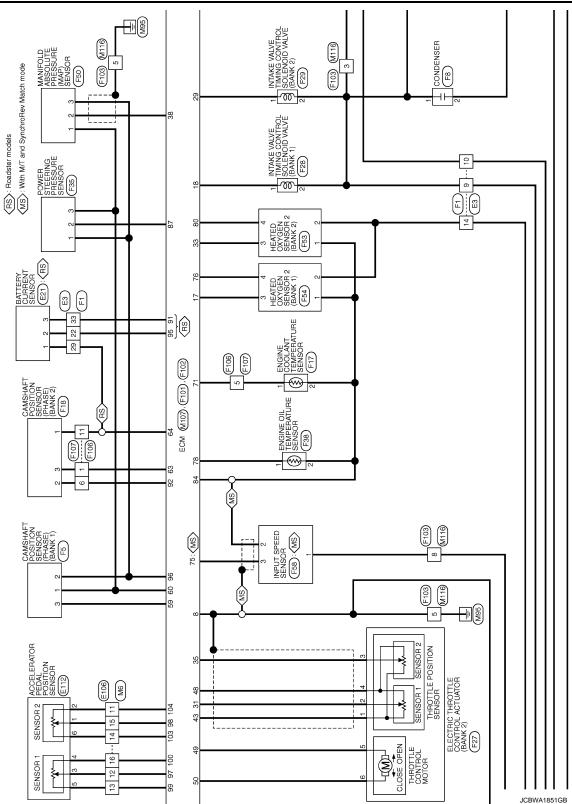
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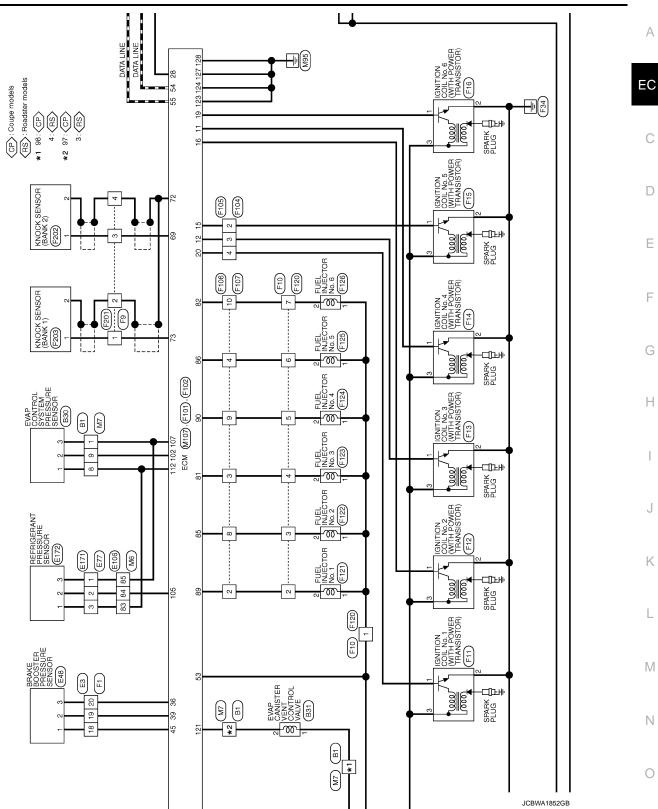
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#### < ECU DIAGNOSIS INFORMATION >



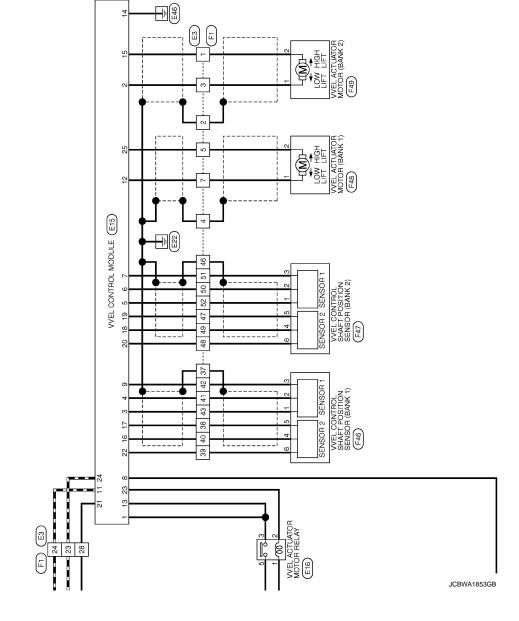






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GNOSIS INFORMATION >	
	A EC C
B9       WIRE TO WINE.       NSIOFHV-CS       INSIOFHV-CS       INSIOFHV-CS       INSIOFHV-CS       Signal Name (Specification)       INSIOFHV-CS       Signal Name (Specification)       Signal Name (Specification)       INSIDE Control	E
Connector No.     B9       Connector Name     WIRE TO WIRE       Connector Name     WIRE TO WIRE       Connector Name     MIRE TO WIRE       Connector Name     Connector Name       Connector Name     MIRE TO WIRE       Connector Name     MIRE TO WIRE       Connector Name     MIRE To Name       MIRE Name     Connector Name       MIRE Name     MIRE To Name       MIRE Name     MIRE To Name	G
- [Coupe models] - [Readster models] 	Ι
45         34         5         44         5         84         5         84         5         84         5         84         5         84         5         84         5         84         5         84         5         84         5         8         8         8         84         6         5         9         1	K
OL SYSTEM WRE CSIG-TM4 CSIG-TM	L
ENGINE         Connector Name BI Commercior Name Decommercior Name BI Commercior Name Decommercior Name De	N

JCBWA1854GB

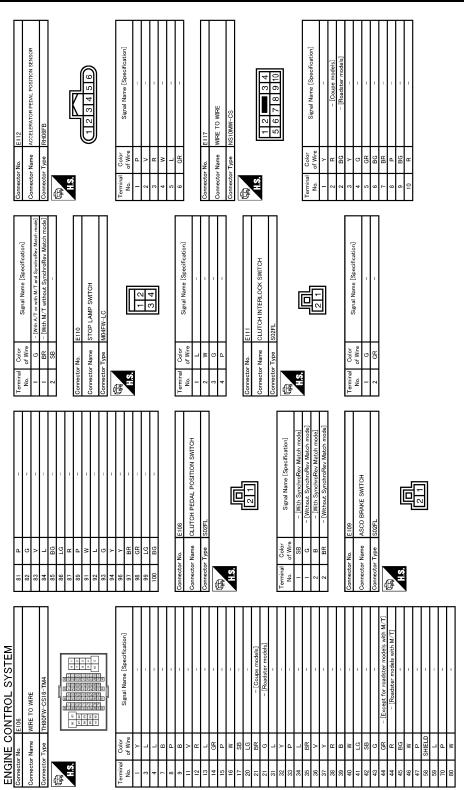
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75         SB         -         -           76         Y         -         -           71         R         -         -           80         W         -         -           Connector No.         E9         -         -           Connector Name         Rouse Revolut         -         -           Connector Type         TH GFW-ANH         -         -	98         97         96         95         94         93         92         94           106         10103         102         101         100         99         97         96         95         96         96         97         96         97         96         97         96         97         96         97         96         97         96         97         96         97         97         97         97         97         97         97         97         97         97         97         97         97         97         97         97         97         96         96         97         96         97         96         97         97         97         97         96         96         97         96         97         96         96         96         96         96         97         96         <	
Connector No.     E6     75     Si       Connector Name     Issue a natural mout     75     Si       Connector Name     Issue a natural     77     R       Connector Type     TH08FW-NH     77     R       Connector Type     TH08FW-NH     80     80       Connector Type     TH08FW-NH     80     80       Main     46     43     44       Main     46     43     44	Terminal Robust         Color of Wine B         Signal Name [Seecification]           Robust         Color B	
42     LG     -       43     G     -       45     SHEID     -       46     SHEID     -       47     W     -       47     W     -       49     G     -       50     B     -       51     SB     -	Connector Nu.         E5           Democtor Name         Part Remuter Porent certmention work.           Democtor Name         Part Remoter Porent certmention work.           Part Remoter Remo	
Endine connector ho.     E3       connector ho.     E3       connector hame     WRE TO WRE       connector Type     SAA36MB-RSB-SH28       connector Type     SAA36MB-RSB-SH28	Terminal Investigation         Color Investigation         Signal Name (Specification)           No.         L/W         -         -           1         L/W         -         -           2         SHELD         -         -           3         L/M         -         -           4         SHELD         -         -           7         G         -         -           9         W         -         -           10         Y         -         -           11         V         -         -           12         SB         -         -           13         L         -         -           14         R         -         -           13         L         -         -           14         R         -         -           15         CR         -         -           16         L         -         -           17         CR         -         -           18         Y         -         -           21         SB         -         -           22         SR         - <td></td>	

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J DIAGNOSIS INFORMATION >		
Fature Action (Arc): Statistical (BAMK 1)         And Freit: Action (Arc): Statistical (BAMK 1)         Report Action (Bank 1)         Signal Mane [Specification]         Ef         Consert = Positive (Bank 1)         Fill         Consert = Positive (Bank 1)         Fill         Consert = Positive (Bank 1)         Fill         Consert = Positive (Bank 1)         Bank 1         Bank 1	E	A
Connector No.     F3       Connector Name     AR FU       Connector Name     AR FU       Connector Type     PH04       1     Connector Name		C
son (Pos)		E
F2       P2       P2 <td< td=""><td></td><td>F</td></td<>		F
18         LG           19         P           20         0           21         BR           22         B           23         V           23         V           23         B           23         SHELD           23         V           23         V           23         V           33         SHELD           33         SHELD           33         SHELD           33         V           34         C           35         SHELD           36         V           37         SHELD           38         V           39         V           31         V           32         V           33         V           34         V           43         V           44         V           50         V <td></td> <td>G H</td>		G H
Occurs find the second set worker		I
E802		J
4         -         -         4           6         0         0         0         0           7         7         0         0         0         0           8         -         -         0         0         0         0           9         9         0         0         0         0         0         0           10         1         0		K
tion]		L
ONTROL SYSTEM E17 WRE TO WRE PROJNE REPOINE REPOINE Signal Name [Specification] Signal Name [Specification]		M
ENGINE     CONTROL     SYSTEM       Connector Name     E111     Connector Name       Connector Name     WEE TO WIEE       Connector Viame     WEE TO WIEE       Connector Viame     WEE TO WIEE       Connector Viame     MEE TO WIEE       Connector Viame     E172       Connector Name     E101       Toto     Signal Name (Specifica       Connector Name     E101       Connector Name     E10		0
	DW/41959CD	

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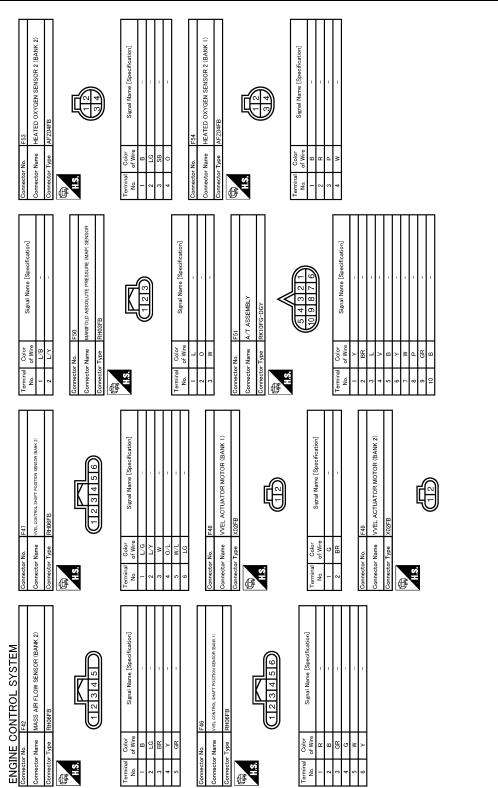
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WWK ()		
SYS CONTROL AL	Terminal         Color         Signal Name (Specification)           1         Color         Signal Name (Specification)           2         BR         -         -           3         R         P         -         -           4         P         -         -         -           Connector Name         EVP - constitute numes counse continue, soughoon vuus         -         -           Connector Name         EVP - constitute numes counse continue, soughoon vuus         -         -           Connector Name         EVP - constitute numes counse continue, soughoon vuus         -         -           Connector Name         EVP - constitute numes counse continue, soughoon vuus         -         -           Time         eVP - constitute numes counse control outpoint         -         -           Connector Name         Color         Signal Name (Specification)         -           r         -         -         -         -         -           r         -         -         -         -         -         -	(



SENSOR [ion]	A
E35     F35       POWER STEERING PRESSURE SENSOR       POWER STEERING PRESSURE SENSOR       RRO3FB       Signal Name (Specification)       Signal Name (Specification)       Signal Name (Specification)	EC
B B Color I Type B Color NM NAme A Color NM NM NM NM NM NM NM NM NM NM	С
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ProD vulve fixers	E
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Name         No.           Type         0.000r           Name         N           Name         N           Name         N           Name         N           Name         1.1ype           P         0.001r           P         0.001r           P         0.001r	G
Connector Connec	Н
20       -	I
F20     -       Alls FUEL RAYID (A/F) SENSOR 1 (BAMK 2)       Alls FUEL RAYID (A/F) SENSOR 1 (BAMK 2)       Signal Name [Specification]       Signal Name [Specification]       Signal Name [Specification]	J
2         Connector Num         F20           Connector Num         PRI-LI         Connector Num         PRI-LI           Connector Num         PRI-LI         Connector Num         PRI-LI           AIR FLIL         Connector Num         PRI-LI         Connector Num           Terminal         Color         V         V           AIR FLIL         Connector Num         PRI-LI         PRI-LI           AIR FLIL         Color         V         V         V	K
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ENGINE CONTROL SYSTEM       Connector Name	Μ
	Ν
ENGINE Commetter Numerical Color Connector Name in Color 2 B B Color 2 B Connector Name in Color 2 B Connector Name in Color 2 B Connector Name in Color 2 B Color 1 Connector Name in Color 1 Co	0

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#### < ECU DIAGNOSIS INFORMATION >

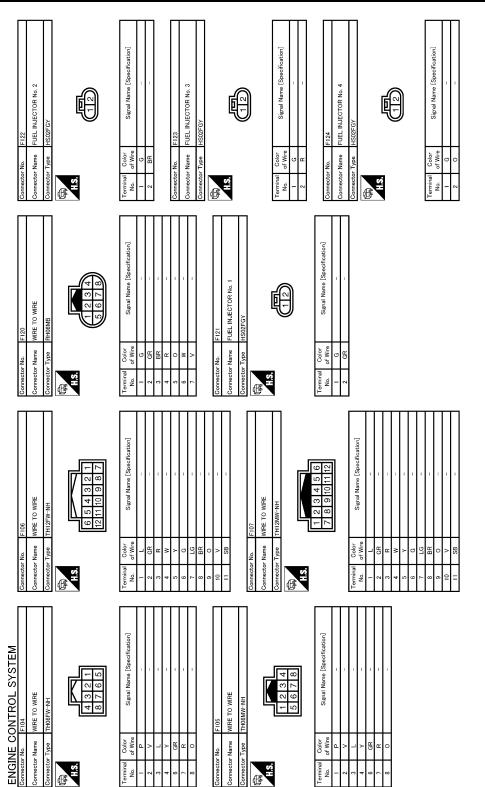
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Revision: 2011 October

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LG         LG           LG         BB         B         B           BB         W         W         W         W           W         Mono         F103         Mono         F103           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V         V         V         V           V         V	С
83         LG           88         88         88           88         88         88           88         88         88           88         88         88           88         88         88           89         89         88           89         99         99           99         99         9           90         0         9           10         0         48           10         0         48           10         0         48           10         0         48           10         0         48           10         0         48           10         0         48	D
CLUTCH H     AlvCo-TPS-E12     AlvCo-TPS-E12     AlvCo-TPS-E12     AlvCo-TPS-E1     AlvCo-TPS-E1     AlvCo-TPS-E1     AlvCo-TPS-E1     AlvCo-TPS-E1     AlvCo-TPS-E2     AlvCo-TPS-E1     AlvCo-TPS-E2	E
	F
	G
42         6         6           43         44         45         45           45         45         45         45           60         6         6         6         6           73         73         73         8         8         8           73         73         8         8         8         8           8         66         6         6         6         6           73         73         8         8         8         8           73         8         6         6         6         6           8         6         6         6         6         6           9         6         6         6         6         6           73         8         8         8         8         8           8         6         6         6         6         6           9         6         6         6         6         6           8         8         8         8         8         6           9         9         6         6         6         6         6           9	Н
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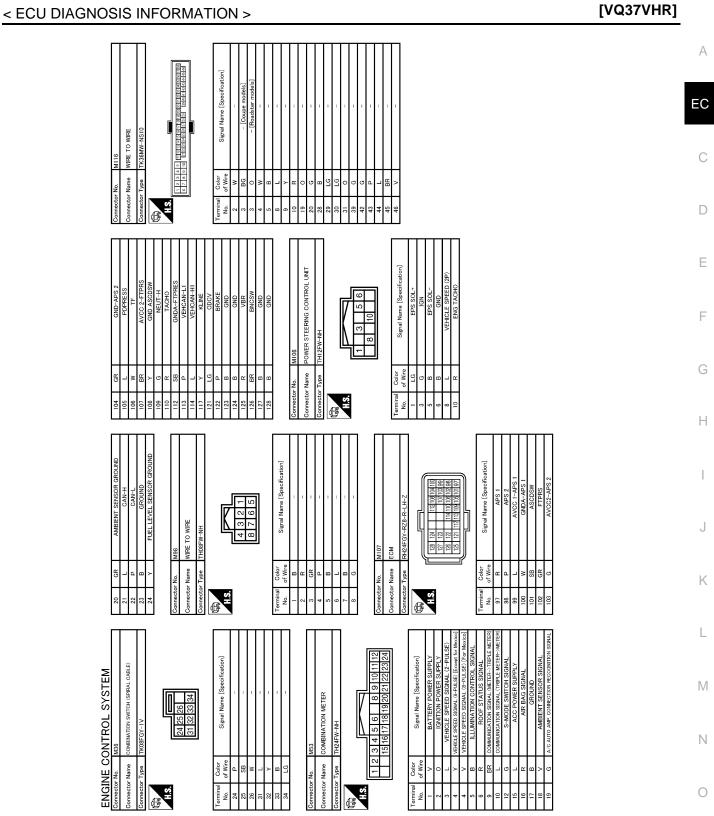
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	EC C
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Specification] Specification S	E
Signal Name         Signal Name           Signal Name         E           Signal Name         Signal Name           Signal Name         Signal Name           Signal Name         Signal Name	F
a Color a Color A Mane A Ma	G
Terminal       Terminal       1       1       2       2       3       3       3       1 <td>Н</td>	Н
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3     W       3     SHELD       Connector No.     Connector Name       Connector Name     Connector Name	Κ
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OL SYSTEM         ECTOR No. 5         ECTOR No. 5         MIRE         WIRE         MIRE         MIRE         B         Construction         B         B         B         B         B         B         B         B         B         B         B         B         B	M
ONTROL SYS	Ν
ENGINE CONTROL SYSTEM         Connector Nam       FUEL NUECTOR No. 5         Connector Nam       FUEL NUECTOR No. 6         Connector Nam       FUEL NUE         Connector Nam       FUE         Connector Nam       FUE         Connector Nam       FUE         Connector Nam	0
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31	BR -	_			64	0	1	5		1	
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39	SB -		7 LG	1	72	٩	1				
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Fail safe

# EC-580

Signal Name [Speci

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HS.

S-MODE SWITCH

Name

#### 2011 370Z

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## NON DTC RELATED ITEM

ENGINE CONTROL SYSTEM <u>Connector Num</u> <u>M232</u> Connector Nume WIRE TO WIRE Connector Type THORW-HHI Connector THI Connector THORW-HHI Connector THORW-HI C

- CABLE)

SWITCH (SPIRAL

**ABINATION** 

Signal Name [Specification]	1	1	-	1	1	1	1	-
Color of Wire	T	T	I	1	1	1	1	1
Terminal No.	13	14	15	16	17	18	19	20

Signal Name [Spe



## [VQ37VHR]

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page	А
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator lamp circuit	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating MIL when there is malfunction on engine control system.		EC
		Therefore, when electrical controlled throttle and part of ECM relat- ed 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 mal- function.	<u>EC-528</u>	С

# DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition	n in fail-safe mode
U1003 U1024	Can communication circuit	VVEL actuator motor relay is turned off, and VVE Engine speed will not rise more than 3,500 rpm of	
P0011 P0021	Intake valve timing control	The signal is not energized to the intake valve tim control does not function.	ning control solenoid valve and the valve
P0101 P0102 P0103 P010B P010C P010D	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm of	due to the fuel cut.
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined b CONSULT-III displays the engine coolant temper	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		Approx 4 minutes or more after 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 tem fan operates while engine is running.	perature sensor is activated, the cooling
P0122 P0123 P0222 P0223 P0227 P0228 P1239 P2132 P2133 P2135	Throttle position sensor	The ECM controls the electric throttle control actu order for the idle position to be within +10 degree The ECM regulates the opening speed of the thr condition. Therefore, the acceleration will be poor.	es.
P0500	Vehicle speed sensor	The cooling fan operates (Highest) while engine	is running.
P0524	Engine oil pressure	The signal is not energized to the intake valve tim control does not function. Engine speed will not rise more than 2,400 rpm of	-
P0605	ECM	(When ECM calculation function is malfunctionin ECM stops the electric throttle control actuator c fixed opening (approx. 5 degrees) by the return s ECM deactivates ASCD operation.	ontrol, throttle valve is maintained at a
P0607	ECM	VVEL actuator motor relay is turned off, and VVE Engine speed will not rise more than 3,500 rpm of	
P0643	Sensor power supply	ECM stops the electric throttle control actuator c fixed opening (approx. 5 degrees) by the return s	



#### < ECU DIAGNOSIS INFORMATION >

DTC No.	Detected items	Engine operating condition	n in fail-safe mode				
P1087 P1088	VVEL control function	VVEL of normal bank is controlled at VVEL ang Engine speed will not rise more than 3,500 rpm					
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 VV Engine speed will not rise more than 3,500 rpm					
P1090 P1093	VVEL actuator motor	VVEL of normal bank is controlled at VVEL ang Engine speed will not rise more than 3,500 rpm					
		VVEL actuator motor relay is turned off, and VV Engine speed will not rise more than 3,500 rpm					
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 of fixed opening (approx. 5 degrees) by the return					
P1236 P2118	Throttle control motor	ECM stops the electric throttle control actuator of fixed opening (approx. 5 degrees) by the return					
P1238 P2119	Electric throttle control actuator	(When electric throttle control actuator does not malfunction:) ECM controls the electric throttle actuator by reg idle position. The engine speed will not rise mor	gulating the throttle opening around the				
		(When throttle valve opening angle in fail-safe n ECM controls the electric throttle control actuate degrees or less.					
		(When ECM detects the throttle valve is stuck open:) While the vehicle is being driven, it slows down gradually because of fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.					
P1290 P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator of fixed opening (approx. 5 degrees) by the return					
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 actuato small range. Therefore, acceleration will be poor.	or by regulating the throttle opening to a				
		Vehicle condition	Driving condition				
		When engine is idling	Normal				
		When accelerating	Poor acceleration				
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sen- sor	The ECM controls the electric throttle control act order for the idle position to be within +10 degree The ECM regulates the opening speed of the th condition. Therefore, the acceleration will be poor.	es.				

# DTC Inspection Priority Chart

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If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

## < ECU DIAGNOSIS INFORMATION >

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	
	P0111 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	
	P0128 Thermostat function	
	P0181 P0182 P0183 Fuel tank temperature sensor	
	P0196 P0197 P0198 Engine oil temperature sensor	
	P0327 P0328 P0332 P0333 Knock sensor     P0325 Quarket (1992)	
	P0335 Crankshaft position sensor (POS)     P0245 Crankshaft position sensor (PUACE)	
	<ul> <li>P0340 P0345 Camshaft position sensor (PHASE)</li> <li>P0460 P0461 P0462 P0463 Fuel level sensor</li> </ul>	
	P0500 Vehicle speed sensor     D0555 Proke begeter pressure concerned	
	<ul> <li>P0555 Brake booster pressure sensor</li> <li>P0605 P0607 ECM</li> </ul>	
	P0643 Sensor power supply	
	<ul> <li>P0705 Transmission range switch</li> </ul>	
	<ul> <li>P0820 Gear lever position sensor</li> </ul>	
	<ul> <li>P0850 Park/neutral position (PNP) switch</li> </ul>	
	<ul> <li>P1089 P1092 P1608 VVEL control shaft position sensor</li> </ul>	
	P1606 P1607 VVEL control module	
	• P1610 - P1615 NATS	
	<ul> <li>P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor</li> </ul>	
	<ul> <li>P2765 Input speed sensor</li> </ul>	

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#### < ECU DIAGNOSIS INFORMATION >

Priority	Detected items (DTC)
2	<ul> <li>P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater</li> <li>P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater</li> <li>P0075 P0081 Intake valve timing control solenoid valve</li> <li>P0130 P0131 P0132 P0133 P0150 P0151 P0152 P0153 P2A00 P2A03 Air fuel ratio (A/F) sensor 1</li> <li>P0137 P0138 P0139 P0157 P0158 P0159 Heated oxygen sensor 2</li> <li>P0441 EVAP control system purge flow monitoring</li> <li>P0443 P0445 EVAP canister purge volume control solenoid valve</li> <li>P0443 P0444 P0445 EVAP canister purge volume control solenoid valve</li> <li>P0444 P0452 P0453 EVAP control system pressure sensor</li> <li>P0550 Power steering pressure sensor</li> <li>P0550 Power steering pressure sensor</li> <li>P0603 ECM power supply</li> <li>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</li> <li>P0830 Clutch interlock switch</li> <li>P0833 Clutch pedal position switch</li> <li>P1087 P1088 VVEL system</li> <li>P1090 P1093 VVEL actuator motor relay</li> <li>P1237 P2101 Electric throttle control function</li> <li>P1236 P2110 P2100 P2103 Throttle control function</li> <li>P1236 P2110 P1031 Throttle control motor relay</li> <li>P1236 P374 D0713 Throttle control motor relay</li> <li>P1306 Brake switch</li> </ul>
3	<ul> <li>P0011 P0021 Intake valve timing control</li> <li>P006A P0101 P010B Mass air flow sensor</li> <li>P0106 Manifold absolute pressure (MAP) sensor</li> <li>P0117 P0172 P0174 P0175 Fuel injection system function</li> <li>P0300 - P0306 Misfire</li> <li>P0420 P0430 Three way catalyst function</li> <li>P0456 EVAP control system (VERY SMALL LEAK)</li> <li>P0506 P0507 Idle speed control system</li> <li>P050A P050E Cold start control</li> <li>P0524 Engine oil pressure</li> <li>P100A P100B VVEL system</li> <li>P1148 P1168 Closed loop control</li> <li>P1211 TCS communication line</li> <li>P1228 P2119 Electric throttle control actuator</li> <li>P1572 ASCD brake switch</li> <li>P1574 ASCD vehicle speed sensor</li> </ul>

# DTC Index

INFOID:000000006352703

 $\times$ :Applicable —: Not applicable

DT	°C* <sup>1</sup>	ltems	SRT			Permanent	Reference
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	code	Trip	MIL	DTC group* <sup>4</sup>	page
U0101	0101* <sup>5</sup>	CAN COMM CIRCUIT	—	1	×	В	<u>EC-181</u>
U0164	0164* <sup>5</sup>	CAN COMM CIRCUIT	—	1	×	В	<u>EC-181</u>
U1001	1001* <sup>5</sup>	CAN COMM CIRCUIT	—	2	—	—	<u>EC-181</u>
U1003	1003	CAN COMM CIRCUIT	—	2	—	—	<u>EC-178</u>
U1024	1024	VVEL CAN COMM CIRCUIT		1	×	В	<u>EC-182</u>
P0000	0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	_	_	Flashing* <sup>8</sup>	_	_
P0011	0011	INT/V TIM CONT-B1	×	2	×	В	<u>EC-184</u>
P0021	0021	INT/V TIM CONT-B2	×	2	×	В	<u>EC-184</u>

#### < ECU DIAGNOSIS INFORMATION >

DT	C* <sup>1</sup>	ltems	CDT			Permanent	Deference	А
CONSULT-III	ECM* <sup>3</sup>	(CONSULT-III screen terms)	SRT code	Trip	MIL	DTC group* <sup>4</sup>	Reference page	A
GST*2	ECINI	, , , , , , , , , , , , , , , , , , ,				- 5 - 1		
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	В	<u>EC-188</u>	EC
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	В	<u>EC-188</u>	
P0037	0037	HO2S2 HTR (B1)	—	2	×	В	<u>EC-191</u>	
P0038	0038	HO2S2 HTR (B1)	—	2	×	В	<u>EC-191</u>	С
P0051	0051	A/F SEN1 HTR (B2)	_	2	×	В	<u>EC-188</u>	
P0052	0052	A/F SEN1 HTR (B2)		2	×	В	<u>EC-188</u>	D
P0057	0057	HO2S2 HTR (B2)		2	×	В	<u>EC-191</u>	
P0058	0058	HO2S2 HTR (B2)	_	2	×	В	<u>EC-191</u>	
P006A	006A	MAP-MAF CORELTION-B1	_	2	×	В	<u>EC-194</u>	E
P0075	0075	INT/V TIM V/CIR-B1	_	2	×	В	<u>EC-201</u>	
P0081	0081	INT/V TIM V/CIR-B2	—	2	×	В	EC-201	F
P0101	0101	MAF SEN/CIRCUIT-B1	_	2	×	В	<u>EC-194</u>	Г
P0102	0102	MAF SEN/CIRCUIT-B1	_	1	×	В	<u>EC-204</u>	
P0103	0103	MAF SEN/CIRCUIT-B1		1	×	В	<u>EC-204</u>	G
P0106	0106	ABSL PRES SEN/CIRC		2	×	В	<u>EC-210</u>	
P010A	010A	ABSL PRES SEN/CIRC	_	2	×	В	<u>EC-215</u>	
P010B	010B	MAF SEN/CIRCUIT-B2	_	2	×	В	<u>EC-194</u>	Н
P010C	010C	MAF SEN/CIRCUIT-B2	_	1	×	В	<u>EC-204</u>	
P010D	010D	MAF SEN/CIRCUIT-B2		1	×	В	<u>EC-204</u>	1
P0111	0111	IAT SENSOR 1 B1	_	2	×	A	<u>EC-219</u>	
P0112	0112	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-221	
P0113	0113	IAT SEN/CIRCUIT-B1	_	2	×	В	EC-221	J
P0116	0116	ECT SEN/CIRC		2	×	A	<u>EC-224</u>	
P0117	0117	ECT SEN/CIRC	_	1	×	В	EC-227	К
P0118	0118	ECT SEN/CIRC	_	1	×	В	EC-227	
P0122	0122	TP SEN 2/CIRC-B1		1	×	В	EC-230	
P0123	0123	TP SEN 2/CIRC-B1		1	×	В	<u>EC-230</u>	L
P0125	0125	ECT SENSOR	_	2	×	В	<u>EC-234</u>	
P0127	0127	IAT SENSOR-B1		2	×	В	EC-237	5.4
P0128	0128	THERMSTAT FNCTN	_	2	×	A	EC-239	M
P0130	0130	A/F SENSOR1 (B1)		2	×	А	<u>EC-242</u>	
P0131	0131	A/F SENSOR1 (B1)		2	×	В	<u>EC-246</u>	Ν
P0132	0132	A/F SENSOR1 (B1)		2	×	В	EC-249	
P0133	0133	A/F SENSOR1 (B1)	×	2	×	A	EC-252	
P0137	0137	HO2S2 (B1)	×	2	×	A	EC-257	0
P0138	0138	HO2S2 (B1)	×	2	×	A	EC-263	
P0139	0139	HO2S2 (B1)	×	2	×	A	EC-271	Р
P0150	0150	A/F SENSOR1 (B2)	_	2	×	A	EC-242	
P0151	0151	A/F SENSOR1 (B2)		2	×	В	EC-246	
P0152	0152	A/F SENSOR1 (B2)	_	2	×	B	EC-249	
P0153	0153	A/F SENSOR1 (B2)	×	2	×	A	EC-252	
P0157	0157	HO2S2 (B2)	×	2	×	A	<u>EC-257</u>	
10107	0107		^	2	^	~	<u> 20 201</u>	

#### < ECU DIAGNOSIS INFORMATION >

DTC	*1		0 <b>D</b> T			Permanent	<b>.</b> /
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	Items     (CONSULT-III screen terms)	SRT code	Trip	MIL	DTC group* <sup>4</sup>	Reference page
P0158	0158	HO2S2 (B2)	×	2	×	А	<u>EC-263</u>
P0159	0159	HO2S2 (B2)	×	2	×	А	<u>EC-271</u>
P0171	0171	FUEL SYS-LEAN-B1	_	2	×	В	<u>EC-278</u>
P0172	0172	FUEL SYS-RICH-B1	_	2	×	В	<u>EC-282</u>
P0174	0174	FUEL SYS-LEAN-B2	_	2	×	В	<u>EC-278</u>
P0175	0175	FUEL SYS-RICH-B2	_	2	×	В	<u>EC-282</u>
P0181	0181	FTT SENSOR	—	2	×	A and B	<u>EC-286</u>
P0182	0182	FTT SEN/CIRCUIT	_	2	×	В	<u>EC-290</u>
P0183	0183	FTT SEN/CIRCUIT	_	2	×	В	<u>EC-290</u>
P0196	0196	EOT SENSOR	_	2	×	A and B	<u>EC-293</u>
P0197	0197	EOT SEN/CIRC	_	2	×	В	<u>EC-297</u>
P0198	0198	EOT SEN/CIRC	_	2	×	В	<u>EC-297</u>
P0222	0222	TP SEN 1/CIRC-B1	_	1	×	В	<u>EC-300</u>
P0223	0223	TP SEN 1/CIRC-B1	_	1	×	В	<u>EC-300</u>
P0227	0227	TP SEN 2/CIRC-B2	_	1	×	В	<u>EC-230</u>
P0228	0228	TP SEN 2/CIRC-B2	_	1	×	В	EC-230
P0300	0300	MULTI CYL MISFIRE	_	2	×	В	<u>EC-303</u>
P0301	0301	CYL 1 MISFIRE	_	2	×	В	EC-303
P0302	0302	CYL 2 MISFIRE	_	2	×	В	EC-303
P0303	0303	CYL 3 MISFIRE	_	2	×	В	<u>EC-303</u>
P0304	0304	CYL 4 MISFIRE	_	2	×	В	<u>EC-303</u>
P0305	0305	CYL 5 MISFIRE	_	2	×	В	EC-303
P0306	0306	CYL 6 MISFIRE	_	2	×	В	<u>EC-303</u>
P0327	0327	KNOCK SEN/CIRC-B1	_	2	_	_	<u>EC-309</u>
P0328	0328	KNOCK SEN/CIRC-B1	_	2	_	_	EC-309
P0332	0332	KNOCK SEN/CIRC-B2	_	2	_	_	<u>EC-309</u>
P0333	0333	KNOCK SEN/CIRC-B2	_	2	_	_	<u>EC-309</u>
P0335	0335	CKP SEN/CIRCUIT	_	2	×	В	<u>EC-312</u>
P0340	0340	CMP SEN/CIRC-B1	_	2	×	В	<u>EC-316</u>
P0345	0345	CMP SEN/CIRC-B2	_	2	×	В	<u>EC-316</u>
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	<u>EC-320</u>
P0430	0430	TW CATALYST SYS-B2	×	2	×	A	<u>EC-320</u>
P0441	0441	EVAP PURG FLOW/MON	×	2	×	А	EC-325
P0443	0443	PURG VOLUME CONT/V	_	2	×	A	<u>EC-330</u>
P0444	0444	PURG VOLUME CONT/V	_	2	×	В	EC-335
P0445	0445	PURG VOLUME CONT/V	_	2	×	В	EC-335
P0447	0447	VENT CONTROL VALVE		2	×	В	<u>EC-338</u>
P0448	0448	VENT CONTROL VALVE		2	×	В	<u>EC-342</u>
P0451	0451	EVAP SYS PRES SEN		2	×	А	<u>EC-346</u>
P0452	0452	EVAP SYS PRES SEN		2	×	В	<u>EC-349</u>
P0453	0453	EVAP SYS PRES SEN		2	×	В	<u>EC-354</u>
P0456	0456	EVAP VERY SML LEAK	×* <sup>7</sup>	2	×	A	<u>EC-360</u>

#### < ECU DIAGNOSIS INFORMATION >

DT	C* <sup>1</sup>	ltems	SRT			Permanent	Reference	А
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	code	Trip	MIL	DTC group* <sup>4</sup>	page	~
P0460	0460	FUEL LEV SEN SLOSH		2	×	A	EC-366	EC
P0461	0461	FUEL LEVEL SENSOR		2	×	В	EC-368	
P0462	0462	FUEL LEVL SEN/CIRC		2	×	В	<u>EC-370</u>	
P0463	0463	FUEL LEVL SEN/CIRC		2	×	В	<u>EC-370</u>	С
P0500	0500	VEH SPEED SEN/CIRC*6	_	2	×	В	<u>EC-373</u>	
P0506	0506	ISC SYSTEM	_	2	×	В	<u>EC-376</u>	D
P0507	0507	ISC SYSTEM	_	2	×	В	<u>EC-378</u>	
P050A	050A	COLD START CONTROL	_	2	×	А	<u>EC-380</u>	
P050E	050E	COLD START CONTROL	_	2	×	А	EC-380	E
P0524	0524	ENGINE OIL PRESSURE	—	2	×	В	<u>EC-382</u>	
P0550	0550	PW ST P SEN/CIRC		2	_	_	<u>EC-385</u>	F
P0555	0555	BRAKE BSTR PRES SEN/ CIRC	_	2	×	В	<u>EC-388</u>	
P0603	0603	ECM BACK UP/CIRCUIT		2	×	В	<u>EC-393</u>	G
P0605	0605	ECM	_	1 or 2	$\times$ or —	В	<u>EC-395</u>	
P0607	0607	ECM	_	1 (A/T models) 2	× (A/T models) —	В	<u>EC-397</u>	Н
				(M/T models)	(M/T models)			
P0643	0643	SENSOR POWER/CIRC		1	×	В	<u>EC-398</u>	
P0705	0705	T/M RANGE SWITCH A		2	×	В	<u>TM-216</u>	
P0710	0710	FLUID TEMP SENSOR A	—	2	×	В	<u>TM-217</u>	
P0717	0717	INPUT SPEED SENSOR A		2	×	В	<u>TM-219</u>	J
P0720	0720	OUTPUT SPEED SENSOR*6	—	2	×	В	<u>TM-221</u>	
P0729	0729	6GR INCORRECT RATIO	_	2	×	В	<u>TM-225</u>	Κ
P0730	0730	INCORRECT GR RATIO		2	×	В	<u>TM-227</u>	
P0731	0731	1GR INCORRECT RATIO		2	×	В	<u>TM-229</u>	1
P0732	0732	2GR INCORRECT RATIO		2	×	В	<u>TM-231</u>	L
P0733	0733	3GR INCORRECT RATIO		2	×	В	<u>TM-233</u>	
P0734	0734	4GR INCORRECT RATIO	—	2	×	В	<u>TM-235</u>	M
P0735	0735	5GR INCORRECT RATIO	—	2	×	В	<u>TM-237</u>	
P0740	0740	TORQUE CONVERTER		2	×	В	<u>TM-239</u>	
P0744	0744	TORQUE CONVERTER		2	×	В	<u>TM-241</u>	Ν
P0745	0745	PC SOLENOID A		2	×	В	<u>TM-243</u>	
P0750	0750	SHIFT SOLENOID A		2	×	В	<u>TM-244</u>	0
P0775	0775	PC SOLENOID B		2	×	В	<u>TM-245</u>	
P0780	0780	SHIFT		1	×	В	<u>TM-246</u>	
P0795	0795	PC SOLENOID C		2	×	В	<u>TM-248</u>	Ρ
P0820	0820	GEAR LVR POS SEN/CIRC	-	1		—	<u>EC-401</u>	
P0830	0830	CLUTCH INTLCK SW/CIRC	—	1		_	<u>EC-406</u>	
P0833	0833	CLUTCH P/P SW/CIRC	-	1	—		<u>EC-411</u>	
P0850	0850	P-N POS SW/CIRCUIT	-	2	×	В	EC-416	
P100A	100A	VVEL SYSTEM-B1	—	2	×	В	<u>EC-420</u>	

#### < ECU DIAGNOSIS INFORMATION >

DT	C* <sup>1</sup>		0.D.T			Dormonont	D (
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Permanent DTC group* <sup>4</sup>	Reference page
P100B	100B	VVEL SYSTEM-B2		2	×	В	<u>EC-420</u>
P1087	1087	VVEL SYSTEM-B1		1	×	В	EC-424
P1088	1088	VVEL SYSTEM-B2		1	×	В	EC-424
P1089	1089	VVEL POS SEN/CIRC-B1		1	×	В	<u>EC-425</u>
P1090	1090	VVEL ACTR MOT-B1		1	×	В	<u>EC-429</u>
P1091	1091	VVEL ACTR MOT PWR		1 or 2	×	В	EC-433
P1092	1092	VVEL POS SEN/CIRC-B2		1	×	В	<u>EC-425</u>
P1093	1093	VVEL ACTR MOT-B2	—	1	×	В	<u>EC-429</u>
P1148	1148	CLOSED LOOP-B1		1	×	А	<u>EC-436</u>
P1168	1168	CLOSED LOOP-B2		1	×	А	<u>EC-436</u>
P1211	1211	TCS C/U FUNCTN		2	_		<u>EC-437</u>
P1212	1212	TCS/CIRC	—	2	_	_	<u>EC-438</u>
P1217	1217	ENG OVER TEMP		1	×	В	<u>EC-439</u>
P1225	1225	CTP LEARNING-B1		2			<u>EC-443</u>
P1226	1226	CTP LEARNING-B1		2			<u>EC-445</u>
P1233	1233	ETC FNCTN/CIRC-B2		1	×	В	<u>EC-447</u>
P1234	1234	CTP LEARNING-B2		2	_	_	<u>EC-443</u>
P1235	1235	CTP LEARNING-B2		2			<u>EC-445</u>
P1236	1236	ETC MOT-B2		1	×	В	<u>EC-451</u>
P1238	1238	ETC ACTR-B2		1	×	В	<u>EC-454</u>
P1239	1239	TP SENSOR-B2		1	×	В	EC-456
P1290	1290	ETC MOT PWR-B2		1	×	В	EC-459
P1564	1564	ASCD SW		1	_	_	<u>EC-461</u>
P1572	1572	ASCD BRAKE SW		1	_	_	<u>EC-464</u>
P1574	1574	ASCD VHL SPD SEN		1	_	_	<u>EC-472</u>
P1606	1606	VVEL CONTROL MODULE		1 or 2	× or —	В	<u>EC-474</u>
P1607	1607	VVEL CONTROL MODULE		1	×	В	<u>EC-476</u>
P1608	1608	VVEL SENSOR POWER/CIRC		1	×	В	<u>EC-478</u>
P1610	1610	LOCK MODE		2			<u>SEC-36</u>
P1611	1611	ID DISCARD IMM-ECM		2			<u>SEC-37</u>
P1612	1612	CHAIN OF ECM-IMMU		2			<u>SEC-39</u>
P1614	1614	CHAIN OF IMMU-KEY		2			<u>SEC-40</u>
P1615	1615	DIFFERENCE OF KEY		2		_	<u>SEC-43</u>
P1730	1730	INTERLOCK		2	×	В	<u>TM-253</u>
P1734	1734	7GR INCORRECT RATIO		2	×	В	<u>TM-255</u>
P1805	1805	BRAKE SW/CIRCUIT	_	2	_		<u>EC-481</u>
P2100	2100	ETC MOT PWR-B1		1	×	В	<u>EC-459</u>
P2101	2101	ETC FNCTN/CIRC-B1	_	1	×	В	<u>EC-447</u>
P2103	2103	ETC MOT PWR	_	1	×	В	<u>EC-459</u>
P2118	2118	ETC MOT-B1	_	1	×	В	<u>EC-451</u>
P2119	2119	ETC ACTR-B1	_	1	×	В	<u>EC-454</u>
P2122	2122	APP SEN 1/CIRC	_	1	×	В	<u>EC-484</u>

#### < ECU DIAGNOSIS INFORMATION >

DT	C* <sup>1</sup>	- Items	SRT			Permanent	Reference	А
CONSULT-III GST* <sup>2</sup>	ECM* <sup>3</sup>	(CONSULT-III screen terms)	code	Trip	MIL	DTC group* <sup>4</sup>	page	~
P2123	2123	APP SEN 1/CIRC	—	1	×	В	<u>EC-484</u>	EC
P2127	2127	APP SEN 2/CIRC	—	1	×	В	<u>EC-488</u>	
P2128	2128	APP SEN 2/CIRC	—	1	×	В	<u>EC-488</u>	-
P2132	2132	TP SEN 1/CIRC-B2	—	1	×	В	<u>EC-300</u>	С
P2133	2133	TP SEN 1/CIRC-B2	_	1	×	В	<u>EC-300</u>	-
P2135	2135	TP SENSOR-B1	_	1	×	В	<u>EC-456</u>	
P2138	2138	APP SENSOR	_	1	×	В	<u>EC-493</u>	
P2713	2713	PC SOLENOID D	_	2	×	В	<u>TM-263</u>	-
P2722	2722	PC SOLENOID E	_	2	×	В	<u>TM-264</u>	E
P2731	2731	PC SOLENOID F		2	×	В	<u>TM-264</u>	-
P2765	2765	INPUT SPEED SEN/CIRC		1	_	—	<u>EC-498</u>	
P2807	2807	PC SOLENOID G	_	2	×	В	<u>TM-266</u>	-  -
P2A00	2A00	A/F SENSOR1 (B1)		2	×	A	<u>EC-501</u>	-
P2A03	2A03	A/F SENSOR1 (B2)	_	2	×	A	<u>EC-501</u>	0

\*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-32, "Description", "PERMANENT DIAGNOSTIC TROUBLE CODE (PERMANENT DTC)".

\*5: The troubleshooting for this DTC needs CONSULT-III.

\*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 flash. For the details, refer to "How to Display SRT Status".

#### 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:00000006352706

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## < ECU DIAGNOSIS INFORMATION >

	OBD-			li	e and Test mit display)	
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description
			P0131	83H	0BH	Minimum sensor output voltage for test cycle
		-	P0131	84H	0BH	Maximum sensor output voltage for test cycle
		-	P0130	85H	0BH	Minimum sensor output voltage for test cycle
			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
HO2S		-	P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
H023			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
	02H	Heated oxygen sensor 2 (Bank 1)	P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			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

#### < ECU DIAGNOSIS INFORMATION >

	OBD-	Self-diagnostic test item		li	e and Test mit display)		A
Item	MID		DTC -	TID	Unitand Scaling ID	Description	EC
			P0151	83H	0BH	Minimum sensor output voltage for test cycle	0
			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	– – E
			P0153	87H	04H	Response rate: Response ratio (lean to rich)	
			P0153	88H	04H	Response rate: Response ratio (rich to lean)	F
			P2A03	89H	84H	The amount of shift in air fuel ratio	
			P2A03	8AH	84H	The amount of shift in air fuel ratio	C
		Air fuel ratio (A/F) sensor 1 (Bank 2)	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	ŀ
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1	
HO2S			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1	
HU23			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	ŀ
			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	I
			P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1	ľ
			P0158	07H	0CH	Minimum sensor output voltage for test cycle	
	06H	Heated oxygen sensor 2 (Bank 2)	P0157	08H	0CH	Maximum sensor output voltage for test cycle	ľ
			P0158	80H	0CH	Sensor output voltage	
			P0159	81H	0CH	Difference in sensor output voltage	(
			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	

#### < ECU DIAGNOSIS INFORMATION >

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Itom	OBD-	Colf diagnostic tost item	DTC		display)	Description
ltem	MID	Self-diagnostic test item	DIC	TID	Unitand Scaling ID	Description
			P0420	80H	01H	O2 storage index
	21H	Three way catalyst function	P0420	82H	01H	Switching time lag engine exhaust in- dex value
	210	(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 in- dex value
	2211	(Bank2)	P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
	31H	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			P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low flow faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
			P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
	35H	VVT Monitor (Bank1)	P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	300		P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
VVT			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
SYSTEM			P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
	36H	VVT Monitor (Bank2)	P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
	301		P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)

#### < ECU DIAGNOSIS INFORMATION >

	OBD-	Solf-diagnostic tost itom		li	e and Test mit display)		1
Item	MID	Self-diagnostic test item	DTC	TID	Unitand Scaling ID	Description	04       02       AP       at       put       rol       cur-       cur-    cur- <t< td=""></t<>
	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down	1
	3BH	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	3CH	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-	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric cur- rent to voltage	
	42H	Heated oxygen sensor 2 heat- er (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric cur- rent to voltage	
	43H	Heated oxygen sensor 3 heat- er (Bank 1)	P0043	80H	0CH	Converted value of heater electric cur- rent to voltage	
SOR HEATER	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric cur- rent to voltage	
	46H	Heated oxygen sensor 2 heat- er (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric cur- rent to voltage	
	47H	Heated oxygen sensor 3 heat- er (Bank 2)	P0063	80H	0CH	Converted value of heater electric cur- rent to voltage	
			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	
			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 injection eveter function	P0171 or P0172	80H	2FH	Long term fuel trim	
FUEL	81H	Fuel injection system function (Bank 1)	P0171 or P0172	81H	24H	The number of lambda control clamped	
SYSTEM		Fuel injection system from the	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	

#### < ECU DIAGNOSIS INFORMATION >

	OBD-	Self-diagnostic test item		lir	e and Test mit display)	
Item	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
		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
MISSIDE			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
MISFIRE	A1H		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

#### < ECU DIAGNOSIS INFORMATION >

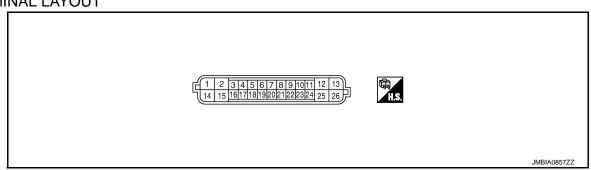
				li	e and Test mit		
Item	OBD- MID	Self-diagnostic test item	DTC	(GST	display) Unitand	Description	
				TID	Scaling ID		E
	A2H	No. 1 cylinder misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driv- ing cycles	(
			P0301	0CH	24H	Misfire counts for last/current driving cycles	
	АЗН	No. 2 cylinder misfire	P0302	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	0BH	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	
MISFIRE			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 driv- ing cycles	
			P0305	0CH	24H	Misfire counts for last/current driving cycles	
	A7H	No. 6 cylinder misfire	P0306	0BH	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 driv- ing 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	

## < ECU DIAGNOSIS INFORMATION >

# VVEL CONTROL MODULE

## **Reference Value**

INFOID:000000006352707



## PHYSICAL VALUES

#### NOTE:

- VVEL control module is located behind the IPDM E/R. For this inspection, remove hoodledge cover (RH).
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

Term	inal No.	Description			Value
+		Signal name	Input/ Output	Condition	(Approx.)
1 (W)	14 (B/W)	VVEL actuator motor pow- er supply (bank 2)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
2	2 14 (L/B) (B/W)	VVEL actuator motor	Outout	[Engine is running] • Warm-up condition • Idle speed	0 - 14 V★ 100µSec/div 5V/div JMBIA0854ZZ
(L/B)	(B/W)	(High lift) (bank 2)	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>When revving engine up to 2,000 rpm quickly</li></ul>	0 - 14 V★ 100µSec/div
3	4	VVEL control shaft posi-	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approx.0.25 - 1.40 V
(G)	(W)	tion sensor 1 (bank 1)		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>When revving engine up to 2,000 rpm quickly</li></ul>	Approx.0.25 - 4.75 V
4 (W)	—	Sensor ground [VVEL control shaft posi- tion sensor 1 (bank 1)]	_	_	_

# < ECU DIAGNOSIS INFORMATION >

## [VQ37VHR]

Termi	nal No.	Description			Value	
+		Signal name	Input/ Output	Condition	Value (Approx.)	A
5	6	VVEL control shaft posi-		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	Approx.0.25 - 1.40 V	EC
(R)	(B)	tion sensor 1 (bank 2)	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>When revving engine up to 2,000 rpm quickly</li></ul>	Approx.0.25 - 4.75 V	С
6 (B)	_	Sensor ground [VVEL control shaft posi- tion sensor 1 (bank 2)]	_	_	_	D
7 (SB)	6 (B)	Sensor power supply [VVEL control shaft posi- tion sensor 1 (bank 2)]	_	[Ignition switch: ON]	5 V	E
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 posi- tion sensor 1 (bank 1)]	_	[Ignition switch: ON]	5 V	G
11 (GR)	—	Engine communication line (ECM)	Input/ Output	_	_	_
12	14	VVEL actuator motor	Output	[Engine is running] • Warm-up condition • Idle speed	0 - 14 V★ 100µSec/div F 5V/div JMBIA08542Z	H I J
(G)	(B/W)	(High lift) (bank 1)		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>When revving engine up to 2,000 rpm quickly</li></ul>	0 - 14 V★ 100µSec/div 	K
13 (W)	14 (B/W)	VVEL actuator motor pow- er supply (bank 1)	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)	M
14 (B/W)		VVEL control module ground		[Engine is running] • Idle speed	_	- N

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#### < ECU DIAGNOSIS INFORMATION >

Termi	inal No.	Description			Value
+		Signal name	Input/ Output	Condition	Value (Approx.)
15	14	VVEL actuator motor (Low	Output	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0 - 14 V★ 100µSec/div € 5V/div JMBIA0854ZZ
(L/Y)	(B/W)	lift) (bank 2)	Cuput	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>When revving engine up to 2,000 rpm quickly</li></ul>	0 - 14 V★ 100µSec/div ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
16	16 17 (R) (L)	VVEL control shaft posi-		<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	3.50 - 4.75 V
-		tion sensor 2 (bank 1)	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>When revving engine up to 2,000 rpm quickly</li></ul>	0.25 - 4.75 V
17 (L)	_	Sensor ground [VVEL control shaft posi- tion sensor 2 (bank 1)]	_	_	_
18 (G)	19 (W)	VVEL control shaft posi- tion sensor 2 (bank 2)	Input	<ul> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>Idle speed</li> <li>[Engine is running]</li> <li>Warm-up condition</li> <li>When revving engine up to 2,000 runn quickly.</li> </ul>	3.50 - 4.75 ∨ 0.25 - 4.75 ∨
19 (W)		Sensor ground [VVEL control shaft posi- tion sensor 2 (bank 2)]	_	rpm quickly	
20 (BR)	19 (W)	Sensor power supply [VVEL control shaft posi- tion sensor 2 (bank 2)]	_	[Ignition switch: ON]	5 V
21 (V)	14 (B/W)	VVEL actuator motor relay abort signal	Input	<ul><li>[Engine is running]</li><li>Warm-up condition</li><li>Idle speed</li></ul>	0 V
22 (P)	17 (L)	Sensor power supply [VVEL position sensor 2 (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 (SB)		Engine communication line (ECM)	Input/ Output	[Ignition switch: ON]	0 - 1.0 V —

#### < ECU DIAGNOSIS INFORMATION >

## [VQ37VHR]

Term	inal No.	Description			Value	_
+		Signal name	Input/ Output	[Engine is running] • Warm-up condition • Idle speed 5V/div ↓ MBIA085477	A	
25		VVEL control motor (Low	Output	<ul> <li>Warm-up condition</li> </ul>	100µSec/div	EC C D
(BR)		lift) (bank 1)		<ul><li>Warm-up condition</li><li>When revving engine up to 2,000</li></ul>	100µSec/div	E
★: Avera	age voltage	e for pulse signal (Actual puls	e signal ca	n be confirmed by oscilloscope.)		G

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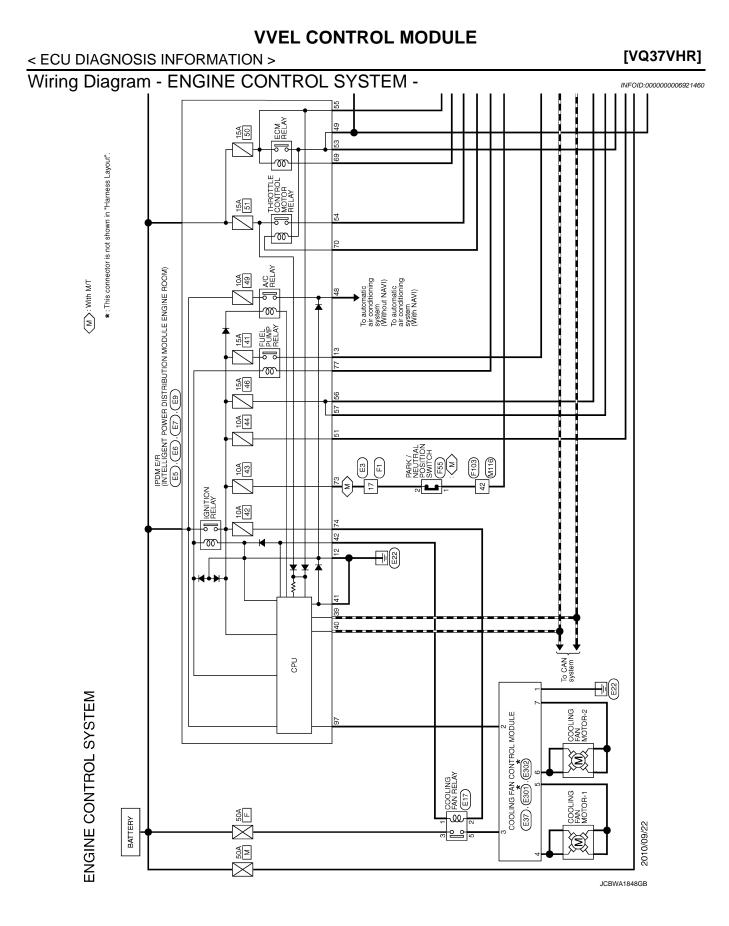
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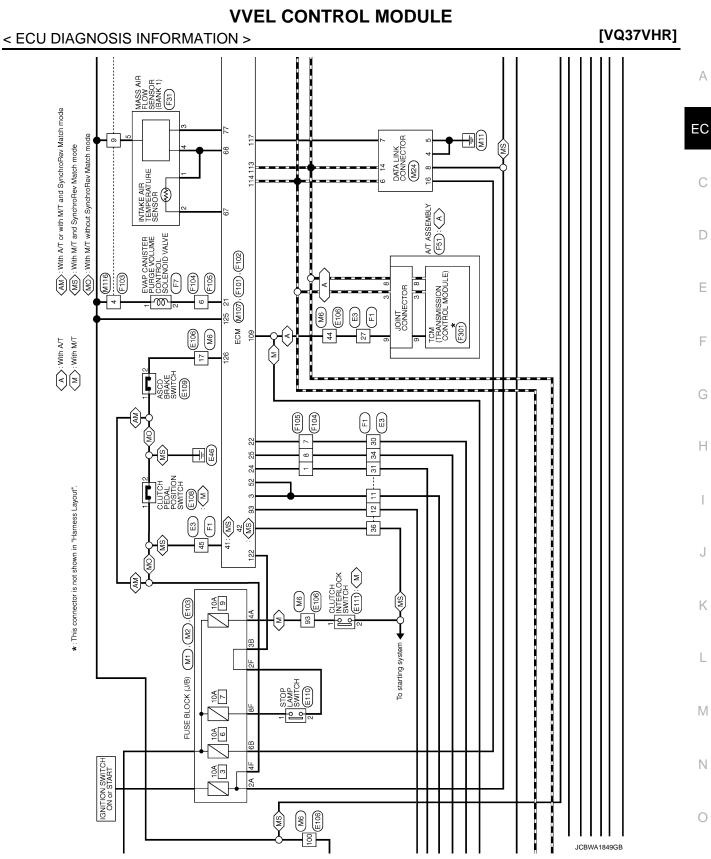
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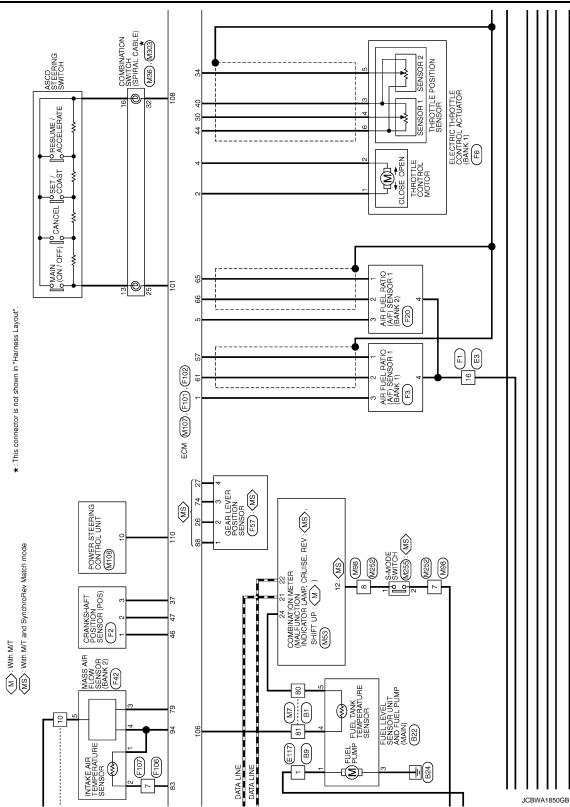
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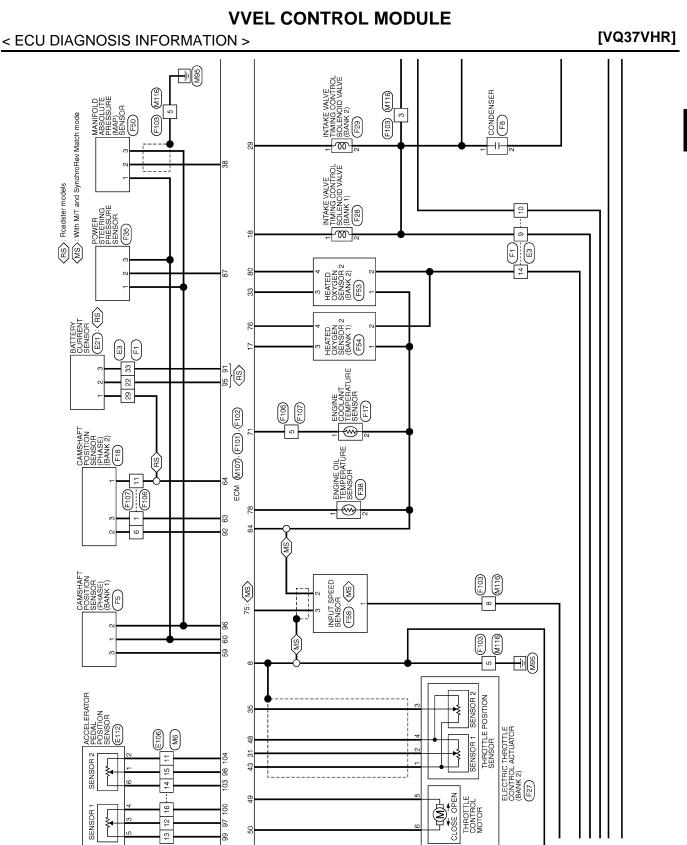




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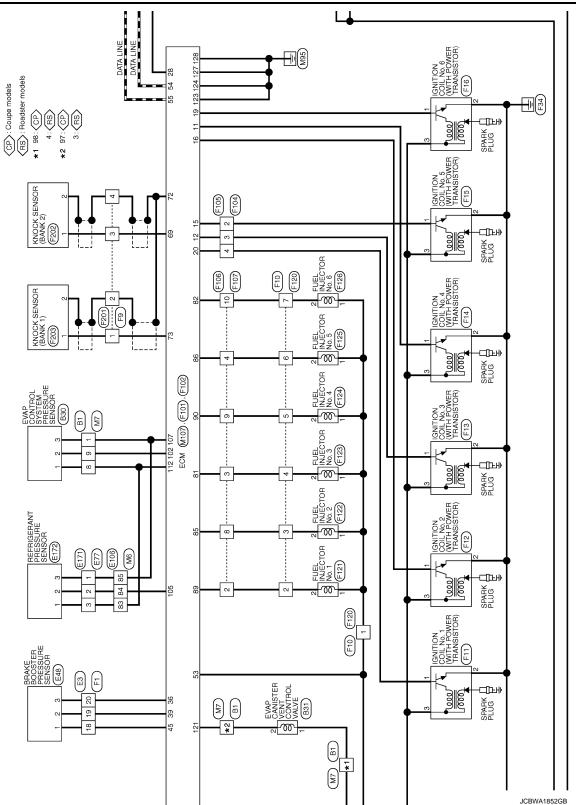
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#### < ECU DIAGNOSIS INFORMATION >



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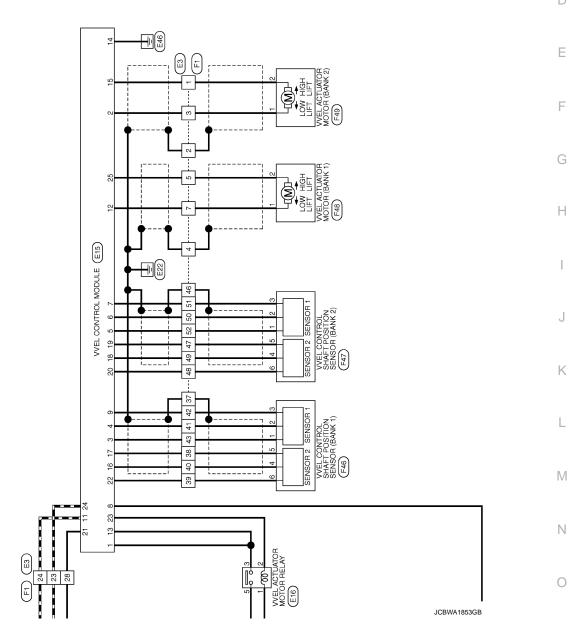
# **VVEL CONTROL MODULE**

#### < ECU DIAGNOSIS INFORMATION >

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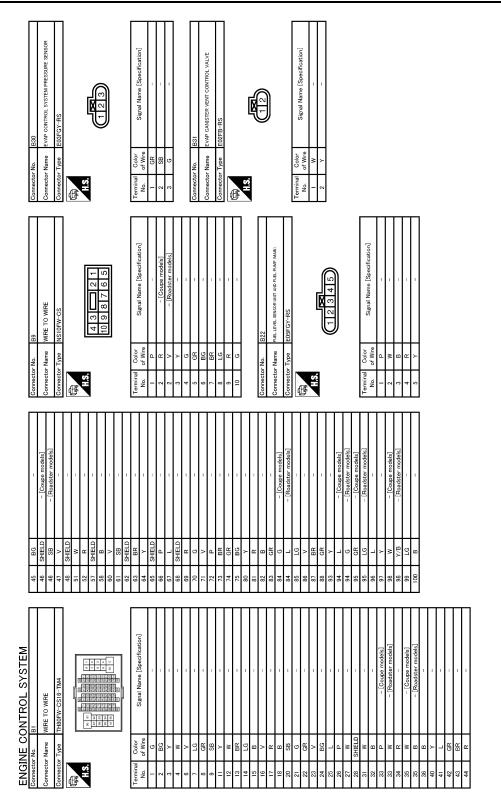






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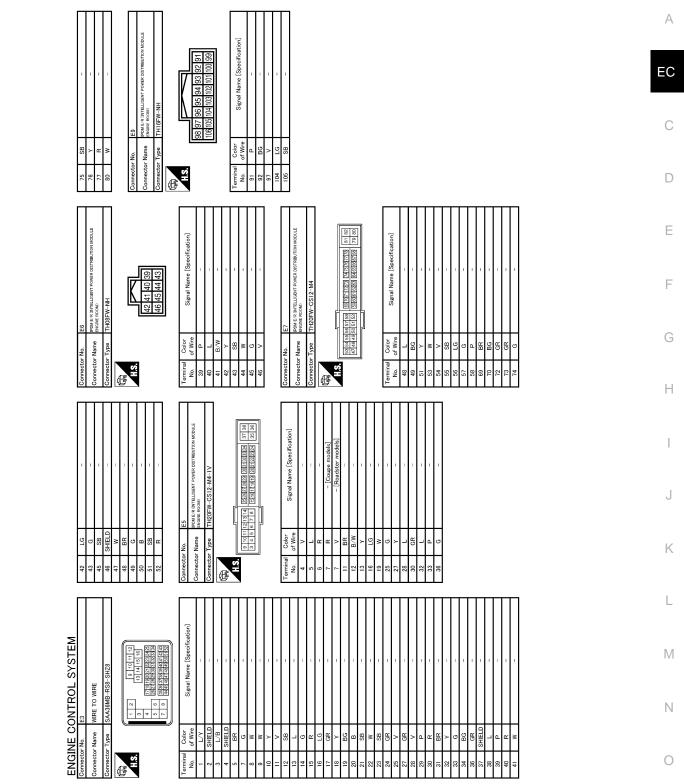
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## < ECU DIAGNOSIS INFORMATION >

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#### < ECU DIAGNOSIS INFORMATION >

Signal Name [Specification] FUSE BLOCK (J/B) 5F 4F 13F 14F 7F 6F 5 Color of Wire Connector Name nector No. BGsol H.S. erminal No. <u>н</u> ß BRAKE BOOSTER PRESSURE SENSOR Signal Name [Specification] Signal Name [Specification] Signal Name [Specification] COOLING FAN CONTROL MODULE 321 WIRE TO WIRE RK03FE Color of Wire Color of Wire Color of Wire Connector Type Connector Name Connector Name Connector Name BG Connector No. Connector No. Terminal No. 倨 HS 倱 HS 小 HS.H Terminal No. ŝ Signal Name [Specification] Signal Name [Specification] Signal Name [Specification] BATTERY CURRENT SENSOR COOLING FAN RELAY 24347 9F900 E21 Color of Wire Color nector Name nnector Name Color of Wire ector Type nector No. vpe AIS. erminal No. HS. 傄 ß 
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 ) Signal Name [Specification] VVEL ACTUATOR MOTOR RELAY PGND L MOTOR L 2 VEL S-R2 AGND 2 VMOT L MOTOR L VEL/S-R AGND 1 AGND 3 AGND 3 AGND 3 VB AVCC 3 VB CAN H CAN H CAN H VOTOR R VEL S-L AGND 4 AVCC 4 ABORT AVCC 2 WEL CONTROL MODULE AJZ8-RH 24347\_9F900 F16 Type Color of Wire G BR < ≤ G GR C B SB B R R ≤ B/W L/Y ≻®ä nector No. Connector Name nnector Name 9 9 erminal No. HS. H.S. Ø ပိ

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ENGINE CONTROL SYSTEM

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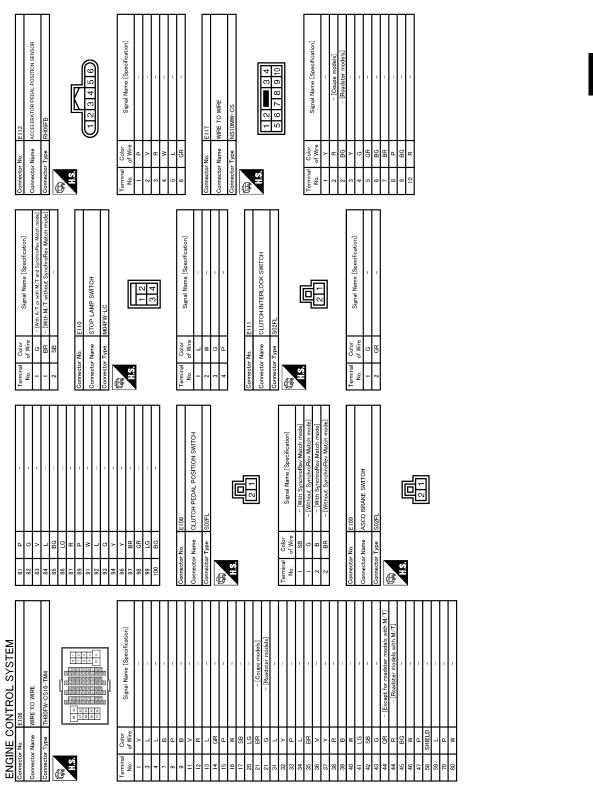
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#### < ECU DIAGNOSIS INFORMATION >

AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1) Signal Name [Specification] Signal Name [Specification] 4 3 2 1 H04MDGY-BR Color of Wire Connector Name ector Name nnector No. ype 化 H.S.H H.S. erminal No. Š E င် Signal Name [Specification] RANKSHAFT POSITION SENSOR (POS) B GR R SB SHIELD Color of Wire K BB V P N/L LG ۲۷ 0/L ×⊇ œ : ≻岀>띵뚪 Connector Name /be - Mar Connector No. . HS Terminal No. 50 49 Signal Name [Specification] Signal Name [Specification] 
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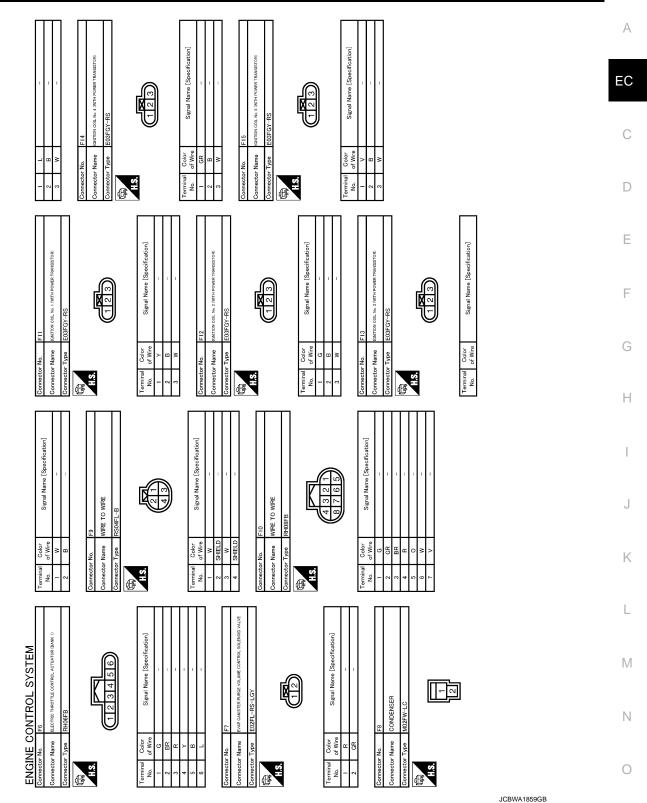
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 WIRE TO WIRE SHIELD L/B SHIELD BR G - o P BR LG o P Color of Wire Color f Wire nnector Name **Fype** nector Name Tvpe ζ ≥≥ nector No. nnector No. Connector 围 HS. H.S. erminal No. erminal No. Ø REFRIGERANT PRESSURE SENSOR Signal Name [Specification] Signal Name [Specification] Signal Name [Specification] ENGINE CONTROL SYSTEM DOLING FAN CONTROL MODULE (COOLING 123 Ð 12 WIRE TO WIRE Color of Wire Color of Wire Color of Wire Connector Type nnector Name Connector Name Connector Name ctor No. Terminal No. erminal No. 限 H.S. . H.S.H srminal No. 配 HS.H

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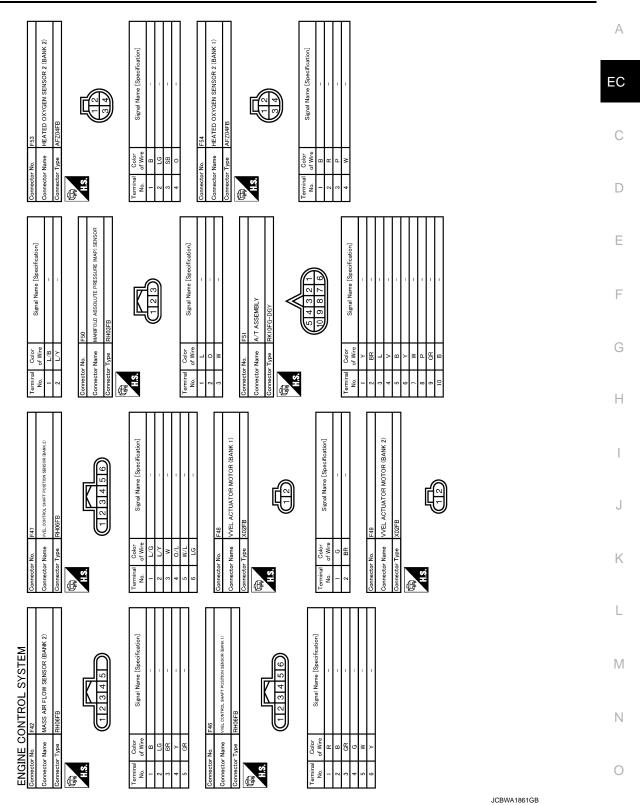
POWER STEERING PRESSURE SENSOR ENGINE OIL TEMPERATURE SENSOR Signal Name [Specification] Signal Name [Specification] 123 Ø DPGY-RS Color of Wire Color of Wire Connector Name Connector Name nector No. nnector No. AIS. Terminal No. erminal No. , si E ß ပိ ALVE (BANK MASS AIR FLOW SENSOR (BANK 1) Signal Name [Specification] Signal Name [Specification] Signal Name [Specification] OL FNOIT 12345 KE VALVE TIMING CONTROL Ø RH06FE E Color of Wire Color of Wire Color of Wire lype onnector Name Connector Name Connector Name Connector No. Connector No. Connector Terminal No. Terminal No. . S.H H.S. Terminal No. . SH 倨 AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2) Signal Name [Specification] Signal Name [Specification] ACTI 12 ECTRIC Color of Wire Color f Wire nnector Name J nector Name ype nector No. lector H.S. erminal No. erminal No. H.S. ß 倨 ð INGINE COOLANT TEMPERATURE SENSOR Signal Name [Specification] Signal Name [Specification] Signal Name [Specification] ITTON COLL No. 6 (WITH POWER Ø 123 ŝ Color of Wire Color of Wire SB Color of Wire ector No. nector Name onnector Name nector Name r No. Terminal No. 化 H.S. erminal No. erminal No. H.S. H.S. 倨 倨

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ENGINE CONTROL SYSTEM

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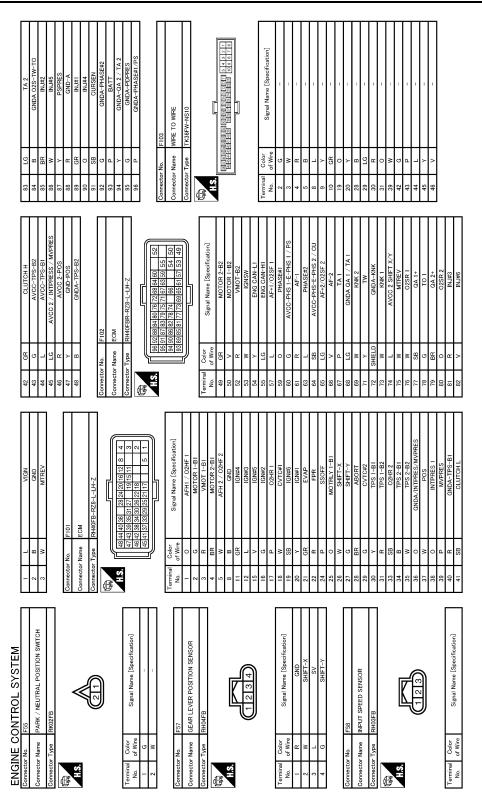
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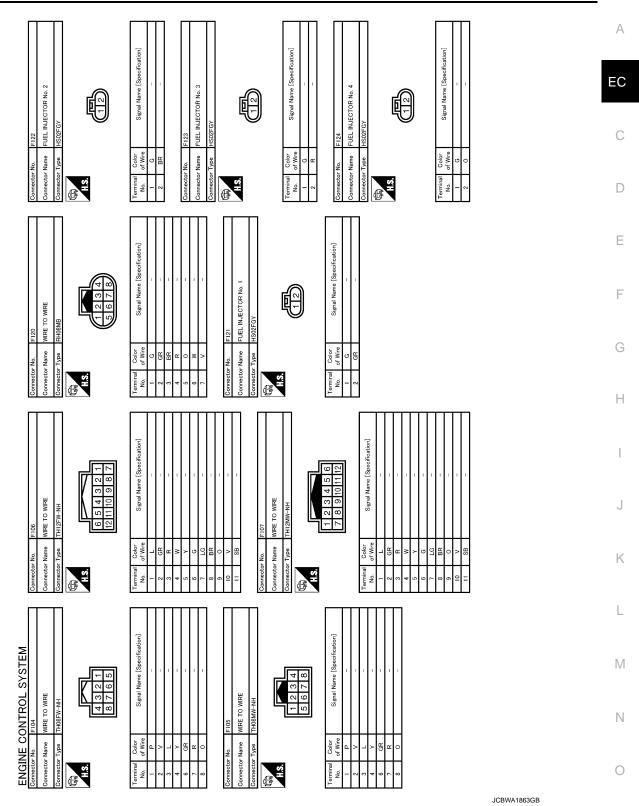
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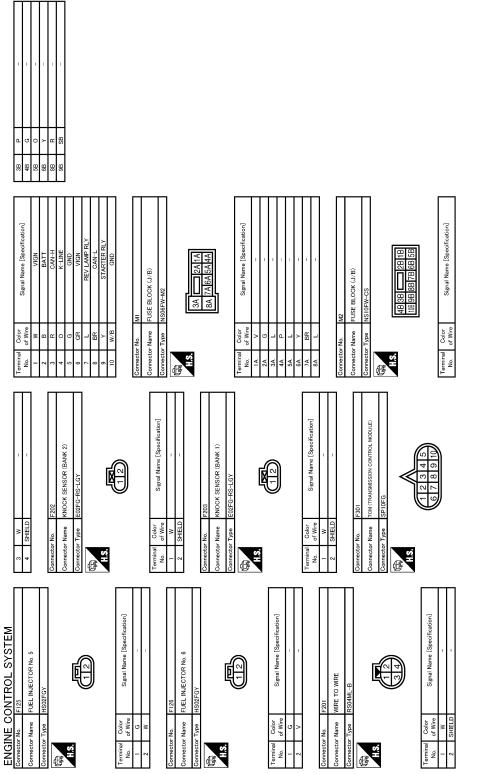
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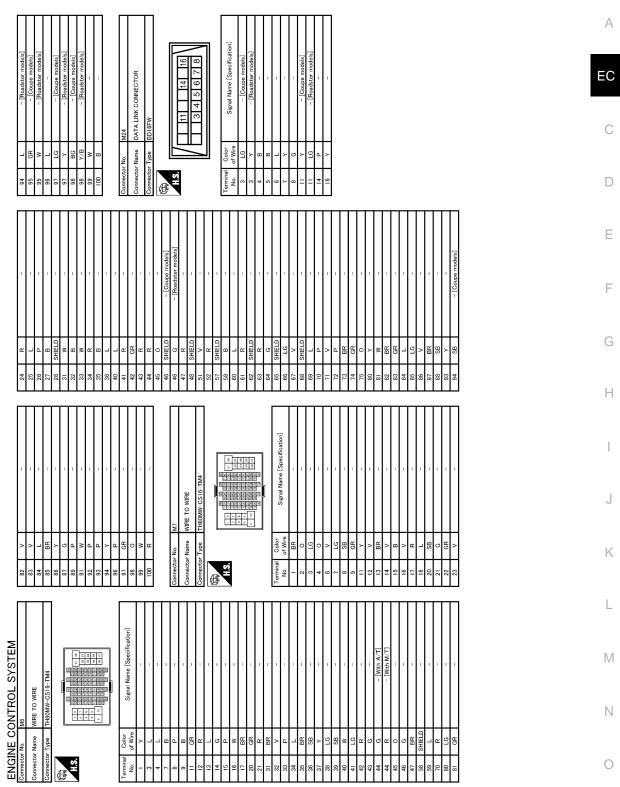


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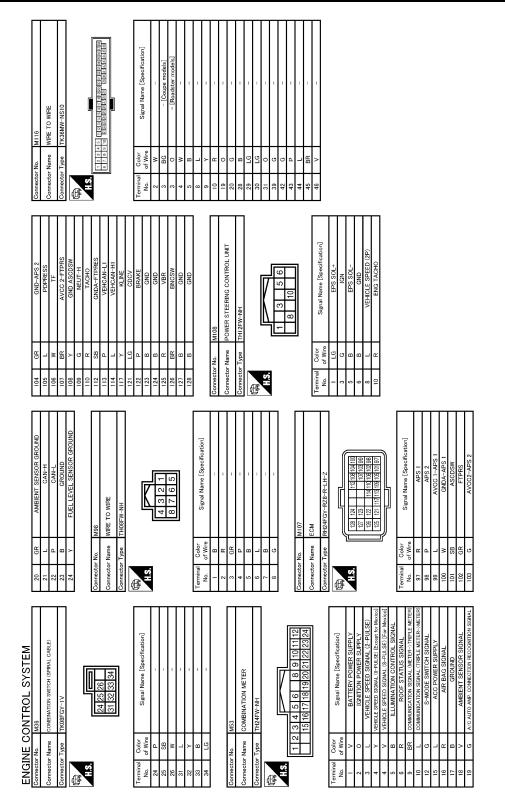
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#### < ECU DIAGNOSIS INFORMATION >

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#### < ECU DIAGNOSIS INFORMATION >

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ENGINE CONTROL SYSTEM

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S-MODE SWITCH

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#### < SYMPTOM DIAGNOSIS >

[VQ37VHR]

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## SYMPTOM DIAGNOSIS ENGINE CONTROL SYSTEM SYMPTOMS

#### Symptom Table

SYSTEM — BASIC ENGINE CONTROL SYSTEM

							SI	MPT	ОМ						
		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
Warrant	y symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	<u>EC-520</u>
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			<u>EC-636</u>
	Fuel injector circuit	1	1	2	3	2		2	2			2			<u>EC-517</u>
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			<u>EC-97</u>
Air	Positive crankcase ventilation sys- tem	3	3	4	4	4	4	4	4	4		4	1		<u>EC-534</u>
	Incorrect idle speed adjustment						1	1	1	1		1			<u>EC-14</u>
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	<u>EC-447,</u> <u>EC-454</u>
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			<u>EC-14</u>
	Ignition circuit	1	1	2	2	2		2	2			2			<u>EC-523</u>
Main po	wer supply and ground circuit	2	2	3	3	3		3	3		2	3			<u>EC-172</u>
Mass ai	r flow sensor circuit	1			2										<u>EC-194,</u> <u>EC-204</u>
Engine	coolant temperature sensor circuit						3			3					<u>EC-227,</u> <u>EC-234</u>
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			EC-242, EC-246, EC-249, EC-252, EC-501
Throttle position sensor circuit							2			2					EC-230, EC-300, EC-443, EC-445, EC-456
Accelera	ator pedal position sensor circuit			3	2	1									<u>EC-484,</u> <u>EC-488,</u> <u>EC-493</u>
Knock s	ensor circuit			2								3			EC-309

Revision: 2011 October

#### < SYMPTOM DIAGNOSIS >

#### [VQ37VHR]

						S	YMPT	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	DLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	A EC C D
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	– AH	AJ	AK	AL	AM	НА		
Engine oil temperature sensor			4		1						3			<u>EC-293,</u> EC-297	F
Crankshaft position sensor (POS) circuit	2	2												EC-312	
Camshaft position sensor (PHASE) circuit	3	2												EC-316	G
Vehicle speed signal circuit		2	3		3						3			EC-373	
Power steering pressure sensor circuit		2					3	3						<u>EC-385</u>	Н
ECM	2	2	3	3	3	3	3	3	3	3	3			<u>EC-393,</u> EC-395	
Intake valve timing control solenoid valve cir- cuit		3	2		1	3	2	2	3		3			<u>EC-201</u>	I
Manifold abslute pressure (MAP) sensor											3			EC-215	
Brake booster pressure sensor											3			<u>EC-388</u>	J
VVEL control module	3		4	4	3									<u>EC-</u> <u>474,EC-</u> <u>476</u>	K
VVEL actuator motor	3		4	4	3									<u>EC-429</u>	
VVEL actuator motor relay	3		4	4	3									<u>EC-433</u>	I
VVEL actuator shaft position sensor	3		4	4	3									<u>EC-425</u>	L
PNP signal circuit			3		3		3	3			3			<u>EC-416</u>	
Refrigerant pressure sensor circuit		2				3			3		4			<u>EC-536</u>	M
Electrical load signal circuit							3							<u>EC-515</u>	
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-5	
ABS actuator and electric unit (control unit)			4											BRC-4	Ν

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

#### SYSTEM — ENGINE MECHANICAL & OTHER

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#### < SYMPTOM DIAGNOSIS >

#### [VQ37VHR]

							S`	(MPT)	MC						
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH 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	HA	
Fuel	Fuel tank	-													<u>FL-11</u>
	Fuel piping	5		5	5	5		5	5			5	İ		FL-4
	Vapor lock		5												_
	Valve deposit							5	5 5	5					_
	Poor fuel (Heavy weight gasoline, Low octane)	5		5	5	5						5			_
Air	Air duct														<u>EM-33</u>
-	Air cleaner		-					-							<u>EM-33</u>
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	_	5	5		5		5	5			5			<u>EM-33</u>
	Electric throttle control actuator	5			5		5			5					EM-34
	Air leakage from intake manifold/ Collector/Gasket														<u>EM-38</u>
Cranking	Battery														<u>PG-118</u>
	Generator circuit	1	1	1		1		1	1					1	<u>CHG-23,</u> <u>CHG-24</u>
	Starter circuit	3										1			<u>STR-23</u>
	Signal plate	6													<u>EM-127</u>
	PNP signal sircuit	4													<u>TM-19,</u> <u>TM-216</u>
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-113
	Cylinder head gasket	5	5	5	5	5		5	5		4	5	3		
	Cylinder block														
	Piston												4		
	Piston ring	6	6	6	6	6		6	6			6			<u>EM-127</u>
	Connecting rod	0	0	0	0	0		0	0			U			<u> - IVI- I Z I</u>
	Bearing														
	Crankshaft														

#### < SYMPTOM DIAGNOSIS >

#### [VQ37VHR]

							S١	/MPT	ОМ							0
		(EXCP. HA)		SPOT		LERATION					ATURE HIGH	NOI	z	(GE)		A EC
		START/RESTART (E)		JRGING/FLAT S	/DETONATION	POWER/POOR ACCELERATION	V IDLE	IUNTING	NOI	URN TO IDLE	OVERHEATS/WATER TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	L CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	Reference page	С
		HARD/NO STAF	ENGINE STALL	HESITATION/SURGING/FLAT	SPARK KNOCK/DETONATION	LACK OF POWI	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/W	EXCESSIVE FL	EXCESSIVE OIL	BATTERY DEAI	_	D
Warranty s	symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA		_
Valve	Timing chain														<u>EM-69</u>	F
mecha- nism	Camshaft														<u>EM-100</u>	
	Intake valve timing control	5	5	5	5	5		5	5			5		_	<u>EM-69</u>	G
	Intake valve												3		<u>EM-113</u>	
	Exhaust valve												Ŭ			
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			<u>EX-4, EX-6</u>	Η
	Three way catalyst															
Lubrica- tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			<u>LU-9, LU-</u> <u>10, LU-11</u>	I
	Oil level (Low)/Filthy oil														<u>LU-6</u>	
Cooling	Radiator/Hose/Radiator filler cap														<u>CO-13,</u> <u>CO-13</u>	J
	Thermostat									5					<u>CO-25</u>	K
	Water pump	5	5	F	5	5		5	F		4	F			<u>CO-23</u>	N
	Water gallery	Э	Э	5	Э	Э		Э	5		4	5			<u>CO-27</u>	
	Cooling fan										-				<u>CO-20</u>	L
	Coolant level (Low)/Contaminat- ed coolant									5					<u>CO-9</u>	
NVIS (NIS NATS)	SAN Vehicle Immobilizer System —	1	1												SEC-6	Μ

1 - 6: The numbers refer to the order of inspection.

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< SYMPTOM DIAGNOSIS >

## NORMAL OPERATING CONDITION

#### Description

#### FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,400 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,400 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. However, if the engine speed is above 4,000 rpm, fuel will be cut off in a few seconds. Fuel cut will be operated until the engine speed reaches 1,000 rpm, then fuel cut will be cancelled. **NOTE:** 

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, <u>EC-48.</u> <u>"System Description"</u>.

#### TORQUE CUT CONTROL (AT HIGH ENGINE OIL TEMPERATURE)

ECM receives engine oil temperature signal from engine oil temperature sensor.

To avoid VVEL performance, ECM performs the engine torque cut control at high engine oil temperature. If engine oil temperature is too high, engine oil viscosity will change. As a result, engine oil pressure is decreased. This control is to control the VVEL operating angle by operating the VVEL actuator sub assembly.

If this control is operated, engine performance will decrease, then maximum engine speed is reduced a little, for example.

#### NOTE:

If the engine oil temperature sensor is deteriorated, its characteristic will change.

In this case, the operating temperature for engine torque cut control might be decrease.

Perform Component Inspection of the engine oil temperature sensor to check for the deterioration. Refer to <u>EC-296</u>, "<u>Component Inspection</u>".

# < PRECAUTION > PRECAUTION PRECAUTIONS EXCEPT FOR MEXICO

EXCEPT FOR MEXICO : 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
   H 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.

**EXCEPT FOR MEXICO : Precaution for Battery Service** 

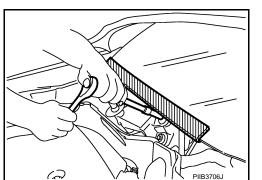
Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

EXCEPT FOR MEXICO : Precaution for Procedure without Cowl Top Cover

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When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



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< PRECAUTION >

## EXCEPT FOR MEXICO : Precautions For Xenon Headlamp Service

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#### WARNING:

Comply with the following warnings to prevent any serious accident.

- Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.
- Never work with wet hands.
- Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)
- Never touch the bulb glass immediately after turning it OFF. It is extremely hot.

#### **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.).

#### EXCEPT FOR MEXICO : On Board Diagnostic (OBD) System of Engine and A/T

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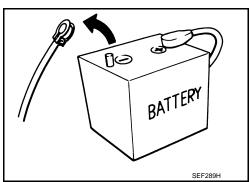
The ECM has an on board diagnostic system. It will illuminate the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration. **CAUTION:** 

- 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, "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.

#### EXCEPT FOR MEXICO : 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.



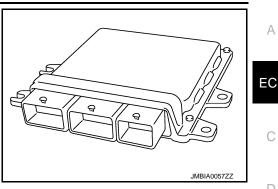
#### < PRECAUTION >

- Never disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes - Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- When connecting ECM harness connector (A), fasten (B) it securely with a lever as far as it will go as shown in the figure.
  - 1. ECM
  - C. Loosen

- When connecting or disconnecting pin connectors into or from ECM, never damage pin terminals (bends or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors. A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs. etc.
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-543, "Reference Value".
- Handle mass air flow sensor carefully to avoid damage.
- Never clean mass air flow sensor with any type of detergent.
- Never disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Never shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).



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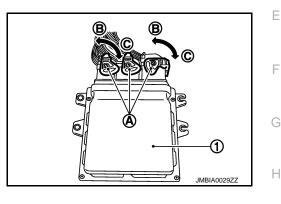
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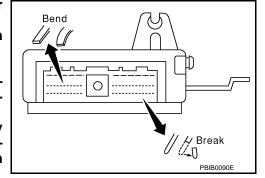
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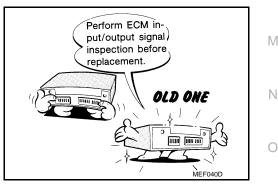
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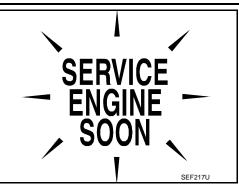


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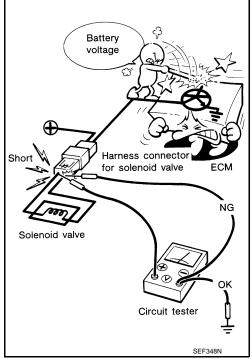
#### < PRECAUTION >

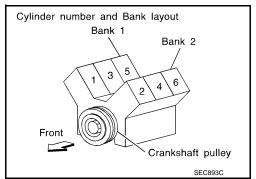
#### [VQ37VHR]

• 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.





- 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.

#### < PRECAUTION >

- Never depress accelerator pedal when starting.
- Immediately after starting, never rev up engine unnecessarily.
- Never rev up engine just prior to shutdown.



- 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.

• When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic

- 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.

## FOR MEXICO

#### FOR MEXICO : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" INFOID:000000006352717

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. 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.

- Κ 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 Ser-Μ vice 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.
- Ρ 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.

#### FOR MEXICO : Precaution for Battery Service

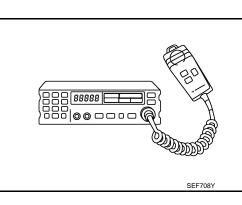
Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

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#### FOR MEXICO : Precaution for Procedure without Cowl Top Cover

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When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.

## FOR MEXICO : 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.

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- Never work with wet hands.
- Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)
- Never touch the bulb glass immediately after turning it OFF. It is extremely hot.

#### 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.).

FOR MEXICO : On Board Diagnostic (OBD) System of Engine and A/T

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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.

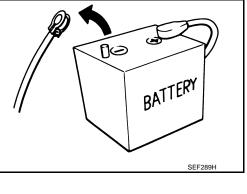
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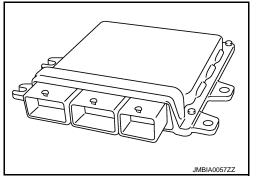
## FOR MEXICO : General Precautions

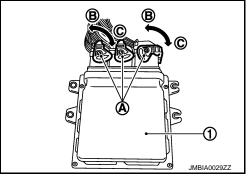
- Always use a 12 volt battery as power source.
- Never attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.
- Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.
- Never disassemble ECM.
- If a battery cable is disconnected, the memory will return to the ECM value.

The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.

- If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- 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







- or pin oltamvay nalion
- 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.

## [VQ37VHR]

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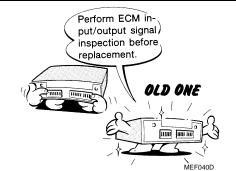
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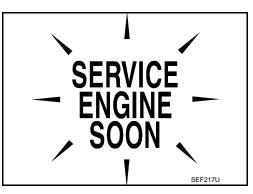
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to <u>EC-543</u>, "Reference Value".
- Handle mass air flow sensor carefully to avoid damage.
- Never clean mass air flow sensor with any type of detergent.
- Never disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Never shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).
- After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.

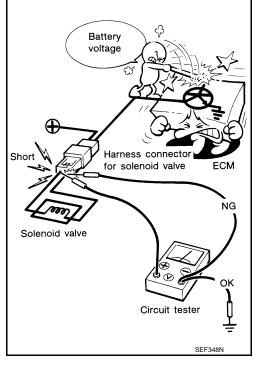
• When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.

Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



[VQ37VHR]





- 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.

• Never rev up engine just prior to shutdown.

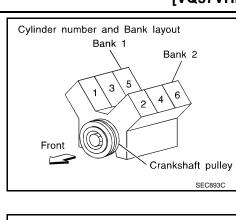
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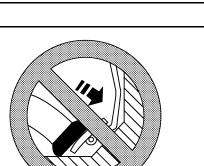
• When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.

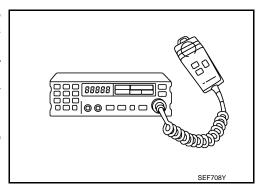
Immediately after starting, never rev up engine unnecessarily.

- 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.

**EC-633** 







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## PREPARATION

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## Special Service Tools

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[VQ37VHR]

#### NOTE:

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
(J-44321) Fuel pressure gauge kit	LEC642	Checks fuel pressure

## **Commercial Service Tools**

INFOID:000000006352724

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)	C D D D D D D D D D D D D D D D D D D D	Applies positive pressure through EVAP service port
	S-NT704	
Fuel filler cap adapter i.e.: (MLR-8382)		Checks fuel tank vacuum relief valve opening pressure
Socket wrench	S-NT815 19 mm (0.75 in) 19 mm 19 mm 19 mm 10 mm 12 mm 12 mm 12 mm 12 mm 12 mm 12 mm 13 mm 13 mm 14 mm 15 mm 15 mm 15 mm 16 mm 17	Removes and installs engine coolant temperature sensor

## PREPARATION

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#### [VQ37VHR]

Tool name (Kent-Moore No.)		Description	A
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	a Mating surface shave	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with anti- seize lubricant shown below. a: 18 mm diameter with pitch 1.5 mm for Zirco-	EC
	cylinder Flutes	nia Oxygen Sensor b: 12 mm diameter with pitch 1.25 mm for Tita- nia Oxygen Sensor	С
Anti-seize lubricant i.e.: (Permatex <sup>TM</sup> 133AR or equivalent		Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.	D
meeting MIL specifica- tion MIL-A-907)	S-NT/79		E

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Revision: 2011 October

## PERIODIC MAINTENANCE FUEL PRESSURE

Inspection

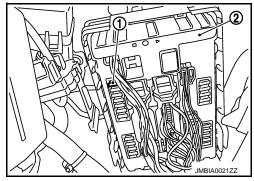
#### FUEL PRESSURE RELEASE

(I) With CONSULT-III

- 1. Turn ignition switch ON.
- 2. Perform "FUEL PRESSURE RELEASE" in "WORK SUPPORT" mode with CONSULT-III.
- 3. Start engine.
- 4. After engine stalls, crank it two or three times to release all fuel pressure.
- 5. Turn ignition switch OFF.

**Without CONSULT-III** 

- 1. Remove fuel pump fuse (1) located in IPDM E/R (2).
- 2. Start engine.
- 3. After engine stalls, crank it two or three times to release all fuel pressure.
- 4. Turn ignition switch OFF.
- 5. Reinstall fuel pump fuse after servicing fuel system.



#### FUEL PRESSURE CHECK

#### **CAUTION:**

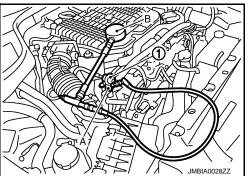
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger. NOTE:

- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because Z34 models do not have fuel return system.
- Use Fuel Pressure Gauge Kit (J-44321) to check fuel pressure.
- 1. Release fuel pressure to zero.
- 2. Install the inline fuel quick disconnected fitting (A) between fuel damper (1) and injector tube.
- 3. Connect the fuel pressure test gauge (quick connector adapter hose) (B) to the inline fuel quick disconnected fitting.
- 4. Turn ignition switch ON and check for fuel leakage.
- 5. Start engine and check for fuel leakage.
- 6. Read the indication of fuel pressure gauge.

#### At idling : Approximately 350 kPa (3.57 kg/cm<sup>2</sup>, 51 psi)

7. If result is unsatisfactory, check fuel hoses and fuel tubes for <sup>L</sup> clogging.

If OK, Replace "fuel filter and fuel pump assembly". Refer to <u>FL-5, "Removal and Installation"</u>. If NG, Repair or replace.



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## **EVAP LEAK CHECK**

## < PERIODIC MAINTENANCE > EVAP LEAK CHECK

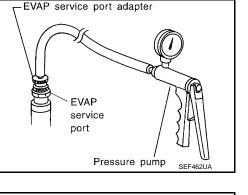
## Inspection

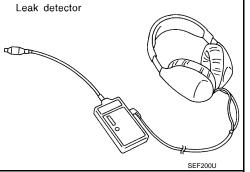
#### CAUTION:

- Do not use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 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.

#### WITH CONSULT-III

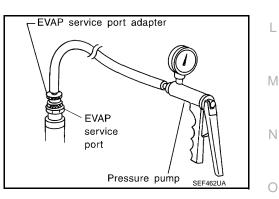
- 1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
- 2. Turn ignition switch ON.
- Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-III.
- 4. Touch "START". A bar graph (Pressure indicating display) will appear on the screen.
- 5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
- Remove EVAP service port adapter and hose with pressure pump.
- 7. Locate the leak using a leak detector. Refer to <u>EC-97, "System</u> <u>Diagram"</u>.





#### **WITHOUT CONSULT-III**

- 1. To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port.
- 2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
- To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm<sup>2</sup>, 0.2 to 0.4 psi).
- Remove EVAP service port adapter and hose with pressure pump.



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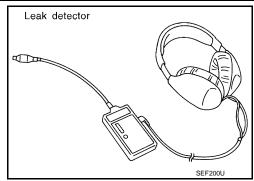
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## **EVAP LEAK CHECK**

#### < PERIODIC MAINTENANCE >

5. Locate the leak using a leak detector. Refer to <u>EC-97, "System</u> <u>Diagram"</u>.



#### [VQ37VHR]

#### SERVICE DATA AND SPECIFICATIONS (SDS)

#### < SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS) SERVICE DATA AND SPECIFICATIONS (SDS)

#### Idle Speed

Transmission	Condition	Specification	0
A/T	No load* (in P or N position)	$650\pm50$ rpm	
M/T	No load* (in Neutral position)	$650\pm50$ rpm	
*: Under the following conditions			Г

\*: 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

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Transmission	Condition	Specification	
A/T	No load* (in P or N position)	$10 \pm 5^{\circ} BTDC$	
M/T	No load* (in Neutral position)	$10\pm5^\circ$ 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-III 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 – 1.2 V*	-
Mass air flow (Using CONSULT-III or GST)	2.0 – 6.0 g/s at idle* 7.0 – 20.0 g/s at 2,500 rpm*	N

\*: Engine is warmed up to normal operating temperature and running under no load.

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